



Flowing to the River of Ultimate Performance  
The Science of Productivity Steven Kotler

Researchers define flow as an “optimal state of consciousness,” a peak state where we feel our best and perform our best. Some of us know this state by other names—“runner’s high” or “being in the zone” or, if you happen to be a jazz musician like John Coltrane, then it’s “in the pocket”—but whatever the lingo, the experience is unforgettable.

If you’ve ever lost an afternoon to a great conversation or become so involved in a work project that all else was forgotten, then you’ve tasted this experience. In flow, we are so focused on the task at hand that everything else falls away. Action and awareness merge. Time flies. Self vanishes. All aspects of performance—mental and physical—go through the roof.

We call this experience flow because that is the sensation conferred. In the state, every action, each decision, leads effortlessly, fluidly, seamlessly to the next. It’s high-speed problem solving; it’s being swept away by the river of ultimate performance.

This last bit is no exaggeration. Over 100 years of research shows that flow sits at the heart of almost every athletic championship, underpins major scientific breakthroughs, and accounts for significant progress in the arts. “When we watch a live concert or a sports event, we’re essentially paying to watch people in a flow state,” says Salim Ismail, former head of innovation at Yahoo turned Singularity University global ambassador. “Whether it’s Kobe Bryant, Roger Federer, Jay-Z, or a jazz crooner, they’ve all practiced thousands of endless hours so that when performance time comes, they are fully and utterly present and in a flow state. An actor with camera ‘presence’ is in flow. A great poet can deliver flow to the reader just through the power of words. We pay to watch, read, or be in the presence of a flow experience. If quantified, you’d find it’s a major chunk of GDP.”

In recent years, flow has also become exceptionally critical to business. In a ten-year McKinsey and Co. study, to offer one example, top executives reported being five times more productive in flow. This is a staggering finding. Five times more productive is a 500 percent increase. It means, if you go to work and spend Monday in flow, you’ll get as much done as your steady state peers do in a week. Or, as Virgin CEO Richard Branson says: “In two hours, I can accomplish tremendous things... It’s like there’s no challenge I can’t meet.”

In fact, according to these same McKinsey researchers, if we could increase the time we spend in flow by 15-20 percent, overall workplace productivity would almost double.

The doubling of workplace productivity may seem like a fairy tale outcome, but researchers have lately made enormous progress on flow and we are starting to tease back the veil on high performance. We now know that flow emerges from a radical alteration in normal brain function, including a profound cascade of neurochemicals. In the state, the brain releases norepinephrine, dopamine, endorphins, anandamide and serotonin. All five impact performance. Norepinephrine and dopamine tightens focus and enhances muscle reaction times. Endorphins block pain and abet social bonding. Anandamide prompts lateral connections and generates gestalt insights. And serotonin, that feel-good chemical at the heart of the Prozac revolution, keeps us calm throughout.

But when it comes to workplace productivity, more important to this amplification is how this chemical cocktail impacts three skills critical for business: motivation, learning, and creativity. We'll take them one at a time.

Right now, according to a recent Gallup survey, 71 percent of American workers are “not engaged” or “actively disengaged” from their jobs. This means two out of three of us hate what we do with the majority of our time. Yet, if we want to reverse such statistics, here too the secret turns out to be flow.

Beyond their performance-enhancing qualities, all five of the neurochemicals that underpin the state are pleasure-inducing. In fact, these chemicals are the biggest rewards the brain can

produce, and flow is one of the only times the brain produces all five simultaneously. This makes the state one of the most pleasurable, meaningful and—literally—addictive experiences available.

Of course, scientists don't like the word "addictive" so they prefer to call flow "autotelic," meaning an end in itself. In other words, once an experience starts generating flow, we'll go pretty far out of our way to get more of it. And we've all seen this in action. When coders stay up three days straight to launch a new app, flow, even more than caffeine and cold pizza, is what gets them to the finish line.

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Beyond motivation, equally important to workplace productivity is how flow impacts learning. A quick shorthand for learning is the more neurochemicals that show up during an experience, the greater chance that experience moves from short-term holding into long-term storage. As flow produces one of the most potent neurochemical cocktails around, the state has a massive impact on our ability to acquire new skills and knowledge. DARPA, the big idea research arm of the US Defense Department, found that military snipers trained in flow learned at a rate 230 percent faster than normal. In a similar but civilian study, scientists at Advanced Brain Monitoring

in Carlsbad, California, found the time it took to train novice marksmen up to the expert level fell by 50 percent. Remember Malcolm Gladwell's fabled 10,000 hours to mastery—what the science shows is that flow cuts them in half.

“In all our studies of extreme performance improvement,” says John Hagel, co-founder of Deloitte's Center for the Edge, “the people and organizations who covered the most distance in the shortest time were always the ones who were tapping into passion and finding flow.”

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Finally, flow's impact on creativity may be its most important role in increasing workplace productivity. Without the ability to think differently we become rut stuck. Innovation and ingenuity grind to a halt, productivity seriously declines. This is also why, when IBM conducted a global survey, asking 1500 top executives in 60 countries about the quality most important in a CEO, creativity was their number one answer.

Unfortunately, as researchers have also discovered, teaching people to be more creative is incredibly difficult. Yet flow states change this equation. In a recent Australian study, 40 subjects were presented with an exceptionally tricky brain teaser—the kind that requires a deep creative insight to solve. No one solved it. But when flow was induced artificially, 23 subjects got the answer right and in record time.

Certainly, solving a brain teaser requires only one type of creativity (problem solving), and a solo egg does not an omelet make. In a more general—though still preliminary—study run by my organization, the Flow Genome Project, subjects reported being seven times more creative in flow. And these gains too come down to neurochemistry.

To understand how this works, you have to start with the fact that creativity is typically recombinatory—the product of novel ideas bumping into old thoughts and birthing something utterly new. The neurochemicals that underpin flow literally surround this process. In the state, norepinephrine and dopamine help us shut out distraction and gather more information (that is, novel ideas). They also enhance pattern recognition, which allows us to make faster connections between those ideas. Anandamide, meanwhile, augments lateral thinking, producing connections between much farther flung ideas. All of this explains why Greylock Partners venture capitalist James Slavet, writing for Forbes.com, called “flow state percentage”—defined as the amount

of time employees spend in flow—“the most important management metric for building great innovation teams.”

It may actually be the most important management metric... period. By turbo-boosting learning, motivation, and creativity, flow is amplifying the three core competencies required to enhance employee engagement, drive workplace productivity, and keep pace in our contemporary environment of radical change. Yet these dividends don't come without serious investment. Restructuring businesses around flow means radically altering their DNA, shifting emphasis from mechanistic efficiencies to deep human engagement. Not every company is up for this challenge. But in an era of relentless progress, making a present tense commitment to flow may be the only way to stay ahead of a breakneck future.

Yet, of course, all of this raises one critical question: how can individuals and organizations create more flow? Here, too, there's good news. Besides decoding the neurobiology of the state, scientists have lately identified 17 “flow triggers”—that is, pre-conditions that lead to more flow. These 17 fall into four categories: psychological, environmental, social, and creative. We'll go into greater detail below, but one thing to know right off the bat: Flow follows focus. It is a state of total absorption. Thus, all 17 of these triggers are ways of heightening and tightening focus, of driving attention into the now and thus driving flow.



# Environmental Triggers

Environmental triggers—a.k.a. “external triggers” are qualities in the environment that drive people deeper into flow.

**High Consequences** is the first trigger. Flow follows focus and consequences catch our attention. When there’s danger lurking in the environment, we don’t need to concentrate extra hard to drive focus, the elevated risk levels do the job for us.

But, for those of us uninterested in taking physical risks, the science shows that other risks—emotional, intellectual, creative, social—work just as well.

“To reach flow,” explains Harvard psychiatrist Ned Hallowell, “one must be willing to take risks. The lover must be willing to risk rejection to enter this state. The athlete must be willing to risk physical harm, even loss of life, to enter this state. The artist must be willing to be scorned and despised by critics and the public and still push on. And the average person—you and me—must be willing to fail, look foolish, and fall flat on our faces should we wish to enter this state.”

These facts also tell us that those Silicon Valley companies with “fail forward” as their de-facto motto have an incredible advantage. If employees don’t have the space to fail, then they don’t have the ability to take risks. At Facebook, there is a sign hanging in the main stairwell that

reads: “Move fast, break things.” This kind of attitude is critical. If you’re not incentivizing risk, you’re denying access to flow—which is the only way to keep pace in a breakneck world.

**Rich Environment**, the next environmental trigger, is a combination platter of novelty, unpredictability, and complexity—three elements that catch and hold our attention much like risk. Novelty means both danger and opportunity, and when either are present it pays to pay attention. Unpredictability means we don’t know what happens next, thus we pay extra attention to the next. Complexity, when there’s lots of salient information coming at us at once, does more of the same.

How to employ this trigger on the job? Well, simply increase the amount of novelty, complexity, and unpredictability in the environment. This is exactly what Steve Jobs did when he designed Pixar. By building a large atrium at the building’s center, then locating the mailboxes, cafeteria, meeting rooms and, most famously, the bathrooms, beside the atrium, he forced employees from all walks of the company to randomly bump into one another, massively increasing the amount of novelty, complexity and unpredictability in their daily life.

**Deep Embodiment** is a kind of total physical awareness. It means paying attention with multiple sensory streams at once. One of the reasons athletes have had so much success getting into flow is because the playing of sport is by definition a deeply embodied practice.

But it's not just sport. Montessori education—which has been shown to be one of the highest flow environments on Earth—is often called “embodied education.” It emphasizes learning through doing. Don't just read about that lighthouse, go out and build one. By engaging multiple sensory systems at once, you're grabbing hold of the attention system, forcing focus into the now.

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## Psychological Triggers

Psychological, or internal, triggers are conditions in our inner environment that create more flow. They're psychological strategies for driving attention into the now.

Back in the 1970s, pioneering flow researcher Mihaly Csikszentmihalyi identified clear goals, immediate feedback, and the challenge/skills ratio as the three most critical. Let's take a closer look.

**Clear goals,** our first trigger, tell us where and when to put our attention. When goals are clear, the mind doesn't have to wonder about what to do or what to do next—it already knows. Thus, concentration tightens, motivation heightens, and extraneous information gets filtered out. Action and awareness start to merge, and we're pulled even deeper into now. Just as importantly, in the now, there's no past or future and a lot less room for self—which are the intruders most likely to yank us to the then.

This also tells us something about emphasis. When considering “clear goals,” most have a tendency to skip over the adjective “clear” to get to the noun “goals.” When told to set clear goals, we immediately visualize ourselves on the Olympic podium, the Academy Award stage, or the Fortune 500 list, saying, “I've been picturing this moment since I was 15,” and think that's the point.

But those podium moments can pull us out of the present. Even if success is seconds away, it's still a future event subject to hopes, fears, and all sorts of now-crushing distraction. Think of the long list of infamous sporting chokes: the dropped pass in the final seconds of the Superbowl; the missed putt at the end of the Masters. In those moments, the gravity of the goal pulled the participants out of the now, when, ironically, the now was all they needed to win.

If creating more flow is the aim, then the emphasis falls on “clear” and not “goals.” Clarity gives us certainty. We know what to do and where to focus our attention while doing it. When goals are clear, meta-cognition is replaced by in-the-moment cognition, and the self stays out of the picture.

Applying this idea in our daily life means breaking tasks into bite-size chunks, and setting goals accordingly. A writer, for example, is better off trying to pen three great paragraphs at a time, rather than attempting one great chapter. Think challenging, yet manageable—just enough stimulation to shortcut attention into the now, not enough stress to pull you back out again.

**Immediate feedback**, our next internal trigger, is another shortcut into the now. The term refers to a direct, in-the-moment coupling between cause and effect. As a focusing mechanism, immediate feedback is something of an extension of clear goals. Clear goals tell us what we’re doing; immediate feedback tells us how to do it better.

If we know how to improve performance in real time, the mind doesn’t go off in search of clues for betterment. We can then keep ourselves fully present and fully focused and much more likely to be in flow.

Implementing this in business is fairly straightforward: Tighten feedback loops. Put mechanisms in place so attention doesn’t have to wander. Ask for more input. How much input? Well, forget quarterly reviews. Think daily reviews. Studies have found that in professions with less direct

feedback loops—stock analysis, psychiatry, medicine—even the best get worse over time. Surgeons, by contrast, are the only class of physician that improve the longer they're out of medical school. Why? Mess up on the table and someone dies. That's immediate feedback.

**The challenge/skills ratio**, the last of our internal flow triggers, is arguably the most important. The idea behind this trigger is that attention is most engaged (i.e., in the now), when there's a very specific relationship between the difficulty of a task and our ability to perform that task. If the challenge is too great, fear swamps the system. If the challenge is too easy, we stop paying attention. Flow appears near the emotional midpoint between boredom and anxiety, in what scientists call the “flow channel”—the spot where the task is hard enough to make us stretch, but not hard enough to make us snap.

This sweet spot keeps attention locked in the present. When the challenge is firmly within the boundaries of known skills—meaning I've done it before and am fairly certain I can again—the outcome is predetermined. We're interested, not riveted. But when we don't know what's going to happen next, we pay more attention to the next. Uncertainty is our rocket ride into the now.

# Social Triggers

There is also a collective version of a flow state known as “group flow.” This is what happens when a bunch of people enter the zone together. If you’ve ever seen a fourth quarter comeback in football, where everyone is always in the right place at the right time and the result looks more like a well-choreographed modern dance than anything that normally happens on the gridiron—that’s group flow in action.

But it’s not just athletes who play this game. In fact, group flow is incredibly common in startups. When the whole team is driving towards a singular purpose with incredible speed—again, group flow in action. “Because entrepreneurship is about the non-stop navigation of uncertainty,” says Salim Ismail, “being in flow is a critical aspect of success. Flow states allow an entrepreneur to stay open and alert to possibilities, which could exist in any partnership, product insight, or customer interaction. The more flow created by a startup team, the higher the chance of success.

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In fact, if your startup team is not in a near-constant group flow state, you will not succeed. Peripheral vision gets lost and insights don't follow."

So how to precipitate group flow? This is where social triggers come into play. These triggers are ways to alter social conditions to produce more group flow. A number of them are already familiar. The first three—**serious concentration; shared, clear goals; good communication** (i.e., lots of immediate feedback)—are the collective versions of the psychological triggers identified by Csikszentmihalyi.

Two more: **equal participation** and an **element of risk** (mental, physical, whatever), are self-explanatory given what we already know about flow. The remaining five require a little more information.

**Familiarity**, our next trigger, means the group has a common language, a shared knowledge base, and a communication style based on unspoken understandings. It means everybody is always on the same page, and, when novel insights arise, momentum is not lost due to the need for lengthy explanation.

Then there's **blending egos**—which is kind of a collective version of humility. When egos have been blended, no one's hogging the spotlight and everyone's thoroughly involved.



A **sense of control** combines autonomy (being free to do what you want) and competence (being good at what you do). It's about getting to choose your own challenges and having the necessary skills to surmount them.

Close listening occurs when we're fully engaged in the here and now. In conversation, this isn't about thinking about what witty thing to say next, or what cutting sarcasm came last. Rather, it's generating real-time, unplanned responses to the dialogue as it unfolds.

**“Always say yes,”** our final trigger, means interactions should be additive more than argumentative. The goal here is the momentum, togetherness, and innovation that comes from ceaselessly amplifying each other's ideas and actions.

It's a trigger based on the first rule of improv comedy. If I open a sketch with, “Hey, there's a blue elephant in the bathroom,” then “No, there's not,” is the wrong response. With the denial, the scene goes nowhere. But if the reply is affirmative, “Yeah, sorry, there was no more space in the cereal cupboard,” then that story goes someplace interesting.

# Creative Triggers

**Creativity.** If you look under the hood of creativity, what you see is pattern recognition (the brain's ability to link new ideas together) and risk-taking (the courage to bring those new ideas into the world). Both of these experiences produce powerful neurochemical reactions and the brain rides these reactions deeper into flow.

This means, for those of us who want more flow in our lives, we have to think different. It's simple as that. Instead of tackling problems from familiar angles, go at them backwards and sideways and with style. Go out of your way to stretch your imagination. Massively up the amount of novelty in your life—the research shows that new environments and experiences are often the jumping off point for new ideas (more opportunity for pattern recognition). Most importantly, make creativity a value and a virtue.

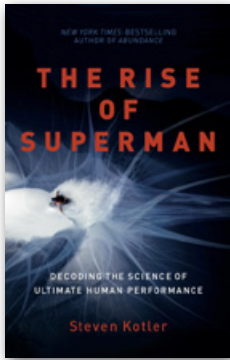
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# Final Advice

One of the most well-established facts about flow is that the state is ubiquitous—meaning it shows up anywhere, in anyone, provided certain initial conditions are met. What are these conditions? These 17 triggers. It really is that straightforward.

And there's a reason for this, as well. We're biological organisms and evolution is conservative by design. When a particular adaptation works, the basic design is repeated again and again. Flow most certainly works. As a result, our brains are hardwired for the experience. **We are all designed for optimal performance—it's a built in feature of being human.** 📖

# Info



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**ABOUT THE AUTHOR** | Steven Kotler is a New York Times best-selling author and award-winning journalist. His previous books include *Abundance*, *A Small Furry Prayer*, and *West of Jesus* and the novel *The Angle Quickest for Flight*. His articles have appeared in over 60 publications, including *The New York Times Magazine*, *Atlantic Monthly*, *Wired*, *Forbes*, *GQ*, *National Geographic*, *Popular Science*, *Discover* and the *Los Angeles Times*. He also writes “Far Frontiers,” a blog about disruptive technology, guerilla neuroscience, and adrenaline sport for Forbes.com, and “The Playing Field,” a blog about the science of sport and culture for PsychologyToday.com. Kotler is the cofounder and Director of Research for the Flow Genome Project.

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