

PHOTOGRAPH BY NICO CAVALLOTTO



# Powering Up

## Are Computer Games Changing Our Lives?

Rebecca Mileham

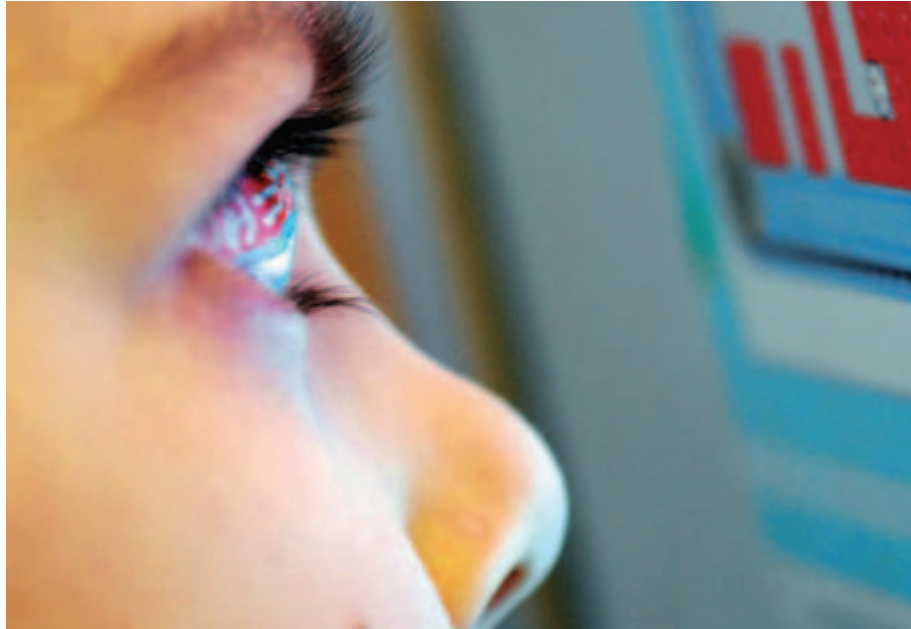




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#### **British Library Cataloguing in Publication Data**

A catalogue record for this book is available from the British Library

ISBN: 978-0-470-72310-4

Typeset in 9.5 on 14 pt SM DIN by SNP Best-set Typesetter Ltd., Hong Kong

Printed and bound by Printer Trento in Italy



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# Introduction

**In five decades, games have** gone from nerds' niche to a cultural phenomenon and multi-million pound, global industry. On the way, they've gathered associations that mean we regard them today with a curious mix of wonder and mistrust.

But I believe they've got a huge amount to offer us all. In this book you can explore the latest scientific research into how games are changing our lives. What's their impact on our **health**? Are games changing the way we **think**? How are our **identities** changing as a result of games, both online and off-line? What is science's view on whether we get **addicted** to games, and if they can make us **violent**? How are games changing the way we **learn**? What's their potential effect on what we **believe**? Finally, what can we say about how they might change – and change us, in the **future**?

By examining what the science is showing, and what the experts are saying, I want to look beyond the fear and the hype and see where computer games could take us next. For the first time, this book brings together the thinkers and doers in computer games research – and tells some stories about the power that computer games really have.

Some of the questions I seek to answer in the book – particularly those connected with the negative impact of games – are those the media ask, and those we ask ourselves as gamers, partners, friends and parents. You'll find plenty of evidence in the book about the bad as well as the good of gaming. But as a result of exploring the answers to these negative questions, I've become convinced that the *other* questions are actually the more important ones.

Rather than asking repeatedly what effects computer games are having on teenagers' propensity for violence, I wonder if we should be exploring how games can help beat bullying and empower the young? Instead of endless concern about the neurological effects of 'game addiction', why don't we try to take advantage of the idea that our brains find games a wonderful way to learn? And rather than thinking games are childish and trivial because of a few juvenile blockbusters, why can't we focus on the creative and thoughtful games that do exist and say 'This is what we want to play!'

Who am I to make these claims for games? I don't think I've got the credentials to be considered a gamer, although I've always been surrounded by people who love games.

One of the first computer games I played was called House. It was programmed in the arcane language Fortran by my enterprising dad at his office, on a Rainbow officially intended for performing engineering calculations. My younger brother, Greg, and I would explore its sprawling map, going from room to room in search of treasure – including the fabled jewelled jaglock – while attempting to avoid the Kraak, whose menacing presence was ever-near. If you found the silver sword, you could cut yourself free when goblins tied you up. If you found the emerald earrings, I'm not quite sure what benefit you gained.

At home, I played the platform adventure game Starquake on an Amstrad CPC, and the names of the teleport stations – Vorex, Snody, Quore, the elusive Raliq – still make me go all glassy-eyed. It wasn't a taxing game – indeed, I didn't have any interest in anything more physically or cerebrally challenging. I just enjoyed getting the unstable planet's core elements safely back in order – a job well done. But piano practice took me away from the screen and I don't think I played another game until college.

Greg, on the other hand, put in the required number of hours to be considered a bona fide gamer during his school years. He incidentally picked up a facility with design and programming that form the basis of his professional life today.

I spent my college days in the company of science and engineering students, 80% of whom were male and liked nothing more than a 3-hour bout of frantic 3-D shooter *Descent* or the spooky adventure game *Alone in the Dark*. What held much greater attraction for me was the dawn of the first web-browser, Mosaic, and my first, guiltily addictive, sessions on Internet Relay Chat. Exploration, interactivity and conversation – these were activities that pushed my buttons. It made sense that the stunning and immersive *Myst* should catch my attention, and that the hours I spent playing it should have been in the company of the man I then married.

Yinch is a computer games programmer, and worked crazy hours in the industry while I worked sometimes-crazy hours in my job at the Science Museum, London, and as a science journalist. It didn't leave much time over for gaming. Once we had added two children to our household, the only computer games played tended to be the sort that are brought to you by the letter 'a'. Until we got a Wii, anyway.

I want to change all that now. I've got excited again about playing games as I've researched and written this book. I do want to get back and finish the *Myst* series – and there are loads more I've got to try. I've also surprised myself by wanting now to *make* games, as some of the people I've talked to do every day. With Yinch in the house, this ought to be feasible – although now that my project is drawing to a close, I ought to let him do some of his own work for a while.

I also want to see what's coming next from the creative people who I've met in the industry – many, many of them fascinating women and men with scientific and

gaming credentials galore, and enthusiasm to match. I interviewed 60 experts for the book, picking their considerable brains on topics from psychology to neuroscience, from game design to education, from gaming and its impacts to the technologies of the future. Their knowledge and ideas, so freely shared, I have gratefully received and I hope faithfully represented.

In addition to the interviews, over 150 people contributed their experiences to the book through an online survey. I heard stories from gamers in America, Australia, across Europe and Asia (and one lone entrant from Africa), which have influenced my thinking and colourfully illustrated the book. I hope the sample, not intended to be representative or statistical, gives a flavour of how players really feel about the games they play. A heart-felt thank you to those who revealed their inner gamer.

Inevitably I have made some decisions in how to define and organise the information in the book, which I will briefly explain: I have called all games mediated by computer technology *computer games* whether they're played on a console, a PC, a mobile phone or in virtual reality. I have probably erred on the side of generosity in what I've classified as a game: where games technology – like a Quake engine, for example – is used to explore a scientific principle, that seems valid and revealing. Games might be psychological, exploratory, carried out using VR or a hand-held gadget. The exception is online gambling which has its own literature and is not covered in this book. I do include the online worlds like *There* and *Second Life*, which the research shows at least *some* players consider to be games. I see them as arenas in which you see psychological games played all the time; and where it's perfectly possible to experience social death. Sounds like a game to me.

I have received colossal support from Yinch and from my parents in writing the book. Their encouragement, active help and expertise and ingenious entertainment of the children is how I got the project finished. Now that it's done, I do plan to spend more time with my family. Maybe we'll play some computer games.

## Glossary

Although it's not necessary to know a lot about computer games to follow the arguments in this book, here are brief definitions of some game terminology I've used:

**3-D game** – simply, a game that takes place in a world that can be explored in three dimensions rather than two. 2-D games are viewed either as 'top down' (bird's-eye) view or via action that scrolls from screen to screen (see platform game). Early 3-D games often appeared in isometric projection, a simplified way of showing a 3-D environment on a screen. Greater computing power now allows games to process and display 3-D scenes in real time.

**Adventure game** – these games often involve exploring a world, solving puzzles and looking for clues to work out the solution to a mystery.

**Arcade game** – games originally played on coin-operated arcade machines, but often now available for the PC, characterised by simple controls and short levels that rapidly increase in difficulty.

**Console game** – as opposed to a PC (personal computer) game, a console game is played on a dedicated piece of game hardware with a controller, and often displayed on a television.

**Engine** (as in 'Quake engine') – the underlying core software of a computer game. Engines can often be reused for different games or to allow users to create their own versions of a game.

**First-person shooter** – players 'see' the world directly through the eyes of their character and progress or achieve goals in the game through the medium of blasting away at enemies using a gun or similar weapon.

**Levels** – these are the stages of a game, sometimes taking place in a sequence of increasingly challenging environments or against differ-

ent opponents, through which the player works in order to achieve the outcomes of a level-based game.

**PC game** – a game available to play on a personal computer (contrast with *arcade game* and *console game*).

**Platform game** – a type of 2-D game in which players jump to and from platforms or over obstacles as the game scrolls from screen to screen.

**Real time** – games wherein the action takes place continuously, as opposed to a turn-based game.

**Role-playing game** – players take on a fictional role, and usually develop the character through a mechanism that reflects experience (for example, work or combat). Massively multiplayer online role-playing games (MMORPGs) can involve thousands of players interacting in a shared environment. Action takes place in a persistent ‘world’ that develops and changes even when the player is absent, often with a fantasy theme.

**Strategy game** – a game that requires the player to make plans and high-level decisions to determine the game’s outcome (rather than luck or quick reflexes playing a large part).

**Turn-based** – games in which players take their turn in their own time, instead of all interacting together in real time.

# 1

# Can Computer Games Affect Your Health?

## Introduction

**Two teenage boys** steps onto patterned mats on the floor of their classroom. Their attention is firmly focused on a TV screen in front of them, and they seem oblivious to their peers who crowd around them. A beat starts, then catchy music, and as arrows scroll up the screen, their feet hit corresponding arrows on the mat below. Forwards, backwards, side-to-side, they jump and swivel to keep in time. They're not mucking about or playing for laughs – this is serious dancing. A few minutes later, the manic music and funky footwork are over, and one boy mops his face with his vest.

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If you'd told me you could get teenage boys to dance at school, I'd have been sceptical. If you'd told me you could get teenage boys to dance, in their classroom, in broad daylight, in front of a judgemental gaggle of their peers, until they dripped with sweat, I'd have been downright disbelieving. Yet this is what's happening in schools all over the USA. Dance Dance Revolution (DDR) is a computer game based on dancing to music videos created by the Japanese company Konami. The way to play is to follow the arrows that scroll up the screen overlaid on the video: sometimes tapping with a toe, sometimes jumping to place both feet on two arrows at once. The music sets the beat – sometimes steady and reminiscent of aerobics classes, more often frenetic and driving. The more arrows you hit at the right time, the higher your score.

**One PE teacher** has estimated that in a **45-minute class**, **children's steps add up** to running a **mile and a half**

Games like Dance Dance Revolution are motivating schoolchildren to get moving.



PHOTOGRAPH © MICHAEL TEMCHINE/NYTI/REDUX



The idea to try using gaming equipment in school PE lessons came from an academic at West Virginia University's Motor Development Center. Linda Carson was surprised one day to see a queue of kids waiting to use the arcade version of DDR in a Philadelphia mall. 'There were all these kids dancing and sweating and actually standing in line and paying money to be physically active', she told the *New York Times*. 'And they were drinking water, not soda.'

A trial project in 20 schools was a hit with classes – and now the state plans to install the game in all 765 of its public schools during 2008. One PE teacher has estimated that in a 45-minute class, children's steps add up to running a mile and a half – some even further.

In this chapter, I examine the evidence that computer games can affect your health – for better and worse. Are we breeding an obese generation of computer gamers who can't get off the sofa? Or can all games actually help you keep fit? Do games give you square eyes, or actually improve your vision? And which games have the power to control pain and illness?

## Does Gaming Make You Fat?

**The Dance Dance Revolution experience** really is revolutionary. The idea that a computer game could raise your heart rate and shift some calories is in profound contrast with our cultural perception that games create couch potatoes. In the current climate of concern about obesity, particularly in childhood, screen-based entertainment is usually one of the activities first in the firing line. Indeed,

the National Obesity Forum, while acknowledging that the development of child obesity in the UK has not been well researched, lists 'time spent in inactive pursuits' among the potential risks. Its president told the BBC recently that parents 'must stop' their children from 'watching TV and playing computer games all the time – these lifestyle factors are key'.

Parents are understandably concerned about a link between games and muscle-rot. One mother of two young children told me by email: 'In a society where an increasing number of our children are obese, and through the increase in technology have lost their ability to socialize and interact with each other – shouldn't we be advocating physical activity, imaginary play and socializing with real human beings?'

These sound like common-sense concerns. Yet, according to a vocal minority of experts, the received wisdom has no basis in science at all. Michael Gard lectures

Shouldn't children just get outside more to combat the rise of obesity?



PHOTOGRAPH BY BOBBI ROBBINS

in physical education at Charles Sturt University in New South Wales, Australia, where concerns about obesity, TV and gaming are prevalent. He recently completed a 4-year study of assumptions about the causes of obesity, and he's made some rather surprising discoveries. One of the biggest is the realisation that the evidence for a causal link between media use and obesity is extremely scarce: the first simply isn't proven to cause the second.

Michael doesn't deny that obesity is now widespread. In Western countries, up to 70% of adults are now overweight or obese, while up to 40% of children fall into these categories. And it's not that overweight people don't watch TV: 'The research on computers and television suggests that children who use a lot of TV *are* more likely to be heavier and less fit', he told me. But what Michael disputes is the idea that gaming and television *cause* that obesity. He thinks that, as a society, we've got that quite wrong.

**Reviews of the research in this area say that many of the children who do the most computer game-playing also do the most physical exercise**

'For years, people were determined to prove a link between obesity and sedentary activities', he tells me. 'There is a common-sense argument that television and games displace physical activity – a rationality that more of one equals less of the other.' The trouble was, no matter how many studies scientists did, the evidence for a link didn't come. In fact, it was rather the opposite.

'There is a consistent finding that TV and computer use is not a very strong predictor of physical activity levels', says Michael. But hang on, aren't we always being told that children who play games are sofa-sluggards? Well, there's more:

'Reviews of the research in this area say that many of the children who do the most computer game-playing also do the most physical exercise.'

## Mind-Changing Science

**Revolutionary, isn't it? Michael certainly** found some resistance in the scientific community to his ideas. 'When I wrote a discussion paper for a British think tank (*Obesity and Public Policy: Thinking clearly and treading carefully*, 2007), a couple of obesity scientists said they had not heard of me; they doubted that I was an academic. They questioned whether I worked for a real university or whether it was a front for the fast food companies.'

This is ironic when you ask Michael what he thinks are the real causes of obesity. 'I feel the problem is the ubiquity of bad quality food. Obesity was flat-lining until 1970, when it spiked up, at the same time as the rise of mega food corporations, and high-calorie food.' Is there scientific evidence that Western tendencies to be 'fast food nations' is to blame? Michael admits the published evidence is still patchy. 'Most research that tries to track people's average caloric intake since the early twentieth century doesn't find any change. But there's been a huge increase in production of chocolate and soft drinks, even though people don't report eating more food. Well, those snacks have got to be going somewhere.' He suspects that people have stopped classifying snacking as eating. 'The fast food companies' strategy is to make it normal to eat between meals', he explains.

Despite these findings, the 'unhealthy gaming' myth has yet to be busted in popular culture. Renowned children's author Michael Morpurgo contributed a telling foreword to a book published in 2007 entitled *How to stop your kids watching too much TV, spending hours on the computer, wasting days on the GameBoy, endlessly texting friends, etc . . .* He wrote:

'Now children have in-house entertainment of every conceivable variety, and all instantly available, instantly stimulating. Like fast food, it is seductive and compelling, and can become deeply habit-forming. Like fast food, too much of it is seriously bad for you. We know that.'

But it turns out we don't know that at all. To Michael Gard, there are strongly social reasons for views such as this. 'There is a long-standing suspicion of technology that is quite deep-rooted in our culture', he says. 'There was even an argument in the scientific literature for a while that TVs and games were *more* sedentary than other sedentary pursuits, like reading – they were supposed to be putting children into a zombie-like state. There was never much evidence.'

Nonetheless, the link goes on being made. The British Dietetic Association (BDA) reported in June 2006 that children spend two and a half months on average each

The rise in obesity began with the rise of easily available high-calorie food, according to Michael Gard.



year staring at screens. The survey of 3000 school children found a fifth of their time was spent playing video games, watching TV and using computers. It was a finding worth serious consideration in terms of physical and social impacts. But instead, the BDA used it as hook for obesity warnings and diet advice.

It may not even make sense to put computer games in the same category of activity as watching television and videos. Research published in 2006 questioned whether computer-game playing should be called 'sedentary'. Academics at the Exercise and Sport Science Department of the University of Miami measured the metabolic responses of 21 boys aged 7 to 10 as they played Tekken 3 for 15 minutes on a PlayStation. They found that the boys expended a significant amount of energy playing the game, showing increased respiratory rate and ventilation – the equivalent of walking at 2 miles per hour. OK, so the children didn't exactly get out of breath – it wasn't quite enough for the experience to be rated as 'moderate activity'. But the calories expended would, the researchers calculated, add up to a weight loss of 1.8kg a year if the player spent an average time at the keyboard or console: hardly a recipe for increasing flab.

**It may not even make sense to put computer games in the same category of activity as watching television and videos**

Another significant difference between gaming and other activities is that, when your hands are busy with a keyboard or game controller, it's impossible to do much 'junk eating'. Research suggests that one factor in children becoming overweight is the over-consumption of foods deliberately marketed to young people. And there

certainly is a lot of food advertising: one American study estimated that during children's television programming, viewers were exposed to one food advertisement every 5 minutes. An influential obesity report (*The Role of Media in Childhood Obesity*, Kaiser Family Foundation 2004) noted that 'From SpongeBob Cheez-Its to Hulk pizzas and Scooby-Doo Marshmallow cereals, today's grocery aisles are filled with scores of products using kids' favorite characters to sell them food.'

Some academics are now joining Gard in his unconventional views. And if the science doesn't support claims that screens equal obesity, maybe health professionals need collectively to rethink their public pronouncements, says Michael Gard. 'If experts want to advise parents about how they should parent – or to advise any of us about how we should live – then it is probably a good idea to base this advice on sound assumptions'.

## Could Gaming Make You Fit?

**Gaming doesn't make you fat.** So could it help you stay fit – or get fitter? If Dance Dance Revolution isn't your game, there are other bits of kit that might be. Research published in January 2007 showed that playing a computer game that required players to move about – unsurprisingly – used more energy than a sedentary one. The project indicated that by playing a game that used a controller such as a Nintendo Wii, players could triple energy expenditure.

It's not the only get-up-and-play technology available. Research at Heriot-Watt University examined how much physical exertion was involved in playing games using Sony PlayStation's EyeToy. 'I tried an EyeToy by chance, and I found myself quite breathless after only a couple of minutes playing one of the games', says Alasdair Thin, a lecturer in human physiology. 'So I figured that active gaming may well have the potential to be a novel form of exercise.'

The Kinetic Videogame is designed as a workout, with a virtual personal trainer and exercise schedules. 'We decided to independently test it against a standard exercise test on a cycle ergometer', explains Alasdair. 'It was possible that the game might be either too easy or too hard and therefore limit the intensity of exercise that the subjects could engage in.'

During testing, young adult players waved their arms, kicked or nodded their heads while having their heart rate and oxygen consumption measured. The 10-minute aerobic session of the game Cascade resulted in the subjects' heart rates reaching the lower end of the range recommended by the experts (the American College of Sports Medicine) for a training effect. Intense 3-minute bouts of Side-winder raised the players' heart rates to the top end of this range. After a total of 36 minutes' playing time, Thin calculated that each player had expended on average about 300 calories – about the amount you'd use walking briskly for an hour. 'Not only does it provide a fun way to exercise and if you want, even a degree of competition with others', said Alasdair, 'It also may help individuals who want to exercise in private if, for instance, they lack confidence, have poor coordination or body image issues.'

So it's good news for all of us who prefer to wear Lycra behind firmly closed doors. And researchers are looking creatively at new ways to use the power of gaming to keep us on the move. Educational innovator Futurelab, based in Bristol, UK, has devised a wrist-mounted pet aimed at getting children to exercise more. The tamagotchi-style creature, known as a Fizee, measures the wearer's heart-rate and motion, using a scoring system to relate the figures to the health of the digital pet.

Dan Sutch, the Futurelab researcher who initiated the project, told me how Fizees were intended to promote health: 'Obesity isn't only caused by children not getting enough exercise – the problem includes diet, economic and social issues, education and understanding too. Fizees tackle two of these elements – exercise and



education.’ The game element of the Fizzee was key in creating an engaging activity: ‘We wanted to develop an approach that children would choose to become involved in and could become immersed in, as they do with digital pets and games’, says Dan.

Fizees are a pet, a game and a learning device rolled into one – and the user chooses which way to engage. ‘You can be a player, earning points and overcoming challenges. You can learn, investigating ways to stay healthy and putting it into practice. And you can also be a carer, nurturing the digital pet by keeping active’, Dan explained.

How have children responded? In the small-scale study so far, the feedback’s been really good. ‘Fizzee appealed to all the children, but in different ways’, Dan told me. ‘One girl, for example took on the role of nurturing the Fizzee and did activities that were best for the Fizzee. Another boy saw the Fizzee as “someone else in the gym” to exercise alongside.’

Futurelab is hoping to start a craze: the technology also allows children to collaborate via a Fizzee website, comparing their pets, swapping activities and looking at their past fitness records. They’ve already observed children comparing each other’s on-screen progress by holding the screens next to each other.

In another ploy to keep kids moving, Gymkids have launched exercise equipment for primary school children that links to any game on any Sony PlayStation. If you don’t keep stepping on the Step2Play, the game abruptly ceases. Alternatively, the Cyberbike comes with five games that link to the television. Keep cycling or it all stops working.

And GameCycle is an upper-body exercise system suitable for wheelchair users, which combines arm cranking (moving handles up and down simultaneously) with Nintendo GameCube racing games. Studies showed that working with the

Fizees: a pet, a game and a learning device rolled into one.



The wrist-mounted Fizee measures the wearer's heart rate and motion and relates it to the health of a digital pet.



GameCycle resulted in more calories being burnt – even though players didn't perceive they'd worked harder. Research published in 2006 on teenagers with mobility impairments due to spina bifida, showed that 87% increased their maximum exercise capability after training with the GameCycle.

Studies showed that **working** with the *GameCycle* **resulted** in **more calories being burnt** – **even though** players **didn't perceive** they'd **worked harder**

Cyberbikes help keep primary school children fit. Keep cycling to keep playing the game.



The GameCycle links to a Nintendo GameCube.



Players burn more calories with the Game Cycle, even though they don't notice they're doing it.



In step with the schools in West Virginia who've benefited from Dance Dance Revolution, Groby Community College in Leicestershire has been using dance mats to promote exercise among girls. When the sports hall was in use for exams, and the 16-year-old girls didn't want to go outside, head of PE, Martyn Thompson saw dance mats as a way to get them moving. And it did. 'All of a sudden they had something in sport that they were good at', Martyn told me. 'It was recognition – good for their self-esteem. And they were the experts. Ultimately they knew more about this than me.' Even habitual non-attenders started appearing for energetic dance sessions.

Martyn extended the lesson by getting the girls to plan their own routines, which they practised away from the dance mats. He's working on ways to incorporate learning about muscle groups, bones and the benefits of exercise 'without the baggage of PE'. And he's noticed several advantages over traditional sports lessons: increased self-motivation to improve, better social interaction in lessons and an interest in getting fitter. It sounds as though 'games' may finally have come of age.

## Sorry Boss, I've Got a (Virtual) Sports Injury

**Like all forms of exercise**, digital workouts come with a warning. As soon as Nintendo's Wii reached people's living rooms, news reports emerged about its capacity to inflict injury on those using it – or those standing innocently nearby. Gamers told of tennis serves attempted underneath low light fittings; shoulder strain caused by over-enthusiastic tenpin bowling and controllers flying out of gamers' hands (towards heads/vases/televisions) with predictable results. Nintendo soon issued a stronger safety strap to avoid the latter accident. In my own household, disaster has only narrowly been averted several times. The 2-year-old

member of the family insists on running forward to see whether the bowling ball is going to hit the pins – while the dedicated bowler is still authentically swinging their arm.

It's not the first time gaming products have caused problems through sheer popularity and players' enthusiasm. Nintendonitis (or PlayStation Thumb) was widely reported as new consoles swept the culture. Otherwise known as gamer's grip, it is a condition similar to repetitive strain injury, causing swelling and pain in the finger or thumb joints. In serious cases, the condition may lead to tennis elbow and carpal tunnel syndrome.

'I've got tendonitis in my shoulder, and in one of the Wii games you have to hit 30 baseballs 125 metres', Michelle told me. 'You really swing, and it's aaarghhhh!' Kar On from Singapore said 'Wii Sports provides almost real-life sporting experience in your living room. But I have hurt my back while bowling without proper warming up and stretching.' I ought to mention that Kar On is my father-in-law, and at 67 is a dedicated Wii-bowler and golfer.

David, 38, told me in answer to the question 'What do you like most about Wii Sports?' that he enjoyed 'nearly decapitating my nephew.' In explanation he said that he had successfully beaten his mother at the game by realising that she would not want to cause the passing toddlers any harm, thus handing him a tactical advantage.

Alasdair Thin at Heriot-Watt University has also heard of a few problems: 'There have been some reports of overuse injuries with the Nintendo Wii which focuses more on shoulder and arm movement. The EyeToy games that I have seen tend to involve more body movement and therefore place less strain on individual joints. It's important that games include some form of warm-up activity and provide a way for players to build up their skill and fitness over a period of time.' Alasdair added: 'It's my great hope that appropriately designed "active games" can act as a stepping stone for people to become regularly physically active.'

## Can Games Tackle Physical Problems?

**Games' potential to help people** recover from physical and psychological injury (not just those inflicted by games themselves) has been under test in a number of labs, hospitals and companies. Back in 1988, a study with upper-limb burn victims found good rehabilitation results using computer games controlled by a range of large and small joysticks. Therapists found that games helped their patients overcome fears, as well as distracting them from pain. Far from being sterile or artificial, players found the computer-based therapy encouraged natural hand and arm movements by providing feedback.

And the power of game-based therapy to motivate people undergoing therapy has been underlined continuously since then. In 1993, scientists were already working with 20 people experiencing spasticity in their arm as a result of brain injury. The results showed that the game generated a much wider range of motion than a rote exercise. Indeed, many participants carried on playing their 'therapy' even when they'd completed the session. What's not to like?

## Life-Changing Play

**GestureTek is a California-based company** with an intriguing story. It pioneered the use of camera-enabled computer control – the art of telling a computer what to do simply by moving your body. Today, GestureTek technology is used in countless locations from hospitals to top corporate offices, for therapy, for video-conferencing and in toys (it's licensed to Sony for the EyeToy). But it started out with very different uses, as its creator Vincent John Vincent explained.

'Back in 1986 when Francis MacDougall and I first created this technology, I had just graduated with a psychology degree and was working as a psychotherapist', Vincent told me. 'The technology got people excited about engaging their full body

Saving a goal, avoiding a shark, playing the drums or beating an opponent at volleyball: these games make physical therapy fun. Stroke patients who played Sharkbait reported enhanced balance and movement skills.





