

# Learning the language of pain

**Pain is an essential and unavoidable part of being a cyclist. It warns us off danger and keeps us safe on every ride. Why, then, does it continue to be so misunderstood?**

*David Bradford investigates*

**“T**o be a cyclist is to be a student of pain,” noted US cycling writer Scott Martin. “At cycling’s core lies pain, hard and bitter as the pit inside a juicy peach... If you never confront pain, you’re missing the essence of the sport. Without pain, there’s no adversity... no challenge... no improvement... Might as well be playing tiddlywinks.”

What’s special about this quote is that it captures the complexity of pain: a sensation loathed but also longed-for, repellent but also habit-forming. Even more astutely, Martin frames the cyclist’s experience of pain as a learning process. Becoming a *student of pain*, we will show, means opening your mind and re-evaluating everything you thought you knew about what it means to hurt.

Consider your last crash. Mine was a stupid spill on an unanticipated kink in an otherwise featureless cycle path. I braked and flicked the bike sharply right without noticing a patch of gravel; the front end slid out and I was on the deck before I knew what had happened. My brother, following just behind, clipped me and promptly joined me, sprawled on the stony ground. Such was my embarrassment I

jumped up immediately, remounted and insisted that we resume riding without dwelling on the causes of the crash (indisputably my lack of bike-handling finesse).

I can’t recall feeling any pain at all — until I got home, that is, when my hip began to ache, and then really hurt. It

got gradually worse for several days as it became clear I’d sustained quite a heavy bash and some nasty bruising. So how come it hadn’t hurt at the time?

“The tissues of the body do not have the ability, on their own, to produce the experience we call pain,” says Derek

Griffin, a physiotherapist with a PhD in pain. “What they do have is danger receptors, called nociceptors, which alert the nervous system and the brain to actual or potential injury or threat.”

In other words, pain is not directly produced by the hip or elbow that hits the ground; the bashed body parts merely instigate signals for the brain to decipher, filter and process as it deems appropriate.

“The brain pulls on many sources of information,” explains Griffin, “not only the circumstances of the injury. It also takes into account previous history, beliefs around pain, where the injury occurred, what’s going on in the surrounding environment and any immediate danger before it reaches a decision on whether to produce pain.”

In my case, my haste to flee from the scene and avoid the shame of having to face up to my error effectively negated the pain.

## Danger signals

Griffin describes the interaction between body and brain: “The nociceptors around your damaged hip tissues fired off signals to your brain, but because you were

distracted by other priorities — consciously embarrassed and in a rush to get up — your brain used its amazing ability to regulate the response. This is called descending inhibition; the brain reduces the amount of danger signals it’s receiving.”

As a result, I felt only a mild level of discomfort — disproportionately little pain when weighed against the fairly heavy impact. Had the circumstances of the crash been different, it might have hurt more.

“It can work the opposite way,” adds Griffin. “If you’re being hyper-vigilant,

feeling stressed or you have negative beliefs around pain, the brain can amplify the level of danger signals it receives, turning up the level of pain.”

The brain’s modulation of your sense experiences is happening all the time, not only when you crash. Whenever you feel pain, its intensity is determined by your brain based on multiple factors: sensory, perceptual, cognitive and emotional. It’s no longer sufficient to equate pain to damaged tissue. Science has shown it’s far more complicated than that. Your past experience, as well as your beliefs, expectations, mood and attitudes — whether conscious or not — all play a role. For cyclists, the implications of this are far-reaching. Whether you’re managing an injury, learning to tolerate hard training or striving to produce your best performance in a race, you need to develop an intimate relationship with pain.

## Feel your pain

To understand how pain makes itself felt, we need to fully appreciate its purpose. Pain is a symptom of damage, of course, but it is principally a protective mechanism: a discomforting, potentially even debilitating, safety barrier to stop you from causing yourself further harm. It hurts you for your own good.

“The revolutionary piece of new understanding,” says Professor Lorimer Moseley, a clinical neuroscientist at the University of South Australia, “is that pain is produced by the brain to make you protect yourself.”

Crucially, this mechanism does not function like an overbearing schoolmarm doing everything she can to restrict your fun. On the contrary, your internal purveyor of pain cares only about protecting you, and thus reacts in proportion to the perceived threat.

“Meaning is the critical determinant of pain,” explains Moseley. “If a [sensory signal] was evaluated by the brain as reflecting no threat to body tissue, pain would clearly be an erroneous output, serve no survival function and offer no evolutionary advantage.”

Educating oneself in pain is therefore a two-way process; as you experiment with and endure pain, you simultaneously assimilate and modify its meaning.

No one has more experience in communing with pain than Jens Voigt (see panel). Over 17 years as a dogged domestique of the pro peloton, he carved

**“As you endure and experiment with pain, you will assimilate and then modify its meaning”**

out a reputation for being able to shout pain into submission. But does he really believe he has a special talent for blotting out agony? “I think it developed,” he says. “At the start, I was just a kid with the desire to win, but I realised that if you can push yourself that one time more, it can make the difference between winning and not winning.”

#### Levels of tolerance

Voigt’s self-analysis conforms to established psychological models of pain tolerance. By resolutely associating the physical discomfort of exertion with the positive emotions connected to winning, he learned how to tolerate ever greater amounts of pain.

“When I got positive feedback for winning something, then in the brain it triggered the message that, in a hard situation, if you can push yourself for a moment into even

more pain, you might actually get away with it and you might actually win again.

By doing that over many years, I believe I pushed my pain barrier a little higher than other people’s.”

Getting to grips with the complexity of pain also helps

us understand the multifaceted nature of performance. Just as the brain determines pain based on a complex web of sensory signals, perceptions, emotions and memories, so is the feeling that insists: “Enough already! This is your limit, you can’t push any harder.”

#### An inconvenient truth

It was previously thought that this sensation arose solely from ‘issues in the tissues’ such as the accumulation of lactic acid and the depletion of glucose. But this ‘physical limit’ theory was always dubious, not least because almost everyone manages to summon an inexplicable burst of energy at the end of a race to sprint over the line. The inconvenient truth — a discrepancy between our perceived limit and our absolute physical limit — could not be fudged forever.

The latest research in this area, most notably by South Africans Professor Tim Noakes and Dr Ross Tucker, postulates

an anticipatory model of pacing, whereby exertion is regulated by the brain based on predictions drawn from a multiplicity of inputs.

“During exercise, [sensory] feedback from numerous physiological systems is responsible for the generation of the conscious rate of perceived exertion,” explains Tucker, “which is continuously matched with the subconscious template by means of adjustments in power output. This subjective rating is biologically linked, allowing pacing strategy to be adjusted to prevent catastrophic changes in the monitored physiological variables.”

This conjures up, for me, an image of a control centre swarming with miniature, pace-policing wonks obsessing over data — real-time versus historical — on multiple screens as they scream instructions to the innumerate

consciousness department next door.

And only one thing pacifies wonks: more data. Your control centre gets smarter as you cycle.

Pain is not what we thought. It is an emergent property of the whole human, mind and body, not reducible to tissue damage,

sensory receptors or any single physical structure or system. Pain refuses to be kept in a box. Indeed, Moseley has called for the study of pain to branch out across “neuroscience, immunology, endocrinology, psychology, sociology and philosophy... especially, perhaps, philosophy”.

So as the pace quickens and you struggle to hang on to the wheel in front, remember this: the danger signals fired from your quads to your brain are no more than a prelude; the amount of pain from here on — and how greatly it affects your race — will be determined by a grand, orchestral interplay between multiple systems, metabolites, hormones and neurotransmitters, as well as by your beliefs, memories, emotions, hopes and dreams.

Regardless of whether you win or lose, you’ll reach the finish line understanding yet more intimately what it means to hurt. Cycling is a study in pain. No one said it was meant to be easy.

## ‘Shut up, pain!’ Jens Voigt on handling hurt



**Cycling Weekly:** Did you really tell your legs to shut up?

**Jens Voigt:** Yes, absolutely. Also, it helps to have self-belief and think in a logical way. I told myself many times in races or in difficult situations: ‘They [other riders] are only human, like you. They cannot be stronger than you.’ If I suffer — and I’m a good rider — they must suffer at least as much as I am. Even if they’re pretending it’s easy, they must be hurting as well. Just by pure logic, they’re only human. You just hang on for dear life and survive.

**CW:** Did you train yourself to tolerate pain?

**JV:** I think so, yes, because when you feel unable to carry on, when your body tells you that, you still have another 20 per cent to go. It’s not that your body breaks down. Your brain wants to stop you earlier. What you realise is that beyond the point where you think, “I can’t do it anymore,” there’s a whole new level of, “I can still do it.” You have to teach your brain and your body: “No, no, no, we can go further.”

**CW:** Did you use any mental strategies or techniques?

**JV:** Yes. On climbs, I tried not to think, “Oh my God, I’ve got 15 or 20km of climbing ahead.” I just thought, “OK, I’m going to hold



on to this group until the next switchback or next traffic sign.” It helped me to split it up.

**CW:** Any others?

**JV:** It sometimes helped me to make myself just mad, angry and aggressive. That would be a last, desperate measure. That could create for a short moment some extra energy.

**CW:** How did you do that?

**JV:** I don’t know! Just thinking it’s about life or death, or thinking about the other riders in your group, that they want to steal your result — the result you need in order to earn money to feed your family. I’d look at it as though, in a way, they were trying to steal food from my kids, or trying to steal the holiday from my kids.

Sometimes it’s easier if you have people in the group you don’t like so much or people who’ve said something you remember. Or just sometimes you think about the world and it makes you angry; there is so much injustice and intolerance in the world that it’s easy to get mad sometimes. You cannot do it on a daily basis because it will have an effect on you and your well-being, but in a desperate last try, sometimes it helps.

**CW:** Tell us about a moment when you had to deploy all these techniques.

**JV:** One really hard moment was in the [2006] Tour de France that Oscar Pereiro won [after Floyd Landis was disqualified for

doping]. Floyd Landis had this magic ride, making a solo breakaway for 120km. He attacked early and everything was blown to pieces. We were climbing hard, doing a really hard tempo to catch him or reduce the time loss, and I was the last of the group.

All the time, I thought, “I’m hanging in here with all I have.” I was sure that if I went through all this pain and made it to the KOM, Bjarne [Riis] was going to come on the radio and say, “Jens, we need to ride tempo because we have Carlos Sastre in a good position” — and then I’m going to put myself into even more pain.

That was one of my most mentally strong moments in my career. I knew that if I was going to suffer like a pig for another 25 minutes, only to get to the top of the climb and then suffer even more. I was just hanging on, punishing myself, in and out of the seat, going left and right, looking for wind shelter, getting dropped, catching back to the group, really on the limit of blowing.

And sure enough, we crossed the hilltop and went into the downhill. I had just stopped pedalling for two seconds and had a sip of water, and Bjarne came on the team radio: “Jens and Christian [Vande Velde], we’ve got to ride tempo and start to chase Floyd Landis.” I was just digging deep, not thinking about the next day or the price I was going to pay on the final climb — basically just throwing all my energy out. That was definitely one of the hardest days.