myflow

BREAKING BARRIERS

The future of mental training in sports

How pupil measurements enable evidence based mental training

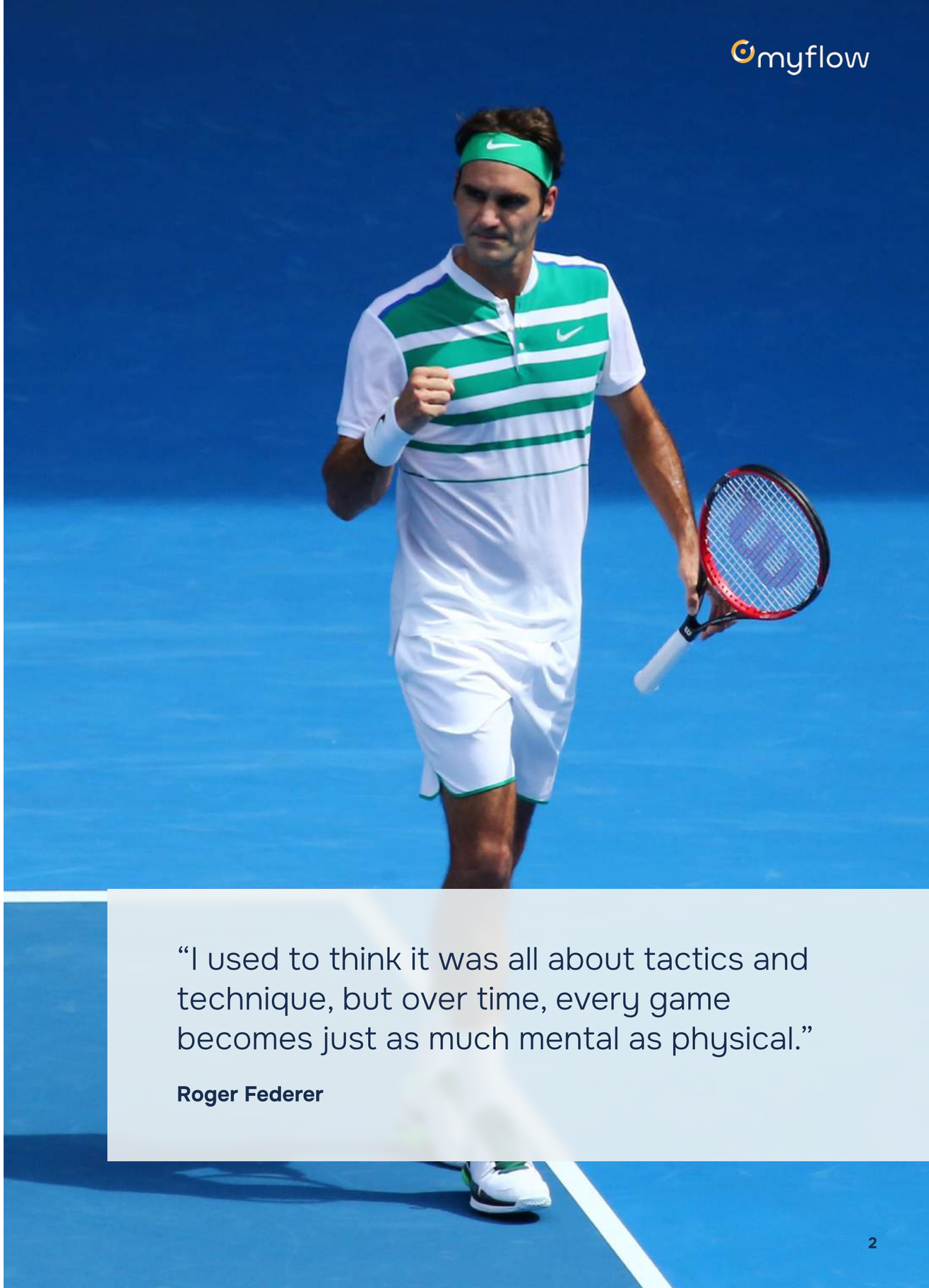
The mental game of sports

In sports, mental performance is a fundamental determinant of success and is often described as the 'game changer' for athletes and teams.

Physical skills such as speed, strength, and endurance are essential for high performance. To measure, track, and improve these skills various tools and technologies are well-established. Numerous metrics provide objective data that are constantly used to evaluate physical performance during training, games, and competitions. Despite the focus on physical data, optimal performance cannot be achieved through physical training alone. The mental aspects influencing performance, such as focus, mental readiness, self-awareness, and resilience, are equally critical for success. Sports psychology has long highlighted the importance of these factors, but tools for objectively measuring and tracking mental capabilities are still limited.

This lack of objective tools to measure and track mental abilities limits athletes to fully develop their ability to understand and improve their mental performance, hindering them from reaching their full potential.

Achieving peak performance requires a comprehensive approach that integrates both physical and mental training, ensuring athletes are holistically prepared for competition. Understanding the mental factors that influence performance is therefore of upmost importance and empowers athletes to take meaningful steps toward their success.



> “I used to think it was all about tactics and technique, but over time, every game becomes just as much mental as physical.”
>
> **Roger Federer**

Performance relevant mental factors

Self-regulation

is the ability to regulate mental and physiological states, such as managing stress, maintaining focus, and handle emotions, by optimizing arousal levels during training and competition.

Mental resilience

is the ability of positive adaptation capacity, bouncing back/rebound, and maintenance of well-being despite exposure to adversity.

Self-awareness

is the ability to recognize individuals' mental states, strengths and weaknesses, leading to increased understanding of emotions, thoughts, and behaviours.

Mental strength

is the ability to persevere through challenges, maintain focus under pressure, and stay resilient in the face of adversity. Key traits of mental strength include resilience, confidence, determination, and the ability to effectively manage stress and setbacks.

Focus

is the ability to concentrate on a task while ignoring distractions. It involves sustained attention, selective attention and situational awareness to stay engaged during critical moments.

Mental readiness

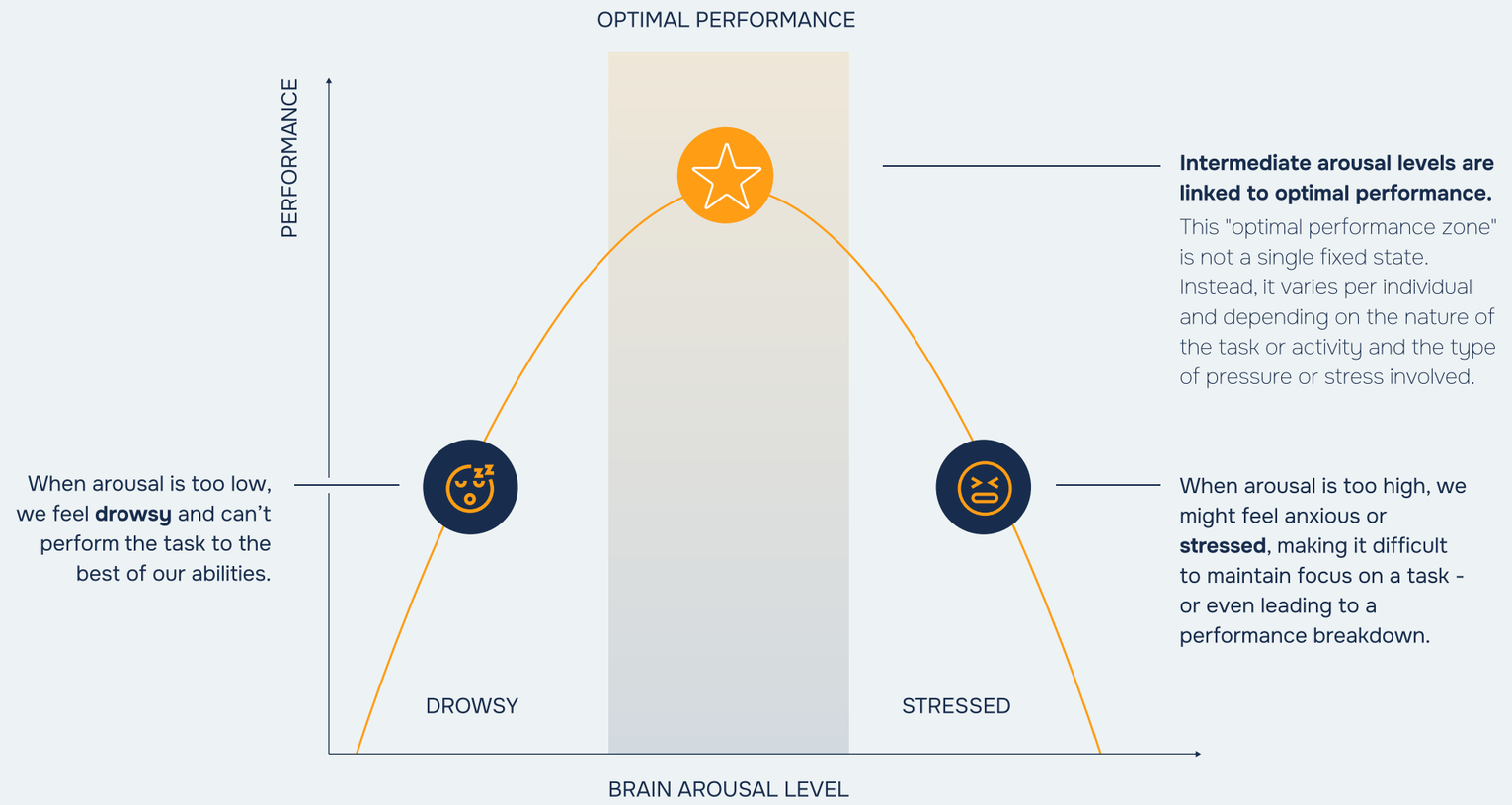
is the ability to be fully prepared to perform at one's best during a specific moment or event. It involves a state of alertness and focus on the task at hand.

Mastering arousal self-regulation to reach peak performance

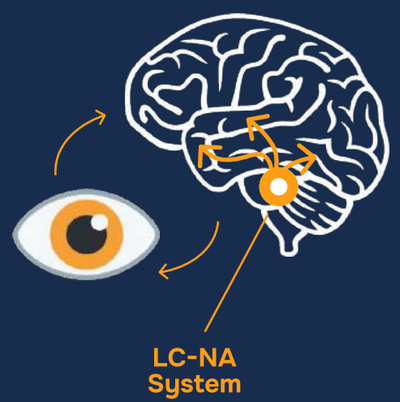
Effective mental training enables individuals to master their mental state through achieving an optimal level of arousal, and ultimately, entering a state that is perfectly tuned for reaching peak performance: their flow zone.

Flow (or the Flow Zone) is a positive yet elusive peak experience marked by complete immersion and optimal performance. Actions feel smooth, effortless, and automatic, often accompanied by a loss of self-consciousness and a sense of time distortion. Athletes often describing it as a state in which they perform at their peak level. However, high-pressure situations can disrupt this flow. In such moments, the ability to self-regulate becomes crucial for maintaining optimal performance. Top athletes therefore train their ability to self-regulate and modulate their arousal levels, helping them maintain an optimal performance state even under pressure.

Our brain arousal levels and performance follow an inverted U-shaped relationship:



Brain arousal level
refers to an individual's state of alertness and mental or physical activation. One key regulator is the Locus Coeruleus (LC), a small nucleus in the brain stem that serves as the main source of noradrenaline in the brain.



The locus coeruleus (LC)

- Is a small region in the pons of the brainstem
- Is the main source of noradrenaline in the human central nervous system
- Activity changes lead to pupil size changes

When we face a stressor LC increases its activity and:

- releases noradrenaline
- increases sympathetic activity ("fight or flight")
- increases brain arousal levels

When we relax LC decreases its activity and:

- parasympathetic activity decreases with it ("rest or digest")

The myflow approach to mental training

myflow's pupil-based neurofeedback makes the brain's arousal system accessible to volitional control. In other words, training with myflow allows you to directly tap into the control of your arousal levels.

Using self-regulation strategies is well established in the field of sports psychology, stress management, or relaxation. However, these mental strategies are highly individual and difficult to measure objectively. Through a unique combination of direct feedback and continuous practice, **myflow** empowers users to explore and keep track of which strategies work for them to increase (upregulate) or decrease (downregulate) their brain arousal levels.

Training self-regulation in a virtual reality environment allows retreating into a "virtual room" dedicated to practicing self-regulation skills. One can step away from distractions, and purely focus on self-regulation and how it affects one's own brain.

Our technology builds on key scientific insights:

- Our pupil size is an indirect readout of the brain's arousal level under constant lighting conditions.
- A small brain region in the pons of the brainstem – the locus coeruleus (LC) – is a main contributor to these pupil size changes.
- This was initially demonstrated in basic research where targeted activation of the LC led to substantial pupil dilation.

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Our new pupil-based neurofeedback approach integrates this link between pupil size, the brain arousal levels, and their regulators (e.g., LC activity), into the myflow training. With this approach we measure pupil size via eye tracking technology and feed it back in real-time as a visual representation.

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Bio-/neurofeedback training
Is a powerful tool helping individuals to learn to control specific physiological functions (such as heart rate, muscle tension, or pupil size) by providing real-time information on these responses. By visualizing their body's physiological reactions, individuals can learn how to consciously adjust and gain better control over these functions. Neurofeedback is a specific type of biofeedback and uses signals produced from the brain.

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Pupil-based neurofeedback training
Offers a powerful way to refine self-regulation strategies by providing real-time feedback on arousal levels derived from pupil measurements. By identifying and refining the most effective strategies for each individual, pupil-based neurofeedback training helps optimize self-regulation skills, which can lead to improved confidence in high-pressure situations.

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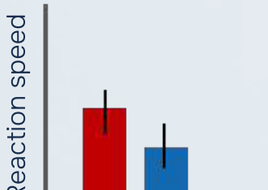
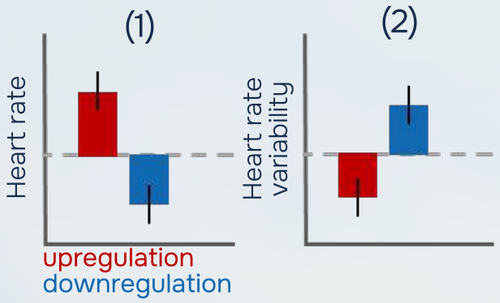
Self-regulation techniques
Such as visualization, mental rehearsal, and self-awareness exercises help manage stress, maintain focus, and improve performance under pressure. For instance, controlled breathing can lower the arousal level and induce relaxation, while mentally rehearsing key components of an action can increase arousal and help sustain concentration and readiness.

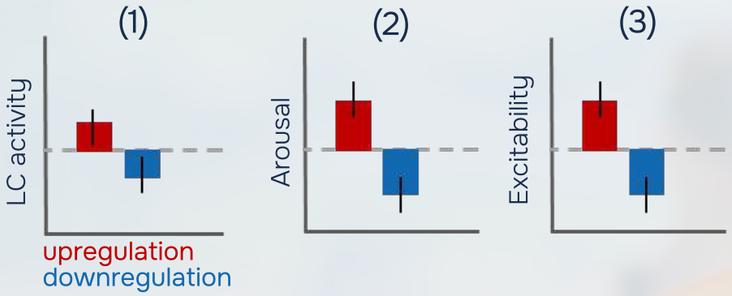
The benefits of training with myflow



myflow influences reaction speed, with faster reaction times observed during downregulation compared to upregulation in lab-based attention tasks. These findings highlight the performance-relevant benefits of mental self-regulation and suggest that adopting appropriate mental states can enhance performance.



myflow influences markers of autonomic regulation of the heart, with downregulation leading to reduced heart rate (1) and increased heart rate variability (2) compared to upregulation . These changes reflect a shift towards a more relaxed (downregulation), compared to a more activated (upregulation) state, demonstrating a mind-body connection during self-regulation.

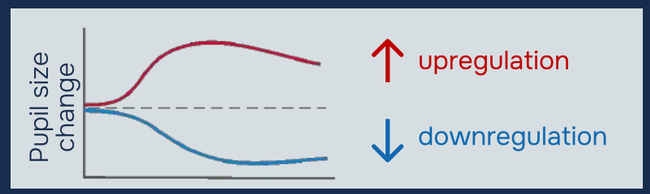


myflow modulates activity in arousal-related brain regions (1). Actively increasing pupil size (upregulation) leads to higher arousal (2) and excitability (3) of the brain, compared to decreasing it (downregulation). These results demonstrate that volitional control of pupil size influences neural markers of arousal. This supports the effectiveness of the training and highlights its potential to attain brain states that are critical for optimal performance.

Self-regulation

myflow enhances the training of self-regulation skills by teaching individuals to voluntarily control their pupil size using mental strategies. Users receive objective feedback on the effectiveness of their strategies for increasing (upregulation) or decreasing (downregulation) pupil size.

Pupil size changes during self-regulation

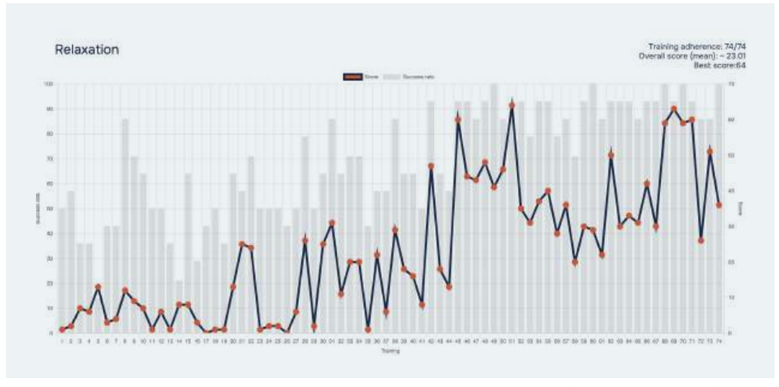


Stronger self-regulation is the core benefit of training with **myflow.** Such self-regulation forms the foundation for physiological and mental improvements, influencing performance-relevant mental factors, such as mental readiness, focus, self-awareness, resilience, and mental strength.

Athlete success stories: the mental edge in sports

Even though challenges differ in sports, athletes share a common need for optimal mental control in decisive moments. This is where myflow's pupil-based neurofeedback training has made a significant impact, helping them train self-regulation, optimize focus, and enhance their performance under pressure.

By integrating mental training into their routines, these athletes have gained an edge that allows them to compete at their best – both physically and mentally. With myflow, mental performance is no longer left to chance – it's measurable, trainable, and a decisive factor in peak athletic achievement.



Real athlete data: Graph shows success rate and relaxation score of training with myflow in the first month. The higher the score, the better.

Further benefits of using myflow - mental well-being

Competing at a high level isn't just about performance - it's also about mental well-being. The stress of training, competition, and expectations can take a toll on athletes, affecting confidence, decision-making, and recovery. With myflow's self-regulation training, athletes learn to manage stress, stay composed in high-pressure moments, and maintain mental clarity - not just on the field, but in their daily lives.

How myflow transformed athletes' performance

Joscha Burkhalter
BIATHLON


© Yara Burkhalter

Mastering focus in critical moments

In biathlon, the transition from high-intensity skiing to precise shooting requires a high level of mental control. Swiss biathlete Joscha Burkhalter faced the challenge of calming his mind and body as he approached the shooting range, shutting out the distractions of crowds and competitors to focus on hitting his targets.

Since integrating myflow into his training routine, Joscha is delivering his best results as a professional athlete. By learning to self-regulate and manage his arousal levels, he can enter a deep focus state faster and more efficiently, leading to quicker, more accurate shooting and maintaining peak energy in the final stretch of his races - even when exhaustion sets in.

Lena Flück
ALPINE SKIING

Finding calmness before the storm

As a young Swiss alpine skier, Lena Flück faced the challenge of staying calm and focused at the start of a race and managing fluctuating stress levels between runs. Too much tension led to inflexible movements, while being too relaxed slowed her reactions in the race.

Through her new mental routine, Lena has learned to control her mental state before and between runs, allowing her to stay in the zone and attack each course with confidence. With her improved focus and composure, she has stepped up her performance, securing several top 10 finishes in her races.

Ruben Homburg
VOLLEYBALL

Precision in reception and serving

In volleyball, maintaining sharp focus under pressure is essential, especially in high-stakes moments like executing or receiving a serve under pressure. Swiss youth volleyball player Ruben Homburg initially struggled to stay fully focused during these key situations, often feeling overwhelmed by the pressure and fast decision-making required during matches.

With improved self-regulation and the ability to eliminate distractions through downregulation training, Ruben has significantly enhanced his focus and consistency, ensuring more precise receptions and serves. His stronger mental game and on-field performance has contributed directly to his team's success, putting them in the fight for first place in the rankings.

Beyond self-regulation neurofeedback training

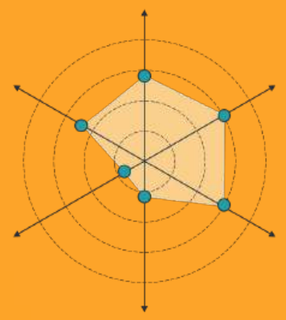
myflow envisions a future where mental performance is as measurable, trainable, and optimizable as physical fitness.

By combining immersive VR environments, neurofeedback technologies, and advanced performance tracking, myflow aims to revolutionize mental performance across high-pressure fields - starting with sports and expanding into domains such as protection and rescue services and corporate executives.

Innovation lies at the heart of this vision. **myflow** continuously evolves, offering increasingly adaptive and personalized training. But we head beyond training alone: we put performance at the center. To optimize mental performance, we are expanding our solution two critical areas: assessment and analytics.

By integrating mental training into immersive VR environments, **myflow** goes beyond simple exercises, allowing users to train in realistic, high-pressure scenarios, ensuring their mental performance is fully optimized for real-world challenges.

With this we are setting a new standard for optimizing and sustaining peak performance where it matters most.



2025-2026

myflow will introduce a unique pupil-based assessment that provides deep insights into key cognitive and mental skills. This will allow users to precisely identify strengths and weaknesses, track improvements over time, and tailor their training with greater accuracy.

Alongside this, we are enhancing our analytics capabilities, constatly offering new insights to both coaching staff and athletes.

The team behind myflow

MindMetrix brings together a highly skilled, interdisciplinary team of experts in neuroscience, sports psychology, software development, and business.

myflow was developed in a joint project of MindMetrix, ETH Zurich and EHS Magglingen. Our core technology was developed at ETH Zurich by **Prof. Dr. Sarah Meissner** (Brain-Body Regulation Lab) and **Dr. Marc Bächinger** (ETH Pioneer Fellow), pioneers in pupil-based neurofeedback. The effects of myflow training on neurophysiology, sports performance and sleep were further validated in a Bridge Discovery project by Dr. Zsanett Bondàr (Sport Psychologist, EHS Magglingen), Dr. Marieke Weijs (Neuroscientist, ETH Zürich) and Dr. Stephanie Huwiler (Head of Product)

Together we ensure a strong foundation to bring real value to our customers and to re-define how we perform under pressure.

Spin-off | ETH zürich

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