



BACK FROM THE DEAD

After a serious traffic accident, Simon Lewis was left in a coma so profound doctors said he'd never recover. Then, to their amazement, his brain flickered back to life...

Are you ready for our drive then?" Simon Lewis, 56, comes hobbling into his parents' living room in Sherman Oaks, a suburb of the San Fernando Valley, north of Los Angeles. An Englishman by birth, his public-school accent remains unsullied by nearly 40 years in the United States. "Brave man!" he chuckles.

"Brave" is one way of putting it. "Foolish", another. After all, Lewis has constricted vision in his left eye, or "peripheral neglect" – he needs special glasses to see the road. He also suffers from a perceptual distortion known as "flat time", which means he can't distinguish the chronology of his memories. The upshot of this in the present is that he struggles with the sequence of events, such that if you play him a piece of film backwards, he likely won't even notice. "So the trouble is," he explains, "if I see a pedestrian on the side of the street, I can't tell if he's going to cross or just stand there."

But most of all, Lewis just hasn't had much luck with cars. The reason for his impaired vision, his flat time and his limping gait is a road traffic accident 20 years ago. Crashes seldom make the news in Los Angeles, they are so routine. But when Lewis and his wife Marcy were brutally T-boned one evening in March 1994, the consequences were so shattering the *Los Angeles Times* ran it on the front page.



'Simon is the only person with this degree of physical impairment functioning at such a level'



Park, a well-heeled suburb of mansions and manicured lawns. Lewis was a thriving film producer of 36, best known for the huge comedy hit *Look Who's Talking*, starring John Travolta, and Marcy, 27, was in marketing. They'd been married five months.

Then out of nowhere, a white Chevrolet van hit them at 75mph, an absurd speed for the neighbourhood. Marcy was killed outright and Lewis was so thoroughly broken that the paramedic on the scene took him for dead. The Chevrolet driver, meanwhile, fled the scene, and was never caught. That was the story the *Times* ran with – the destructive experience of a hit-and-run in a city where everyone drives everywhere.

Twenty years on, that crash continues to reverberate. Only this time, it's a happier story, one that Lewis has told in a book, *Rise and Shine*, and before large audiences at numerous public events. It's the story of his astonishing recovery, and it not only gives hope to sufferers of traumatic brain injury (TBI), but provides proof, in the most dramatic fashion, of the brain's incredible ability to regenerate and reorganise itself.

Doctors simply didn't expect Lewis to live on the night of "the trauma", as his mother Pat calls it. When two Jaws of Life machines freed him from the wreckage, he'd sustained a broken skull, jaw, arms, clavicle and pelvis, with compound fractures in nine ribs. And then there was the "catastrophic

WRITTEN OFF Simon Lewis's life changed forever when he and his wife, Marcy, above, were the victims of a hit-and-run in 1994, main. He still bears the scars of numerous operations, top

of his right hemisphere and caused a contusion to the brainstem and severe internal bleeding. He was so bloated with blood that his brother David, who was called in to identify him on the operating table, remembers "this enormous Michelin man lying there with raccoon eyes". Lewis went into a coma that night – the most severe coma on the internationally accepted Glasgow Coma Scale (GCS). On a scale of three to 15, GCS3 means no motor response, no verbal response and no visual response.

It's as close as one can get to death without actually dying. And although the Glasgow Scale is considered somewhat crude and subjective for a field as complex as traumatic brain injury, studies suggest that patients with GCS 3-5 have less than a 10 per cent chance of a survival with good outcomes, particularly if they fail to respond within two weeks of the injury. Lewis remained in that state for 31 days.

When he came to, Lewis was a shell. He had little awareness of his surroundings. He couldn't read or write, and he had acute short-term amnesia – he wasn't aware that he'd been in a crash at all. He struggled with language, attention, visual-spatial awareness and basic comprehension.

Doctors deemed his cognitive function so low it was untestable – that is, an IQ below 50. It was likely, they said, that he would have to rely on others for even the most

But then his recovery began. It has been a long road, littered with surgeries, and even now it isn't over – but, today, Lewis has not only regained most of his cognitive function, he actually has an IQ as high as the one he had before the crash. He is an extraordinary medical phenomenon and gives hope to all those facing similar challenges.

The odds of surviving a coma are notoriously hard to predict, brain injury being the most complex of problems afflicting the most complex organ in the body. Some people do make amazing recoveries. Former cheerleader Sarah Scantlin, from Kansas, began talking 20 years after falling into a coma after a hit-and-run accident. Carrie Coons, an 86-year-old from New York, regained consciousness after a year and engaged in conversation. The Olympic rower James Cracknell has written a book, run marathons and stood as an MEP, despite serious damage to his frontal lobe in a 2010 cycling accident.

But, in general, many patients struggle to regain full brain function and the odds of doing so fall off sharply the longer the coma continues. So when, in June, the former Formula One driver Michael Schumacher emerged from a 24-week coma, medical experts were quick to manage the expectations of his supporters. Dr Ganesh Bavikatte, of the Walton Centre in Liverpool, which specialises in neurological issues, spoke of a long road to recovery, “filled with uncertainty and frustration”.

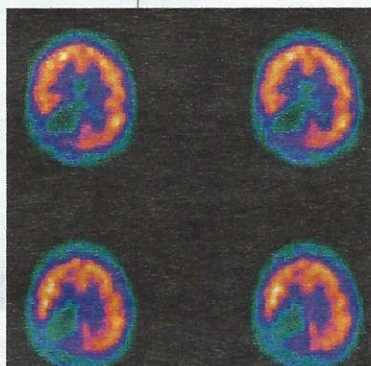
In Lewis's case, it took a village to rebuild his mind – in his talks he attributes his progress to issues as disparate as circulation and jaw alignment. But he owes much of it to Dr Lois Provda, an educational therapist in West Hollywood – not a ground-breaking scientist, or prize-winning researcher, just a conscientious practitioner who helps those who have slipped down the learning curve. When he was sent to her, in October 1995, his IQ had climbed significantly to 89, just a point below the lower edge of “normal” (between 90 and 110) on the Revised Wechsler Adult Intelligence Scale. But when she was finished with him in February 1997 – after three sessions a week, with gaps for the occasional surgery – Lewis had an IQ of more than 151, close to so-called “genius” levels.

Dr Provda is elderly and struggles to remember the details of Lewis's case, but her work speaks for itself. Today, Lewis is in possession of not a damaged brain but an overactive one. Bright eyed, beaming and permanently cheerful, he's like an effusive academic, propelled from tangent to tangent by his own enthusiasm. A Cambridge graduate (in law), he was always bright, much like his brothers, David and Jonathan, a barrister and stockbroker respectively. “All my boys are high calibre,” says Pat, with pride. But only Lewis is missing a third of his right hemisphere and still capable of fielding questions about neuroplasticity and possible reforms to the education system, his pet subject. That he's not a neuroscientist or policymaker, but a movie producer, just makes it all the more impressive.

“That's why we chose Simon,” says Dr Suzy Walton, a psychologist and deputy chair of the RSA, who introduced Lewis when he spoke at the London-based organisation last year. “Plenty of people with brain injuries survive, but he also has ambition, drive, confidence and, on top of that, he puts himself out there as a public speaker, which means he's able to cope with nerves and anxiety. He's the only living example of someone with that degree of physical impairment who can function at that level.”

For Lewis, talks like the one he gave at the RSA are a cherished opportunity to spread the good news about the

Your attitude determines how well you recover. Patients who say, ‘I don't need advice’ do poorly’



LOOK, I'M TALKING

Lewis, who produced the hit 1989 comedy ‘Look Who's Talking’, suffered permanent damage to the right parietal and occipital regions of his brain, top. He returned home from hospital in late 1994, above

brain changes the way it functions. Until relatively recently neuroscientists believed each part of the brain had a well-defined, unchanging role; if it was damaged there was little you could do about it, you just had to learn to live with it. But it is now widely acknowledged that the brain is more versatile than that and that, with the right sort of cognitive training, it is possible to persuade other areas of the brain to take on, at least to some extent, the tasks formerly carried out by those areas that have been damaged.

“I remember this influential doctor from UCLA told me, ‘Looking at your recovery, it's a miracle,’” says Lewis. “And I just thought, ‘That's not right. I've come this far because I've seen people who have helped me.’ There are techniques that rebuild the processes of your mind.”

Cognitive training is not new. It first emerged after the world wars, to treat the brain-injured soldiers returning home. And ever since, a body of research has accumulated, especially in the Seventies and Eighties, which honed the methods that Dr Provda used on Lewis. She evaluated him first, and then took him through a series of games and exercises to develop his deficient skills.

“She had me working with Kapla building blocks, and memorising numbers backwards and forwards,” says Lewis. “I had to put cartoon images in sequence, to help me with cause and effect, the idea that one event leads to another. Another exercise was called Interactive Metronome, where I'd have to write things with a metronome clicking out a beat. It was exhausting!”

For Lewis, these techniques have implications for us all – not just the head-injured. “What my experience demonstrates is how much we can train the brain measurably and

repeatedly,” he says. “And that applies to everyone. We need to start screening children at school who are falling behind, and treat their difficulties, rather than writing them off.” He believes “brain training” can help children diagnosed with ADHD and dyslexia and those at risk of dementia.

And he's not the only one. Today, cognitive training is big business. In the past decade especially, companies such as Lumosity, Posit and Cogmed have harnessed the language of physical fitness – “it's a gym for the mind!” – to sell a multiplicity of apps, games and digital exercises that promise to, in the words of the Lumosity publicity, “build your cognitive reserve”. According to SharpBrains, a neuroscience market research consultancy, the global revenues of the brain training industry increased from \$200 million in 2005 to \$1.3 billion in 2013.

Scientists, however, are ambivalent about the claims such companies

make. Very little of the research that shows brain training works (in those who have not been the victim of a severe brain injury) has been peer reviewed. And one study, published in 2010, which monitored the outcomes of 11,000 adults who took part in exercises designed to improve their reasoning, memory, attention and visual-spatial skills, concluded that they got better at carrying out the tasks themselves but were not able to transfer those improvements to other areas of life.

Headway, the British brain injury association, is also reluctant to set too much store by brain training games: it

stresses the importance of bespoke care plans tailored to each patient's needs, which tend to be complex and multifaceted. In the best case scenario, patients work with neuropsychologists, speech and language therapists, occupational therapists, social workers, physiotherapists, doctors, counsellors and cognitive behavioural therapists.

Intensive brain training exercises, in fact, can actually exhaust people, sap their confidence and end up being counter-productive, the association believes.

"It's people's attitudes and support system that really distinguish who recover well and who don't," says Jeffrey Kreutzer, the editor of *Brain Injury* magazine, and professor of physical medicine and rehabilitation at Virginia Commonwealth University. "Patients who stay at home, and say, 'I don't need advice, I'll figure it out myself, leave me alone.' They do poorly. But someone who seeks out social relationships, volunteer work, does much better. Recovery isn't just neuronal – it's a process that involves family support, as well as a positive attitude."

These factors undoubtedly played a part in Lewis's recovery. His book *Rise and Shine* is, among other things, a catalogue of his family's persistence in the face of setbacks – doctors making mistakes, surgeries to correct surgeries, and the dehumanising ordeal of the American health care system.

And it's unlikely he would have fared much better in Britain. Despite there being, on average, 55 admissions to hospital for severe head injuries in the UK every day, and doctors acknowledging that proper rehabilitation is crucial to improving patients' quality of life and long-term outcomes, the provision of services is extremely variable across the country. "Many people slip through the net and are discharged from hospital with little or no support," says Richard Morris, a spokesman for Headway. "Helping these people access the help they need is one of our most important functions."

Simon Lewis continues to receive treatment two decades after his accident and still has significant disabilities. His brain no longer communicates with the muscles that pick up his left foot, so in order to walk he relies on an ingenious device that senses his steps and stimulates the muscles accordingly. His reconstructed pelvis remains an issue, not to mention his vision problems and perception of time.

"My memories used to be like a photo album," he says. "You could flick the pages and go back in time. But now, the album's gone, all I've got are the photos, and I can't tell what order they came in."

Furthermore, his memories are all equally vivid, which means even though his accident was 20 years ago, memories of the trauma and his wife's death feel as close as those of the film he saw last week. "I remember my old life," he says. "They're very fond memories. But for a long time I couldn't bring myself to recall my wife. When I started writing *Rise and Shine*, I didn't write her name. I still almost never say it because I know I'll tear up. Because I do feel sad sometimes, when I think about how I don't have a family. That's the thing about brain injury, you get quite emotional. There's no filter anymore."

Nevertheless, Lewis remains overwhelmingly positive. "I never lose sight of the fact that I get a chance that my wife will never have. It's a responsibility of survivors to never complain, and to make the most of what remains." And in this new post-coma chapter of his life, he has found himself strangely unburdened. "I don't feel anger anymore at all," he says. "There are some emotions that have just melted away."

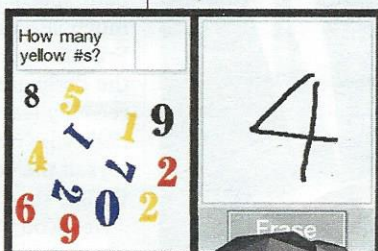
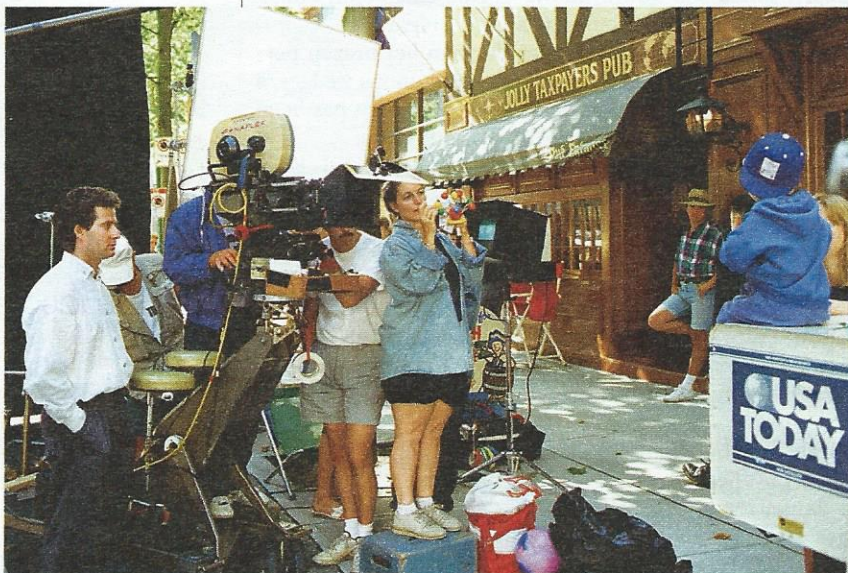
He lives with his parents, both of them now retired. But at

'For a long time I couldn't bring myself to recall my wife. I still almost never say her name'

ence are being sown. He's back at work on the science fiction script that he was developing at the time of his accident. And writing this time around is a new adventure. He considers his perceptual quirks an asset, a fresh and creative take on life. His hearing is much more acute and, for Lewis, there's even an upside to visual impairment.

"Have you heard of blindsight?" he asks, excitedly. "It's a perfect example of neuroplasticity. I had a doctor hold up coloured cards outside of my field of vision, and I could guess the colours correctly even though I couldn't see them! What happens is the visual information from the retina bypasses the conscious brain and is processed by the subconscious. So I'm constantly in touch with my subconscious. It's like a waking dream!"

It's time to see the waking dreamer behind the wheel, before it gets late and Lewis starts to tire. He has enough stacked against him as it is. The plan is to just pop around



THE BRAIN GAME

Lewis, pictured top on the set of 'Look Who's Talking', credits his recovery in part to exercises similar to those featured in Nintendo's 'Dr Kawashima' game

the corner for a coffee, maybe a mile or so. So we leave the house and buckle into his Lexus automatic, Lewis talking constantly as he goes.

"Right so let me put on my prismatic glasses [glasses that give him back his peripheral vision], make sure there's nothing behind me. No that's fine. Right, so I see that guy with the dog. The coast is clear. OK then!" And off we go, nice and smooth. It took him three tries to pass his driving test again, but he made it eventually, which was much more than a symbolic victory for Lewis – as everyone in this city knows, there's just no life without driving in Los Angeles.

"You have to get back in the saddle, it's the only way," he says. "I once spoke at this community event for stroke victims – there were about 100 people there. And I was demonstrating the NESS, the device I use to help me walk. I'll never forget, this man in a wheelchair asked, 'When can I start jogging again?' And I love that attitude – it's so American. Not walking, 'jogging!'"

So Lewis is nothing if not hopeful about his future. About the prospects of having a family, and children of his own. "It's probably my head injury speaking, but I'd like to meet someone," he says. "So I've started dating again! I met a lovely lady last week actually. I realise my income is limited for now, but you never know."

We arrive at the coffee shop. He pulls in and beams – this driving lark is easy. "I've been so fortunate in my life if you think about it," he says. "There's something wildly improbable about recovering from my injuries. They were telling my brother in the ICU, 'No one thinks he's going to make it.' I have everything to hope for."