With the help of a trainer and a robotic exoskeleton in development at UCLA, Mark Pollock is gaining control of long-dormant leg muscles and taking small steps toward a release from paralysis.

UNBROKEN

His specialty, he jokes, is acquiring disabilities. In fact it is resilience. With each loss—eyesight, mobility—**MARK POLLOCK** has upped his accomplishments. His quest for a cure for paralysis offers broader lessons on the pursuit of the impossible.

In 1998, when I was 22, I was studying for a business studies and economics degree at Trinity College in Dublin, Ireland. I was raised in Northern Ireland, and I wanted to be an investment banker. But really, I went to Dublin to continue my rowing career. I was racing for the University and also for Ireland and starting to break into the senior team at that stage. The things that I did defined my identity.

One morning in the spring of 1998, I was down at the boathouse, opening up the boat bays, and as I swung open the doors and looked out over the river, I noticed blurring around the edge of my vision. It was the same blurring that I had seen as a five-year-old when I lost sight in my right eye. I knew the blurring was another detachment of the retina, this time happening in the left eye. I didn't go rowing that day. I left the boathouse, got a train up to Belfast, to the hospital where I'd had operations previously. They sent me to Manchester, and two weeks later I had an operation from which I didn't recover. From then, in 1998, until now I've been completely blind. Twelve years later, I became paralyzed.

To make sense of these crucible moments, I've come to acknowledge that sometimes we have the luxury of choosing our challenges and sometimes they just choose us. What we decide to do next is what counts. In particular, I have identified three decision themes that we all face when challenges appear. To be a competitor or a spectator? To be an optimist or a realist? To be a collaborator or a soloist?

Amid the uncertainty and sense of loss that followed my blindness, I feared that I was going to have to sit on the sidelines of life as a reluctant spectator. But my desire to compete got me back in a boat, eventually winning silver and bronze medals rowing at the Commonwealth Games. I became an adventure athlete on a quest to rebuild my identity as a competitor, racing ultra-marathons in deserts and mountains. I started with six marathons in a week in the Gobi Desert. On the sixth anniversary of my blindness I ran the North Pole Marathon.

I'd completed plenty of endurance races, but I always felt the reason people patted me on the back is that I'd done these things blind. I wanted to do something that was really inspiring to me personally, regardless of the blindness. On the tenth anniversary of losing my sight I committed to compete in a race of three-man teams to the South Pole. To do it we had to race for 43 days in Antarctica. More than 1,000 kilometers of skiing. In temperatures as low as -50°C. Ultimately, we ended up finishing fifth out of six teams, which we were disappointed about. But in truth, the disappointment simply proved to me that we were there to compete and not just make up the numbers.

It took many years and thousands of kilometers to realize I was on a quest to rebuild my identity, to become a competitor again. Competitors are people who understand that in pursuit of success, the risk of failure travels with them. That's where I wanted to be: defined by my willingness to try.

Now, to be a realist or an optimist?

Back in 2010, the year after we reached the South Pole, I fell from a third-story window onto the concrete below. The friends who found me thought I was dead. The doctors in intensive care suspected I was going to die. I had fractured my skull, I had bleeds on my brain, massive internal injuries, and I couldn't feel or move anything from my stomach down. I ended up in the National Spinal Injuries Centre in the UK, a place called Stoke Mandeville. I was sur-

rounded by people who were paralyzed, some from the neck down, some from the chest down, some from the stomach down. I was better off than some and worse off than others. But what I couldn't admit in those early days was that I was one of them.

As I lay there I remembered listening to an audio version of Jim Collins' *Good to Great* some months before my accident. What jumped out at me was his conversation with Admiral James Stockdale, whose story is bleak. He was captured and locked up in the Hanoi Hilton at the height of the Vietnam War from 1965 to 1973. He was tortured multiple times and had no idea if he would ever get out. When Collins asked him, "Who didn't survive?" Stockdale said, "The optimists didn't survive because they kept thinking they'd get out by Christmas. And Christmas would come and go and they wouldn't be out. And Easter would come and go and they wouldn't be out. And then it would be Christmas again. Lots of those people became disappointed, demoralized. Many died in their cells."

Collins asked, "What's the difference between your approach and the optimists'?" Admiral Stockdale went on to say that he never lost faith in the end of the story, which is surely a hopeful view. But he also confronted the brutal facts of his current reality. It is this confronting of the brutal facts whilst remaining hopeful that I think defines Admiral Stockdale as a realist.

"TO BE A SPECTATOR OR A COMPETITOR? AN OPTIMIST OR A REALIST? A SOLOIST OR A COLLABORATOR?"

As I lay there, I wanted to be an optimist because the hopeful future would mean that I would walk out of there. But I risked being disappointed and demoralized if it didn't happen. So the obvious answer was that I should be a realist, hopeful about the future while confronting the brutal facts.

Being a competitor, that is having a willingness to try, and being a realist, having hope whilst confronting the brutal facts, those two things have freed me to tackle something which has never been done, which is to find a cure for paralysis.

This leads to the final choice: To be a soloist or a collaborator?

Over the last number of years, I've come to understand that spinal cord injury strikes at the very heart of what it means to be human. It turns us from upright, running, jumping forms into seated compromises of what we once were. We're not designed to sit down for the rest of our lives but that is the only option for up to 500,000 people per year after spinal cord injury. It's not just the lack of feeling and movement. Paralysis also causes spasms, nerve pain, cardiovascular issues, infections, kidney problems, all these things which stack up to exhaust even the most determined.

Worse, up to this point in history it has proven to be impossible to find a cure for paralysis. Yet history is filled with accounts of the impossible made possible through human endeavor, the kind of human endeavor that took people to the South Pole at the start of the last century. And, the kind of human endeavor that will take people to Mars this century.

Inspired by those stories of exploration, I figured there must be people out there exploring the fringes, seeking to cure paralysis. We didn't find any in Ireland. We had to look further afield. We had to go to America, England, Switzerland and elsewhere.

Specifically we found San Francisco-based engineers at Ekso Bionics who had created a robotic exoskeleton. Initially it allowed me to walk in their workshop back in 2012 and I've done over one and a half million steps since. But the robot was doing all the work for me. We needed something more. Fortunately, in 2013, we started working with a visionary scientist at UCLA—Dr. Reggie Edgerton and his team—who had just had a scientific breakthrough using electrical stimulation of the spinal cord allowing for voluntary movement of paralysed limbs.

We discovered that the engineers at Ekso Bionics and the UCLA scientists knew about each other,

REALISTS DISREGARDING THE IMPOSSIBLE

SIMONE GEORGE was engaged to be married to Mark Pollock when he took the fall that added paralysis to his existing blindness.

Rushing to the hospital, she found him bandaged, immobile and tied to tubes and wires.

"I kissed him the way you kiss a newborn baby, afraid of his fragility," Ms. George said in a 2018 Ted Talk that the pair delivered jointly, and which has garnered nearly 1.5 million views.

Mark advised her to leave. "You need to get yourself as far away from this as possible," he said.

"Are you breaking up with me?" Simone asked.

"You signed up for blindness, not this," Mark told her.

She replied: "What I can't handle right now is a breakup with someone in intensive care."

Nine years later, Simone and Mark remain together. Theirs is a partnership that relies on being realists who disregard the impossible.

Neither is a scientist. But as a blind man, Mark accomplished athletic feats that test the limits of human endurance, and as a human rights lawyer, Simone is committed to causes that many might dismiss as unsolvable.

They've already overcome a danger that doctors warned about before Mark ever left the hospital: Not to allow themselves to become too hopeful.

"We were told that hoping for a cure had proven to be psychologically damaging," said Mark. "But cancelling hope in favor of acceptance alone runs contrary to everything that I believe in."

PHOTOGRAPHS: COURTESY OF MARK POLLOCK

After he was left blind at the age of 22, Mark Pollock became an endurance athlete, running the world's most difficult marathons, once completing six of them in seven days in the Gobi Desert. His crowning achievement was leading a team in a race to the South Pole, above, amid temperatures as low as -50˚C.

of course, but as so often happens when people are busy doing groundbreaking work, they hadn't yet got together. That seemed to be our job, a way we could contribute to the cause.

We created our first collaboration combining those two technologies in 2014. For three months we moved into the UCLA lab. Every morning Reggie's team attached electrodes to my lower back, which pushed electricity into my spinal cord and excited my nervous system as I walked in the Ekso.

For the first time since I had been paralysed, I could feel my legs beneath me. Not the way I used to, but with the stimulator turned on, upright in my robot, they felt substantial; I could feel the meat of my muscles around the bones of my legs. As I walked, the electrical stimulation enabled me to voluntarily move my legs. As I did more, the robot intelligently did less. My heart rate rose to a running level of 140 to 160 beats per minute. My calf muscles, which had wasted to almost nothing, began to come back.

My fiancée, Simone, describes it like the moment when Iron Man plugs the mini arc reactor into his chest and he, and his suit, suddenly become something else altogether.

It was a start, but we're not finished yet. Since then we have been systematically forging connections worldwide to break through silos across disciplines and institutions to accelerate progress towards the cure. In particular, alongside my team, I have developed research projects valued at over $5 million involving rehabilitation; robotics; neuro-modulation; neuro-technology; virtual reality; and pharmacology. In addition, I co-created the Druid Collective, an initiative within the World Economic Forum to connect science and technology spin-out companies with relevant expertise and capital. So far, we have facilitated the formation of a $5 million venture philanthropy fund with a Silicon Valley VC and US philanthropic foundation to help early-stage funding of NeuroRecovery Technologies, a start-up focused on commercializing the spinal stimulators.

It's funny but I've started to consider myself more aligned with the Polar explorers than I ever did while racing to the South Pole. We have been working with incredible pioneers all around the world, who had unfortunately been working in isolation. I say unfortunately because we know that no individual, no single academic institution, is going to crack this particular problem on their own—but together we believe that they will. Despite the hero narrative being so compelling, it's rarely true. The hero is too often a soloist. That isn't how things progress. For the real breakthroughs we need people who are prepared to collaborate. So, I'm on a new expedition, this time to cure paralysis in our lifetime. To do it we are actively exploring the intersection where humans and technology collide and we are catalysing newfound collaborations. ◆

This story is drawn from a talk **MARK POLLOCK** delivered at a Brunswick conference in London as well as an interview in New York with **KEVIN HELLIKER,** Editor in Chief of the Brunswick Review.