

“Flow states have triggers: these are preconditions that lead to more flow...

22 of them have been discovered.”

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My name is Steven Kotler. I'm a writer and a researcher, and my latest book is "The Art of Impossible."

Chapter 1: The biology of our brains

When I think about why a physiological explanation for human is more interesting to me than a philosophical one, I always say that the philosophical, or as it evolves in the 20th century, you get the psychological, and there's sort of the same thing for a little while.

Psychology's an incredibly useful science, but in a lot of cases, it's an outside-in science,

Psychology’s “outside-in” blind spot we're seeing something from the outside and putting a name on it inside the brain. The brain is actually an inside-out mechanism. And psychology, as a result, and philosophy, they're metaphor, they're great metaphors. They really help us think about things, but there's still metaphor. If you're interested in human performance, what you want is something that's reliable and repeatable, and thus, you want neurobiology, 'cause neurobiology gives you mechanism. And often, not always, but often, the advantage in neurobiology, when you're trying to train

human performance from the psychological level, personality often gets in the way. And personality is very individual. When you get down to the neurobiological level, and we're talking about things that evolved across the entire species, what works for me will work for you.

Whereas at the level of psychology when personality is involved, because personality is shaped by both nature and nurture, right, genes and the environment we grew up in, what works for you probably isn't gonna work for me. So at the level of neurobiology, we get mechanism, and we get something that's reliable and repeatable, and most likely will work for everyone, or at least has a much better chance of working for everyone.

Technology, as many of us know, is now kind of accelerating exponentially, this includes neurotechnology. Brain imaging technology has been advancing on exponential growth curves for quite a while. And over the past 20 years, starting in the late 1990s with SPECT scans and things like that, and moving into the early-1000s with FMRI, which has only gotten better and better and better, and yes, there are still all kinds of problems, but better and better and better. So we're now able to kind of see where in the brain things are taking place. This is what we get out of FMRI, for example, this gives us location sometimes, not just neural anatomy, but networks of the parts of the brain that are working together at once. And then we have technologies like EEG and MEG that move very, very quickly and allow us to look at things that happen in (snaps fingers) really short, quick timescales in the brain.

FMRI is like usually over the order of seconds. And with EEG, you're talking about milliseconds. So the traditional understanding of the brain, and, you know, this was a bad idea, in a sense, from go 'cause this idea emerged out of phonology, right? This study of like various bumps on the head, which were supposed to relate to psychological characteristics, and it was absolute nonsense. But out of that thinking, we came up with the idea of certain areas of the brain are optimized for certain functions.

Some of this happened, this happened, usually, through like people would have strokes, or a different part of the brain would get injured, and, you know, some characteristic would go away, and we'd figure out, "Oh, Broca's area does language," for example. Some of that is true, it is not that certain functions aren't kind of localized in certain regions, some of that is true, but as a general rule, the brain works in networks,

The brain works in networks it's a lot of different parts of the brain working together at the same time. Now, when people hear the term networks, they think, "Oh, hardwired together." And that is sometimes true in the brain, and there are hardwired connections in the brain, and they're myelinated, which is basically a way of insulating kind of the neuronal connections for faster information transmission.

But as a general rule, we'll have what are known as functional networks, where a bunch of different neurons are organized into what's called a cell assembly. And basically, they're all active at the same time, they're all doing work at the same time. And this could be very, very quick. These cell assemblies are like the order of, they

come together at like 1/100th of a millisecond, and they can, you know, be together for very quick periods at a time. We call that functional connectivity.

And more and more, the recent thinking on the brain is, you know, it's mostly comes down to networks and how the different parts interact and work together. You know, some of the more famous ones are the ones that are, you know, there's a fear network, there's fear circuitry in the brain, there's the executive attention network, right? When you have to pay attention to something that you're not particularly interested in, you're listening to a boring lecture, but you're gonna be tested on it later, that's the executive attention network. The executive attention network also lets you override kind of more instinctive behavior, right? You have an impulse to eat, you know, all the ice cream in the refrigerator 'cause it's sugary, and it's sweet, and you want the calories. But the executive attention network goes,

"No, no, no, let's think about this, let's think about the future, let's think about your waistline." You know, it can suppress those instincts. So there's tons of different networks, and new ones are discovered all the time, but those are a couple of big basic ones. So it's not that kind of this localized neural anatomy ideas are wrong, it's just that they don't take us far enough. And, you know, so, again, some of the problem here is that we started, when kind of neuroscience started, it actually started with one of my great heroes, you know, William James, he wrote a book called "Principles Psychology," the first psychology textbook. And he lists, "Oh, here's perception, and here's time perception."

He puts, "Here's memory." And this is basically like an outside-in perspective. We think this is what the brain is doing, we think memory and perception is a thing, and where does it happen in the brain? But, you know, it turned out the brain is inside-out. And, you know, our vague psychological terms sort of relate to what the brain does, but not exactly. So the new thinking is inside-out and kind of networks at the heart of this. When I talk about peak performance, I often define peak performance as getting our biology

Making biology your ally: the four performance pillars to work for us rather than against us. This, by the way, is not, this is not a new idea, this is not my idea at all. In fact, William James, in the very first psychological textbook ever written about 120 years ago, said, "The great thing in all education is to get our nervous system to be our ally and not our enemy." And by "our nervous system," right, he meant our brain and our biology. The reason that is so useful is, in a sense, it takes the genetics out of it, right? We're all born a little different from the other person, but the biology underneath it tends to work the same.

And when we talk about our biology, especially in the work that I do, which is on cognitive peak performance predominantly, that's actually a limited skillset. So I'm saying, "Our biology," but what I'm really talking about are the systems underneath what we call motivation, learning, creativity, and flow. And flow is an optimized state of consciousness, where we feel our best and we perform our best.

Finding flow's sweet spot, to put this in kind of slightly different terms, each of those headings is sort of a catchall term, right?

Psychologists or scientists or neuroscientists say, "Motivation," they're often talking about extrinsic motivation, things in the world we're gonna work hard to get, intrinsic motivators, things that drive us from within, like curiosity or passion or purpose. They're also talking about goal-setting and grit.

So, these are catchall terms. When you're talking about cognitive human performance, these are the four categories. And the way I sort of like to think about it is, motivation is what gets us into the game, learning allows us to continue to play, creativity is how we steer, and this is especially true if we're sort of going after high, hard goals, we don't quite know how to get there, right? We know where we wanna go, but we don't know the path, creativity is really crucial. And flow, which is optimal performance, is how we amplify all the results kind of beyond all reasonable expectation.

Chapter two, What is Flow?

So, scientifically, flow is defined, as I mentioned earlier, as an optimal state of consciousness, it's a state of consciousness where we feel our best and we perform our best. More specifically, it refers to any of those moments of wrapped attention and total absorption, you're so focused on the task at hand, so focused on what you're doing, everything else just seems to disappear. Action and awareness are gonna start to emerge, your sense of self, sense of self-consciousness, the voice in your head, your inner critic, are all gonna diminish, time is gonna dilate, which is a fancy way of saying it's gonna pass strangely.

Occasionally, it'll slow down, you get a freeze-frame effect. I mean, any of you who's been in a car crash, for example, more frequently, it

speeds up, and five hours go by in like five minutes, right? And this is experience we all have, right? You get so sucked into what you're doing, you look up, a couple hours has gone by. And throughout all aspects of performance, both mental and physical go through the roof. Now, I wanna take this a couple steps further. When psychologists define flow, they say, "Okay, we know somebody's in flow when their experience.

Six signs you're in flow; has six core phenomenological characteristics." Big, fancy word that essentially means how this makes me feel. So I listed some of these a second ago. When psychologists wanna know if you were in flow, they say, "Well, was there complete concentration on the task at hand? Was there a merger of action-awareness? Did self vanish? Did time dilate?" And because we don't register peak performance as a sensation, what we feel on the inside is, part one, a sense of control.

The ability to control things that we normally can't control, right? This is an basketball player in the zone, talking about seeing the hoop, and suddenly, it's as big as a hula hoop. Or this is, you know, me as a writer at 6:00 AM on a Tuesday, doing things with sentences that, you know, I normally don't do at 6:00 AM on a Tuesday. And finally, the experience is autotelic. And autotelic is a fancy way of saying an end in itself. It means the experience of flow is so euphoric, so joyous, so wonderful, we'll go extraordinarily far out of our way, just to get more of that experience. So that's how psychologists define flow.

When you move into the level where I like to work, which is neurobiology and neurophysiology, we now track flow with,

depending on whose numbers you're going by, 12 to 15 different markers. There are markers in the brain, there's markers in physiology. In fact, it's gone all the way point, and there's much more research needed on this particular fact, but I still think it's interesting, when we're in flow, our smile muscles are hyperactive, and our frown muscles tend to be paralyzed or deactivated. This is a constant issue in my marriage, where my wife thinks I'm mad (laughs) at her or somebody, and I'm like, "No, no, I'm just thinking. This is just me thinking. I'm in a robot mode."

Flow is often described as a state of kind of effortless effort, where we feel like we're propelled through the activity, we're not really working hard. And what that frowning is is a sign that the brain is doing work. So, one of the reasons we can't frown and flow is 'cause it doesn't feel like we're doing work. Even if you're expending tremendous amounts of energy, it doesn't feel that way. And that's where the frowning seems to come from. But as I said, more research here is needed, but it's a really cool finding. Flow science itself, or this flow is an altered state of consciousness.

A brief history of flow. So, the science of altered state of consciousness and the idea that they could be beneficial for performance, this idea dates back all the way to the 1870s. Flow itself, actually, the term is coined by Goethe, who uses the German word *rausch*, which means overflowing with joy. Nietzsche actually wrote about flow. William James worked on the topic, other people worked on it, you know, throughout the 20th century. But Mihaly Csikszentmihalyi is often referred to as the godfather of flow psychology. He was a professor, and then later the chairman of the University of Chicago Psychology Department back in the '60s, '70s,

and '80s, and '90s, actually, before he moved to Claremont Colleges in California.

But he's often talked about as the godfather of flow psychology because it was Csikszentmihalyi, first of all, coined the term flow. And what he did is, he was very interested in sort of well-being, meaning of life, those sorts of things. And he sort of went around the world talking to people about the times in their lives when they felt their best and they performed their best. And everywhere he went, people said the same thing, they said, "You know, when I'm at my best, when I'm feeling my best, when I'm performing my best, I'm in this altered state of consciousness where every action, every decision I make seems to flow effortlessly, perfectly, seamlessly from the last." So that's where the term flow comes from, it's actually another phenomenological description of the state. Flow actually feels flowy. The one thing that's interesting about flow is, it's a constant across people, that's one of the things that makes it so very interesting. It's an incredibly consistent experience. Every time you go there, it's always the same. So, for all of us, it means sense of self diminishes, time dilates, the experience is autotelic, there's that sense of control. It's the same thing for all of us.

Sometimes it's a little bit shaped by the activity. For example, I'm a big skier. And when I'm in flow, I'll get directions, "Right, left, do this, do that," and it's very quick. And one of the things that athletes talk about a lot, and this is oddly true, is, you either do what the voice is telling to you to do, or you tend to crash, it tends to be one or the other. Oddly, the hit rate for accuracy seems to go up in flow, and this is an ongoing puzzle. Why is that the case? We're starting to have some ideas about why, but it's an ongoing mystery, for sure. I

like to say flow follows focus because one of the things that we've learned over the past 20 years is that flow states have triggers, triggers that spark flow these are preconditions that lead to more flow. 22 of them have been discovered, there are probably way, way more, but so far, researchers have identified 22. This is some of the stuff that my lab at the Flow Research Collective has worked on. But a lot of other people have worked on this as well. And while the triggers all sort of vary in their neurobiological mechanisms, there are really three different things they do under the hood, and they can do one, two, or all three of these things, all these mechanisms do the same thing, they drive attention into the present moment.

Flow only shows up when all of our attention is in the right here, right now, on the task at hand. And that's what these triggers do, they drive attention into the now. And as I said, they do this different ways. So neurobiologically, some of the triggers produce dopamine, a neurochemical called dopamine. Some of the triggers produce a neurochemical called norepinephrine. Some of these triggers lower cognitive load.

Dopamine, norepinephrine, like all neurochemicals, are multi-tools. They do a bunch of different things in the brain, but in this case, they drive focus, they drive attention, they drive alertness and excitement. So, when these chemicals in our system, we wanna pay more attention to the thing that's front of us. Cognitive load, it's basically all the crap you're trying to think about at any one time. And if I lower cognitive load, I liberate more energy, and the brain will repurpose it to pay attention to the present moment. So that's essentially what the triggers do under the hood, but kind of in reality, they drive attention to the now, which is why flow follows focus. One

way to kind of explore flow triggers, there's a cluster of them that are predominantly dopamine triggers, these are triggers that will push dopamine to our system.

And there's a lot of different ways to get dopamine. Novelty produces dopamine. So when we encounter anything new that excitement that I wanna pay attention to, it's a little bit of dopamine, a little bit of no epinephrine, predominantly dopamine. We get that same dopamine from risk-taking, and this could be physical risks, emotional risks, social risks, intellectual risks, possibly spiritual risks, it doesn't matter, risk-taking, and really, the anticipation. We get the dopamine not as a reward for taking the risk, which is what some people used to believe, but now we know it's to kind of drive motivation to give us kind of courage, so we will take that risk.

We see the same thing with unpredictability, complexity. Complexity is a little more particular. Complexity refers to, say, the experience of awe. You look up at the night sky, and you see stars everywhere, and you know those stars are actually universes, and you get sort of perceptual vastness, that will do it. And what you mentioned, which is pattern recognition. So when the brain connects two ideas together, this is a fundamental property in the brain, right? The brain does pattern recognition automatically, but it's so important to survival.

This is like in cause to effect and things like that, that whenever we notice a pattern, we're rewarded with a little squirt of dopamine. Everybody's had this experience. If you've ever done a crossword puzzle or Sudoku, you get an answer right, that little rush of pleasure you get, that's dopamine. Cool side, tangential fact, but this is one of

the reasons flow has such a big impact on creativity, dopamine and, for a certain degree, norepinephrine, one of the other things they do in the brain, I said these neural chemicals are multi-tools, is that they amplify pattern recognition. So, everybody's done a crossword puzzle, you get an answer right, you get that little rush of pleasure, and then you usually get a couple of answers right in a row, that's because the dopamine that is now in your system is amplifying pattern recognition for sort of a like a tight little window that it's around, and you'll get a couple of answers in a row.

This is a more familiar experience to all of us outside of crossword puzzles, this is creative ideas spiraling, where one creative idea leads to the next, leads to the next, leads to the next. That's a dopamine-based phenomenon predominantly. The golden rule of flow: challenge-skills balance. Challenge-skills balance is often called the golden rule to flow, it is arguably flow's most important trigger. And the idea here is pretty simple, we said earlier that flow follows focus, so we pay the most attention to the task at hand when the challenge of that task slightly exceeds our skillset. So you wanna stretch, but not snap.

And to put it sort of in emotional terms, people often talk about flow and this trigger as not exactly on, but near the midpoint between boredom and anxiety. Boredom, there's not enough stimulation here. I'm not really paying attention to what I'm doing. Anxiety, whoa, way too much stimulation, right? I can't stop paying attention. In between is this sweet spot, what's often talked about as the flow channel. Now, as a trigger, this can be a little bit tricky to utilize, because if you are shyer, quieter, meeker, a little more timid, that sweet spot tends to sit, not always, but tends to sit when we're using

our skills to the utmost, right? We're really pushing ourselves to the utmost and we're outside our comfort zone. So, to do this work and to get good at it, you have to get good at kind of being comfortable with being uncomfortable. Now, there's a flip side to this, which is type A types, really hard chargers, they will often blow right by this sweet spot, right? The sweet spot, people like to talk about it as like three degrees, four degrees, five degrees wide, meaning like the challenge of the task at hand needs to exceed our sales skillset by about 4%, 5%, that sweet spot.

And type A types, they'll take on challenges that are 10%, 20%, 30% greater, right, simply for the thrill of it, it helps them wake up and pay attention. And what's interesting from a performance perspective is, we know that these actually high, hard goals, these large challenges, are really great for motivation.

There's really good motivational research. This is simply setting a high, hard goal, as long as it's clear, can increase motivation 11 to 25%. Now, that's a huge, huge boost, right? In an eight-hour day, at the upper end, it's like getting two free hours of work, simply for like putting a goal around what you're doing. That said, to get at flow's triggers, I'm not saying don't set these huge, high, hard challenges that are important, but you have to chunk down the task at hand, so, the thing that's in front of you is only about 4 or 5% greater than the skills you're bringing to it.

So that's the first part. Now, I'm about to make something that sounded really, really simple a lot more confusing. What do we mean by "challenge" and "skills"?

Psychologists and neuroscientists have spent about the past 30 years arguing over the question, "Hey, what do we mean exactly by challenge? What do we mean exactly by skills? What are those terms?" And there's now a cluster of about eight different things that seem to come together to form what we mean by challenge and skills, and this could be everything from tolerance to anxiety, ability to delay gratification, your cultural background matters, energy levels can play a role, confidence is huge.

In fact, there's a study that was run by Susan Jackson, who did a lot of work back in the early days with Mihaly Csikszentmihalyi. They wrote a book together called "Flow in Sports." They were working on athletes. And she was working with top, top athletes. And she found that among top athletes, what we actually mean by skills, 'cause at the elite levels of sport performance, talent sort of starts to equalize out. Everybody's pretty damn good. So at that elite level, sometimes what we mean by challenge and skills, 81% of that can come down to confidence.

So, we know the challenge-skills balance itself, that's biological, that's shared by everybody, this is going to work as a flow trigger for everyone. But individually, right, how does it apply to you?

How do you apply it? How do I apply it? There's a lot of variety in there. This is why what works for me isn't exactly going to work for you. If you want to increase motivation in people, the research is really clear, the place to start is actually extrinsic motivation, things that are outside ourselves, that will work hard to get, money, sex, fame are the classic examples.

And the research is interesting, and this is not my research, this is Dr. Daniel Kahneman's work predominantly. But Danny figured out that from an extrinsic perspective, if you really want to increase motivation, you want to start with money, you need to earn enough money to pay your bills and have a little leftover for fun. It's not a lot more, right? You're not saying, "I need to be a millionaire," or anything like that.

And the reason is simple, fear peak performance, fear blocks flow, the neural chemicals that underpin fear can block flow, essentially, they can tip you out of that challenge-skills sweet spot, right?

They're going to raise the anxiety level and push you out of that sweet spot.

How to harness intrinsic motivation? So, you need to, if you're interested in motivation, you want to start with extrinsic motivation. But once you can earn enough money to pay your bills and have a little leftover, and you're not worried about, "How am I going to make rent, how am I going to feed my kids," those kinds of things, intrinsic motivators become more important. Now, there are lots of different intrinsic motivators, but from a motivation standpoint, there are five, there's big five, and they're all designed to be built into one another and work in a sort of specific order, in a specific sequence. It's not to say that you can't get motivation by using these things out of order and out of sequence. It's just that when you use them the way they were designed evolutionarily to work, you get farther, faster, with a lot less fuss. So, the most basic human motivator is curiosity.

Neurobiologically, curiosity is a little bit of dopamine and a little bit of norepinephrine. So, we often talk about curiosity as a flow trigger,

the reason is, it produces a little bit of dopamine and a little bit of norepinephrine. So, what's the big deal here? Why did these intrinsic motivators matter?

One big reason is, they give us focus for free. The brain is an energy hog. It uses 25% of our energy at rest and way more when we're doing something like trying to pay attention to something we're not interested in, right? So, the brain is always trying to conserve energy.

And one of the things we get from curiosity is, we get focused for free. When we're curious about something, we don't have to struggle, we don't have to burn a lot of calories trying to pay attention to it. Curiosity is designed biologically, again, to be built into passion. Curiosity is like a little bit of focus; passion is a lot more. And neurobiologically, passion is just a lot of dopamine and a lot of norepinephrine. And think about, we've all fallen in love, how much attention you pay to the person you're falling in love with, you can't stop thinking about them, you can't stop staring at them, that's a tremendous amount of focus for free.

Now, passion is incredibly useful, but as a motivator, you can go one better, which is purpose. Now, purpose is literally just saying,

Why purpose is better than passion?

"Okay, this is my passion. And now, I'm going to attach my passion to something that is greater than myself," right?

It's attaching it to something that's outside yourself. And especially in contemporary society, purpose, everybody wants to talk about, "Oh, I have a purpose, and it's this big altruistic thing, and it's good for the world."

And all those things may be true, but from a peak performance perspective, it's very, very selfish.

When we have a purpose, we are bringing other people into the equation, and thus we get more feel-good neurochemistry, we get oxytocin, endorphins, and anandamide, and some serotonin. These are pro-social neural chemicals. They all show up.

They're pleasurable chemicals that all show up once other people are in the equation. So, in a sense, passion, when coupled with something outside of ourselves, gives us purpose, and you get better neurochemistry. Once you have purpose, the system demands autonomy.

I want the freedom to pursue my purpose. And once you have that freedom, the system wants the last of the big motivators, mastery.

Mastery is the skills to pursue that purpose well. So, when we talk about a motivational stack, starting from extrinsic motivators all the way through intrinsic motivators, that's what we're talking about.

And it's a sequence, one is designed to be built into the next, is built into the next, and built into the next. So, there are a number of different things you can do to sort of prepare yourself and prepare the environment to drop into flow.

This is a way of kind of prepping yourself to utilize flow's triggers. We now know that the human brain was sort of designed to focus, to pay attention to one thing for about 90 to 110, 120 minutes.

This is a focus waking cycle. We all know that we have REM cycles when we sleep, right? These are our dreaming cycles. They are 90 to

about 120 minutes long, depending, right? Sometimes they can be a little shorter.

If we're depressed, they tend to be a little bit shorter. And if we're really happy, they tend to be a little bit longer. But as a general rule, they're 90 to 110 minutes long. This is a dreaming cycle. We have a focus waking cycle that's similar. So, when we work with our clients at the Flow Research Collective when we're training people in flow, one of the things we ask people to do is, you want to start your workday.

And for most of us, that means early morning, but you really want to sort of start your work session, if you can, in relationship to your physiology. I'm what's known as an extreme lark.

I like to wake up at 3:30, four o'clock in the morning. That's when I'm most awake, most alert. I am married to a night owl.

My wife doesn't wake up till five, six, seven o'clock, eight o'clock at night. That's when her brain comes alive.

Most people sort of tend to wake up, you know, and be able to focus the best eight or nine o'clock in the morning, they're sort of in the middle on this. But if you can, if you have that kind of control over your schedule, you want to start your work session in conjunction with your circadian rhythms, you're a right extreme lark, night owl, whatever. And then you want to try to block out 90 to 120 minutes for uninterrupted concentration, and what this means is, especially in the modern world, practice distraction management ahead of time. Our attention can't compete with our devices, right?

It doesn't work. So, you want to turn off your phones, turn off your cell phone, turn off email, Twitter, Facebook, Instagram, et cetera, all your messages, all your alerts, so you can completely focus on the task at hand.

The other thing that I always tell people to do, if you're doing this work, is have your conversations ahead of time. And what I mean by this is, we can go into what flows good for later. One of the things that happens in flow is, there's a huge spike in motivation and productivity. In fact, McKinsey, the business consultancy, tried to take a deeper look at the spike in productivity. And this study is self-reported, so small grain of salt, big grain of salt, depending on how you feel on self-reported studies. But they went around the world for about 10 years, talking to top executives about how much more productive they felt in flow. And the average response was 500% more productive.

And when I was writing my book "Stealing Fire," I asked Richard Branson this question. And he said, "In two hours in flow, it feels like there's very little I can't accomplish." So' a use huge burst productivity.

My point here is, have your conversations ahead of time, talk to your spouses, your kids, your boss, you know, if we're working at home, if you're working, your coworkers.

Say, 90 to 120 minutes of uninterrupted concentration, that's asking a lot in today's work environment, or even in our home life. But what you have to explain to people is, you're going to get so much time back on the back end, you'll have more time for these people if you can actually preserve this 90- to 120-minute block.

So, that's one example of how to prepare the environment for flow.

If you want more flow, the flow triggers are your toolkit.

There are 22 triggers, they will all drop you into flow. And working with those triggers is how you get to spend more time in the state.

The good news here is, it appears, there is some debate over this,

Flow is a focusing skill, but I'm of the opinion flow *is* a focusing skill, in the same way that certain kinds of mindfulness and meditation, they're focusing skills, they're different, different things are happening in the brain when we're meditating than we're in flow, they're sort of complementary, and we can talk about that if you care. But it's a focusing skill.

And like any focusing skill, the more flow you get, the more flow you get, right?

So, if I go skiing on Monday and drop into a flow state, I'm sort of training my brain to drop into flow.

And Tuesday, when I sit down at my writing desk, I'm going to have an easier time getting into flow. So, it transfers a little bit.

This is also why we often tell people, What is your primary flow activity? Everybody has, there's different terms for this, but we call it a primary flow activity, this is essentially whatever you've done your whole life that just sort of drops you into flow most of the time.

As I said earlier, for me, it's skiing. For my wife, it's hiking our dogs in the background. For some people, it's gardening or knitting, or giving a speech, or playing the drums, or on and on, coding, architecture, on and on and on, right?

We all have our primary flow activity. And interestingly, as we become adults, right, this is often the very behavior that we put away, right? We put down childish things as we're getting responsible, the surfboard goes away, the skateboard goes away. And from a peak performance standpoint, that's actually a disaster. The greatest inhibitors of flow, they tend to be different for different people.

But the obvious one, distraction is probably the number one flow blocker. And there was a really interesting study done on coders. And flow, being in the zone, is really important to coding. Pattern recognition increases in flow, and that's a lot of what's going on in coding. So, it's a really crucial skill. And there was a study run a bunch of years ago where they found that coders in flow, if they get knocked out by distraction, a knock at the door, a text alert, or whatever, it can take them 15 minutes to get back into flow, if they can get back in at all.

So, often, you're just knocked out and you're knocked out. But there are a lot of different other ways to get kicked out of flow, fear will do it. We talked before about the challenge-skills balance and how flow exists kind of near that midpoint between boredom and anxiety. And if stimulation falls away, if we get bored, we're going to drop out of flow. If there's too much stimulation, too much anxiety, right, that can also knock us out of flow.

Another one that's really interesting is, and I'll give you a really crazy example of this from my own life. So, in flow, a bunch of different neurobiological things happen. One of the things that happens is what's known as transient hypofrontality.

What this means is the temporary deactivation of the prefrontal cortex, the part of our brain that's sort of right behind our forehead. This is a part of our brain that does lots of important stuff kind of in normal life.

This is complex, logical decision-making, sense of willpower, sense of morality lives there. Our sense of self actually is produced predominantly by the prefrontal cortex. And as this turns off in flow, that's why our sense of self diminishes. This is also why time passes so strangely in a flow state.

Time is a calculation sort of performed all over the brain, but largely in the prefrontal cortex. And as parts of the prefrontal cortex start to wink out, we lose our ability to separate past from present from future. We're plunged into an experience known as the deep now or the eternal present, that feeling that the present moment is stretching out. But when we think about ourselves, egocentric thinking of any kind, you're going to activate the prefrontal cortex.

So, when our sense of self disappears, great, we can drop into flow. But when it comes roaring back online, self-consciousness can drop you out of flow. I'll give you a crazy example from my own life.

When I started out my career as a journalist, one of my beats was action sports. And I chased professional athletes around mountains and across oceans for years. And most of that work was, a lot of that work was with skiers.

And so, I would have in my mind's eye a picture of what, like, the expert skiers, the pros I had skied with, how they looked when skiing. So, when I was skiing, I would try to match my body position

to like this memory of what the professionals looked like. And I did this for years and years and years and years.

And it knocked me out of flow every time. It almost blocked locked me out of flow for almost a decade.

I couldn't figure out what was going on. And I finally, at one point, I changed my metric, in judging my performance, I started to focus on speed, how fast was I moving down the hill rather than this kind of image of, "How did I look?"

3Because how did I look, it just wasn't useful anymore. And as soon as I switched that metric to speed, an external metric that, you know, didn't require me to think about myself, flow became almost automatic.

Almost a hundred percent of the time when I go skiing, I can drop in. But it's really subtle, right? That's a weird thing.

You wouldn't think that trying to kind of match your body position to what somebody else looks like is enough to trigger that, but it is. They like to say that flow requires a task-specific focus, so focus externally outside the self on the task at hand.

So, if you take yourself off that, that can also kick you out of flow.

Chapter three, Flow and Peak Performance

One of the really incredible things about being human is, we're all built for peak performance, it comes as a kind of a fundamental part of being human,

We are all wired for flow and what I mean by that is, this is one of the most well-established findings around flow, it showed up in

Csikszentmihalyi's early research, and it has since been repeated and repeated and repeated, which is that flow is universal in humans, it's actually universal in most mammals, and definitely, all social mammals.

So, all the systems that produce flow are in all of us. I say, "We're all designed for peak performance," what does that mean? And I'm going to give you a long list of all the things that flow's good for. The research has been done all over the place. A lot of people, different people, a lot of different researchers over decades now, have contributed to this. And then we'll talk about why, why it's this big list, why all these things get amplified in flow.

And so, I mentioned a little bit earlier that productivity, motivation skyrocket in flow, and that McKinsey study I talked about, it's sometimes 500% above baseline, and that seems like a huge stratospheric number, and it would be very, very suspicious if it wasn't in line with all the other research. For example, the Department of Defense looked at soldiers in flow, and they were looking at learning. It turns out we will learn 240 to 4 to 500% faster than normal when we're in flow. In research that was done at the University of Sydney, some at Harvard, some by my organization.

How flow impacts creativity and happiness

Flow Research Collective, we've been looking at creativity and innovation, how much does creativity and innovation spike?

Now, creativity is a funky word. And, you know, if you look under the hood, I'm talking about really all aspects of creativity, from problem identification to problem-solving and problem execution, et cetera, et cetera. We see creativity spike 400 to 700% in flow.

Similarly, there's an enormous spike in overall life satisfaction, well-being, sometimes happiness. In fact, this is so profound that when psychologists now define happiness, they actually talk about three tiers of happiness. There's just sort of normal happiness, this is how do you feel right here, right now, in the moment. The next level up is defined as engagement or enjoyment, and this is literally a high-flow lifestyle. You are living in such a way that you're dropping into flow all the time.

This could mean you have a job like mine, writing, where it's really flowy, it drops me into flow a lot.

Or this could mean, I live in Tahoe, a lot of the people are kind of around me, they work construction all summer, so, they could ski all winter. And construction is a little flowy for them, but the skiing is really flowy. That's a high-flow lifestyle. The best we get to feel on the planet is purpose, and this is literally a high-flow lifestyle, where the thing that's producing flow, or one of the things that's producing flow, is linked to a cause greater than yourself. So, when we talk about flow amplifying overall meaning and life satisfaction and well-being, it's a big deal. In fact, studies have shown that the people who score off the charts for these characteristics, who score off the charts for overall well-being and life satisfaction, are the people with the most flow in their lives.

Group flow: empathy, cooperation and innovation

We also see there's a shared collective version of flow's data, a team performing at their best, a group performing at their best, this is called group flow. So, we similarly see an amplification on all of the skills that allow for optimal performance among teams, so

heightened cooperation, collaboration, sometimes communication, empathy goes through the roof, so does what's known as ecological awareness, is our ability to see and perceive the natural world. And this might sound like, "What the hell?"

Why would one state of consciousness amplify all these different things? Like what is going on? That almost doesn't make any sense."

Until you remember that it was evolution that shaped flow. So, evolution is the big driver here. Evolution itself is predominantly a reaction to scarcity, right? Resources get scarce, that's the biggest driver on evolution. And when resources are scarce, we have two options, we can fight over dwindling resources, or we can flee, right, to avoid becoming somebody else's resources, or we can get cooperative, get creative, get innovative, and make new resources.

Physical boosts and evolution's logic

These are the two options, this is everything that flow amplifies, it's all the stuff. On the physical side, there's also, flow will amplify strength, stamina, endurance. fast twitch muscle response, a couple other things. So, basically, in flow, what we're getting is everything we need to fight or flee, or get creative, get cooperative, and make new resources. That's why it's this big swatch of stuff.

You know, we're all hardwired for peak performance. And because flow is such a huge kind of step function, worth of change above what we're normally capable of, we're all capable of so much more than we know. That is a commonality across the board. So that the largest lesson that 30 years in studying peak performance has taught me, is that we're all capable of so much more than we know. And one of the big reasons is we're all hardwired for flow.

And flow is a massive amplification in what's possible for ourselves. On a certain level, we have a drug store in our brain.

The brain's internal drug store

Now, we're going to talk a little about neurochemistry here. And you have to know, there are over 100, maybe 200 known neurochemicals.

So, we're not talking about all those. We're focusing on a core bunch of so-called pleasure chemicals, or chemicals that are very linked with emotions, this is norepinephrine, dopamine, endorphins, anandamide, and serotonin, and oxytocin.

So, one of the easy ways to kind of think about neurochemicals is, every internal chemical that I've just mentioned, there's actually an external chemical, a drug, in the real world that bonds to the exact same receptors that these neurochemicals bond to, that's how drugs work, and give us a clue to how the neurochemicals themselves make them feel.

So, for example, anandamide is the same psychoactive that's released by THC in marijuana. So, dopamine is cocaine. Norepinephrine is essentially speed, crystal meth.

Endorphins, that's a fancy way of saying an internal opiate, like external opiates, oxycontin, morphine, heroin. Oxytocin doesn't seem to have a drug analog exactly, but serotonin is the same psychoactive chemical that's underpins drug trips like LSD, mushrooms, even MDMA.

So, we have those chemicals in ourselves. When they were first started, we discovered, a woman named Candace Pert, who helped

work on the discovery of the endorphins, nicknamed all the neurochemicals that I just talked about are molecules of emotion. So, they make us feel different ways, right?

Dopamine is focus and alertness, and excitement, and the desire to make meaning out of a situation. Endorphins and anandamide, these are both painkillers.

And just to give you an idea, so when I talk about internal opiates, these are really powerful.

So, there's about 20 different endorphins in the brain, the most common of which is a hundred times more potent than medical morphine. So, the internal cocktails are very, very powerful.

In flow, here's something that's interesting, flow tends to cocktail all of these neural chemicals. Group flow will simulate oxytocin; individual flow will not.

But just to put it in context, the neurochemicals that show up in flow; so, dopamine, norepinephrine, anandamide, endorphins, and serotonin, if you were to try to cocktail, the street drug version of that, right, you're trying to blend like heroin and speed, and coke, acid, and weed, and the point is, you can't do it, right?

Like you'll end up in a coma, you'll end up dead, it doesn't really cocktail. In fact, some of those chemicals are antagonistic to one another.

So, MDMA and cocaine won't work in your system at the same time. It turns out the brain can cocktail all of them at once. So, our internal version of these drugs is better than the external version,

which is why people will prefer flow to almost any experience on earth.

It's our favorite experience. It's the most addictive experience on earth. Why? Because it cocktails five or six of the largest pleasure drugs the brain can produce. I don't think most people realize, you know, how much control they have over their own internal state and their own internal neurochemistry.

I'll give you a really simple example. When I'm skiing a really challenging slope, and I need to get up for the fight, especially if I've got a little fear in my system, I can override it by literally like, roar, or make, you know, some aggressive sound that will produce testosterone, which helps me override that.

So, these things are very, very sort of hardwired into our emotions. You know, we talk about kind of dopamine is a feel-good chemical, right? You want more dopamine, expose yourself to novelty, take some risks, right?

Unpredictability will do it. I mean, we all know this, we have a cell phone, right? When our cell phone and text message comes in, right? That's unpredictable, and it could signal something good's about to happen, so we get that little rush of, "Oh, I want TO pay attention to it." It's distracting, it's distracting, because it's producing a little bit of dopamine, right?

That's also what makes it addictive. One of the other things that's really interesting here is that, as I said, neurochemicals do a lot of different jobs in the brain, one of the things they do is, they exist to tag experiences as important save for later.

So, a quick shorthand for how does learning and memory work, and why do we see, for example, such an amplification of learning in flow, well, learning and memory, the more neurochemicals that show up during any given experience, right, the stronger our emotional reaction, but the greater chance that experience will move from short-term holding into long-term storage.

That's essentially one of the things neurochemicals do, they tag experiences, "Super important, save for later." One of the reasons learning goes up so much in flow is because it's this huge cocktail dump of five or six of the most important feel-good neurochemicals the brain can produce. And we tend to remember things that happen in flow states.

In fact, for most people, if you think back on your life, unless you're kind of, you're looking at positive memories, right, things you remember and that are really strong, that are really locked into memory, some of them are, you know, fit. We graduated high school, we graduated college, we got married, those kinds of things.

But if they're not that, chances are, they're things that took place in a flow state, right? I can still tell you the first macro flow state I ever had in my life, I was 13 years old, I was skiing. I can still remember what I was wearing. I can still remember what my friend who was with me was wearing. And the girl I had a crush on in, I think, eighth grade, at this point, was on the chairlift, I can tell you what she was wearing, because it's that locked into place.

Using flow to rewrite PTSD

There has been a lot of work because of this very mechanism in using flow to override and rewrite PTSD. For example, the army with

over a thousand soldiers at Camp Pendleton, they tested a combination of talk therapy and surfing. Surfing is an experience that's packed with flow triggers, right? Some of the ones we've talked about earlier, novelty, complexity, unpredictability, risks, they're all baked into surfing, very high-flow experience. And they were using this as a treatment for PTSD.

And then what they found is that five weeks of, I think they were surfing twice a week, it might have been three times a week, and regular talk therapy sessions after the surf sessions, was enough to significantly reduce or completely remove symptoms of PTSD, and lower people's need for medication, or get them off medication completely. PTSD is basically a very strong memory that's been written, and everything sort of flows back to it, and flow seems to be able to override that memory because it's such a potent neurochemical dump.

Knowing what we now know about kind of our neurobiology, how it relates to our psychology, and kind of all the power we have, and the way that experiences can produce different neurochemicals, it doesn't seem too odd that sometime in the future, we're going to start to see doctors sort of, or psychologists, prescribing experiences.

For example, a lot of action sports and outdoor activities tend to be very high-flow activities. And we know that flow has been very useful in the treatment of addiction, and it's been very useful in the treatment of PTSD.

So, there are, for example, a number of rehab centers, usually aimed at teenagers, where to get kids off drugs, they're taking them into the

mountains and giving them outdoor high-flow experiences. And this is really good thinking.

One of the things that people often don't think about with addiction is, the brain operates by addiction. What we call the habit is an addiction, right? It is an activity that we do over and over and over again. And when we get it right, we get a little dopamine. It's an addiction to the behavior, right? Until it becomes automatic, and we can do without thinking.

From chemicals to habits. But you sort of want to override pleasure chemicals with other pleasure chemicals. To put this, you know, kind of a pithy, practical way, I always tell my friends, you know, when their relationships end, "The easiest way to override heartbreak is to go skydiving." Problem with heartbreak or grief or all those things is, basically, every memory you have goes back to the thing, the person you just lost, right? That's why, you know, you walk through your house, and everything reminds you of the one that got away.

It's a very potent memory. You want that to go away. You want it to diminish. You actually have to override the memory. You have to have an experience that's more powerful than that. Skydiving and the kind of immediate deep flow state it tends to produce, and most people will tend to override that. So, you know, I'm not saying we're going to go to the doctor, and for heartbreak, and they're going to prescribe skydiving, but it would work, and you could do it.

And there might come a time in the future where we actually think that way. There's something in psychology and neuroscience we talk about as the Bannister effect. And this is the idea that you have to

believe something is possible before it becomes possible. It's named after Roger Bannister. And the point is this,

Roger Bannister was the first person to run a sub-four mile. And before he did it, this was a great, crazy impossible. In fact, there were op-eds written by doctors in "The New York Times" that you can go back and see. "This is the first person who runs a sub-four mile.

Besides having a parade waiting for them at the finish line, you should have a hearse." They really thought the first person who did it was going to die from it. It was a total impossible. And interestingly, it took forever to do it.

If you check mile times, they drop like, you know, 1/10 of a second a decade for like 70 years to get us down there, a second a decade. And it's really slow progress. And then Bannister runs the first sub-four mile, and then a month later, somebody breaks his record. And then a couple months after that, somebody shatters that new record within five years, teenagers have done it. So, you got to ask yourself, "The hell happened," right? The same physical requirements for running a sub-four mile, they haven't changed, it's still the same sub-four mile, all that's changed is the mental frame we built around the feat. What used to be impossible is now seen as possible.

And for some reason, that happens, there are various different explanations for why this happens in the brain. What it essentially says is that "Look, there's a (laughs) very, very, very tight coupling between our psychology and our physiology," right? That's really what it tells you. But usually, it's that when we hear something impossible has been done, we start thinking about it, and the brain sort of thinks in pictures, and it starts like working out, "Well, what

would that look like?" And then you start asking questions, "Well, what would it look like when I did it," and/or, "If I did it?" And, you know, it starts out as impossible. And then you hear it's been done, and you're like, "Oh, wow. Far out, I guess that is possible." And then you start thinking about how would you do it, how would you train it, and it becomes a little more probable. And that's sort of how it works. And some of it may have to do with visualization.

Visualization has been shown to be a really great performance tool, maybe really good if we can sort of pre-wire our brain with the patterns we're going to perform ahead of time, when we actually start to perform those patterns, we may get (claps hands) dopamine from pattern matching, it may help (snaps fingers) drive us into flow, which may be one of the reasons this is more easy to accomplish. But anyways, this is known as the Bannister effect, and it's been around for a while, and it's sort of at the heart of the study of, you know, why does the impossible become possible?

If you're interested in peak performance, there tends to be, we talk about these as the positive psychology basics. Basically, positive psychology had spent past 30 years sort of like looking at what gets you ready to perform at your best. You're not performing at your best, but this is sort of the readiness.

And this basically means, if you want to drop into flow, right, if you're interested in producing more flow in your life, these six things are sort of the basics. And there's three on the energy side, on the body side, "Do I have enough energy to perform at my best?" And there's three on the mental side, "Is my brain ready for this?"

Final takeaways: The 6 basics

And on the energy side, we're familiar with most of these. Obviously, sleep matters a great deal. All of us need about seven, eight hours a night. And there's not a whole much, we don't have a lot of wiggle room. The research is really, really clear on this. And if you wanna reliably, repeatedly get in the flow, seven, eight hours of sleep a night is a benchmark. We all, obviously, need hydration and nutrition.

Now, everybody's dietary needs are different, so there's no one diet that works for everybody at all. And there's been zero foods linked with flow or anything like that, or nutraceuticals linked with flow, there's nothing like that. But we do know high-quality nutrition and hydration matter. The other thing that matters, this is interesting, is social support. Now, we know social support is important. Positive psychology talks about we need other people in our lives. Whenever you face a problem, an issue, the brain wants to know, "Hey, is this a challenge that I can rise to, or is this a threat?" And if it's a challenge, if you have other people around you who love you, who have your back, who will pick you up if you fail, and you're maintaining robust social connections, and this doesn't mean you need tons of friends, you need a couple of friends.

And social support differs for everybody. I'm kind of an extreme introvert. I don't need a lot of contact with the outside world, some people need a lot more, it's different for everybody, but you got to figure out what you need and to produce the energy you need to get into flow, those three things are important. There's also a mental preparedness side. So, this is also really great information if you happen to be stressed out, flow requires, we talked about it earlier, it

sits on that midpoint between boredom and anxiety. Too much anxiety tends to block flow.

Now, this is difficult in the modern world because most of us tend to be a little hyper-anxious. And this has nothing to do, this isn't our fault, this is actually how the brain was wired. The brain evolved in an era where most of the threats we dealt with were immediate threats, there's a tiger in the bush. We live in a world where the threats that we face are probabilistic, terrorists might attack, the economy might nose dive, a pandemic could, right? These are probabilistic dangers. The problem is the brain is designed not to turn off the fear response until a danger is gone completely. Probabilistic dangers are never gone completely.

It's not like a tiger in the bush, right? The tiger leaves, it's gone, right? Problem is over. You can calm down. But probabilistic dangers never are gone completely. So, we tend to be a little more hyperreactive in the 21st century, our technology builds on this and problematics. So how do you tune up the nervous system?

The research says there are three tools you can reach for, a daily gratitude practice, a daily mindfulness practice, or regular exercise. And the research is really clear on gratitude. Gratitude practice takes about five minutes. Loads of positive psychologists will recommend listing three things that you're grateful for and turning one of them into a longer paragraph. Or I like to write down 10 things that I'm grateful for, and I write down each one three times.

And we have what psychologists will talk about as a negativity bias. This basically means that we will take in about nine bits of negative information for every positive bit that gets through. This is what kept

us alive for years, right, as hunter-gatherers. The environment is no longer as dangerous, but that's how we're wired, that's the basic brain hardwiring. With a gratitude practice, gratitude is literally, you're just pointing out to the brain things that have already happened that are good. And it tilts this ratio, it goes from like 9:1, negative to positive, about 5:1, or 6:1, so we're taking it a lot less negative stuff. This, by the way, lets more novel stuff come through, which allows it to work, gratitude can work as a flow trigger that way. We also discovered, with work we did with Glen Fox, that people who, with regular gratitude practices, tend to have high-flow lifestyles.

So, there seems to be a correlation there. The second one is mindfulness. And if you want to tune up your nervous system, research is really clear, it doesn't have to be fancy. 11 minutes a day of mindfulness practice of, you know, follow your breath, focused meditation basically, is enough to really calm down your nervous system. Or your third option is exercise, 20 to 40 minutes-worth of exercise is enough. And if you're exercising for kind of mental hygiene, right, for cognition, and I want to get into flow, you want to exercise until basically the voice in your head gets really quiet and your lungs open up.

Both things happen because there's a global release of nitric oxide, it's a gaseous signaling molecule. It's sort of everywhere in the body. One of the things it does is, it flushes stress hormones out of your system, and it'll reset the nervous system sort of back to baseline, back to zero. And what I like to tell people is, "Under normal conditions, do one of these things every day," right? "If you've got

plenty of time, exercise. If you're short on time, do a gratitude practice.

During times of stress, do two of these things a day." If you worked at the Flow Research Collective during COVID, right, during the lockdown, for example, we're a peak performance organization, and I wanted everybody in my organization performing their best. And COVID was a very stressful time. So, if you worked for me, you had to do all three of those things every day. And these are great tools to be able to reach for in times of stress, rather than having to reach for psychopharmaceuticals.