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# SEEING RED

## The tragic prescience of Nintendo's Virtual Boy

Written by *Jon Irwin*

**F**ifteen stones sit on islands of moss, submerged in a lake of gravel. This is Ryoan-ji, a rock garden in northwest Kyoto, and a sacred place of meditation and worship. Translated, the name means "temple of the dragon at peace". The formation is a national treasure. Some call this simple arrangement of stones by an unknown gardener one of Japan's highest cultural accomplishments. Here is the trick, the nifty sleight-of-hand that earned such lavish praise: Only 14 stones are visible from a single vantage; as one moves into view, another fades away. To see the 15th stone, the legends say, you must first achieve enlightenment.

An hour south, in a large white building overlooking a rice paddy, Nintendo's architects of play dream up new toys.

"Sometimes a company develops something so nifty that it takes a while before anyone figures out how to use it effectively." So begins an article published in the August 1990 issue of *Popular Mechanics*, titled "A New Way to See." The company was Reflection Technology, then located in Waltham, Mass.; the "something so nifty" was a miniature display device, invented two years prior, that uses a single column of red LEDs, a magnifying lens, and a swinging mirror to create an image of "vibrant red





characters or graphics on a black background.” Hold the device, called the Private Eye, up to your face and the tiny display appears to be full-scale—the equivalent of a 12-inch screen. When it was invented the possibilities appeared limitless, revolutionary. Reflection Technology was shopping the display to anyone who would listen, from airplane mechanics to anesthesiologists. Office workers needn’t look at blurry, low-res monitors anymore; they’d all wear a headband affixed with the Private Eye, giving them a crisp display and a desk free of bulky equipment. Reflection’s sales team even visited the Pentagon: The Navy SEALs wanted to put the screens inside divers’ helmets. Four years earlier, Reflection was working out of the basement of an old Portuguese bakery in Cambridge. Now the U.S. Military was calling them? The future looked bright, full of blinking red LEDs.

But there was a problem: Though dozens of companies bought development kits, very few products actually made it to market. Feisty engineers would fall in love with the technology and begin a project, but before long their work fell out of favor with the actual decision makers. Secretaries that tested the device had a near-unanimous response: “Can I do something different tomorrow?” The all-red text just wasn’t comfortable to look at for extended periods.

But Allen Becker knew this display was

something special. The young entrepreneur, who had founded the company in 1986, was used to overcoming obstacles. Not feeling challenged, he’d dropped out of MIT to install computers in Saudi Arabia. Then he worked with Ray Kurzweil at The Reading Machine Co., where they developed products to help blind people read. When Al saw a problem, he fixed it. The Private Eye was just another problem lacking a solution.

The *Popular Mechanics* article ends with similar optimism: “Other applications for the Private Eye are probably manifold. Reflection Technologies is interested in any good ideas.”

On April 21, 1989, Nintendo released the Game Boy in Japan to an unsuspecting public. Three months later, the portable system launched in America. With a cheap \$89.99 price tag, long battery life, and the addictive Russian puzzle game *Tetris* packed in every box, Game Boy became the de facto handheld entertainment experience. Millions of parents bought one for their kids. Soon after, millions of parents bought one for themselves. Videogames, having taken over the living room, were now taking over everywhere else.

Al Becker and his team were paying attention. They knew their miniature display could survive in only one of two ways: as an expensive industrial product, sold in low quantities to

specialists with deep pockets; or as a consumer product, where high volume would drive down its cost. Workers hadn't enjoyed the Private Eye screen with its all-red graphics. But what if the display could be used in short bursts? Video games were the obvious choice.

They made two prototypes to show potential suitors. The first looked almost exactly like Geordi La Forge's visor from *Star Trek: The Next Generation*. Reflection collaborated on the build with Frog Design, known for its work with Apple. Steve Lipsey, then the vice president of sales for Reflection, describes the inherent problems of building a device that weighed several ounces and needed to hang in front of your eyes: "That's hard to do in a way that didn't look like you were about to have brain surgery, that was comfortable, [and] wouldn't interfere with women's hair."

Another, slightly cruder version used a football helmet outfitted with two Private Eyes and a Polhemus magnetic tracking device to sense direction. A local game developer made a basic tank game, similar to *Battlezone*. The sense of immersion and total player control the helmet design provided made for an experience like nothing else on the market. After hours of number crunching and staring at screens during the regular work day, the team at Reflection would stay for hours more, playing the demo late into the night.

Becker thought they'd found their killer app. Lipsey traveled across the country pitching their idea to various companies, among them Atari and Mattel. "Security at Mattel was significantly higher than that of the Pentagon," Lipsey says. He also flew to Japan regularly, taking meetings with higher-ups at Bandai and Sony. Jack Plimpton, CEO of JapanEntry, a group that helps American companies do business abroad, consulted on these trips and helped translate. In 1990, Lipsey and Plimpton traveled to Japan for a meeting with Sony executives. Lipsey remembers it well:

"I'm sitting in the middle of the table. Jack is next to me. Across from me is ... maybe vice chairman of the board? Some crazy-high title. Ten minutes into the pitch, the guy's looking at me, he's four feet away across the table. All of a sudden there's a loud thump. His head goes down on the table and he starts snoring! I don't know what to do. Everyone else is listening. But this guy's the decision maker. In America, this is the only guy that matters. And he's snoring."

Lipsey raised his voice a little to get over the noise. Soon the man snorted, looked around, and got up and left. Crestfallen but resilient, Lipsey kept his composure and somehow finished the pitch. Everyone stood up, bowed

**"Sometimes a company develops something so nifty that it takes a while before anyone figures out how to use it."—Popular Mechanics**

politely, had some tea, and left. Outside, he looked at Plimpton: "Well, that was a waste of a plane ticket."

"Oh no, that was wonderful!" Plimpton answered. "Couldn't have gone better." He explained that when the head honcho fell asleep, he was sending a signal to all of his subordinates that things were going well. They didn't need him anymore and should proceed.

"In fact, the relationship [with Sony] moved on quite a bit," Lipsey tells me. But the deal was never closed. "It only took one highly placed naysayer, somebody without imagination to look at this thing and say, 'This is crazy. Let's not do it.' And you're dead. That's what happened there."

The guys at Reflection thought Sony, the company that invented the Walkman, would be perfect for their innovative device. Many others showed interest. None took the necessary leap—

until Gunpei Yokoi, then-head of Nintendo's renowned Research & Development 1, the group responsible for the über-successful Game Boy handheld.

Though Lipsey rarely played videogames, even he saw the compelling nature of their prod-

**“Nintendo was concerned about liability issues: kids, with their eyes blocked, lurching and dancing around.” —Steve Lipsey,**

uct: “The thing about the Private Eye games was that they were totally absorbing.” With no outside information, the player fell completely into the game space. “You were just completely...” Lipsey pauses. “It was your whole world.”

The gaming giant bought exclusive rights to Reflection Technology's display for an as-yet unannounced device. Reflection continued working with Nintendo in secret; team members spoke only of something called the “Dragon Project”, never revealing their Japanese partner to outsiders. There was still much to be done. The initial prototypes, compelling enough to sell Yokoi and Nintendo on the potential of their display, were not without major issues. A virtual-reality helmet with full motion tracking was, in theory, the next great evolution in gaming. In reality, you might as well ship it with subpoena forms.

“The point of this thing [Private Eye] was to liberate you from the couch,” Lipsey says. “Nintendo was concerned about liability issues: kids, with their eyes blocked, lurching and dancing around their houses.” Any device that eliminates your vision in real space while tasking you with virtual obstacles is a safety hazard. Staff at Nintendo were worried a child, strapped into their new head-mounted visor, might walk off a subway platform while leaping

for a 1-up in a bathroom. Thousands of people played Game Boys during long car trips; imagine the consequences of an accident while a conglomeration of hard plastic, glass, and metal hangs two inches from your face.

Others within the company were worried about the lack of a full-color screen. The all-red display was a matter of economics; blue LEDs were prohibitively expensive. But even without the motion-tracking or full color, Yokoi and his team thought they had a game-changer. By combining two Private Eyes in a pair of goggles, they could achieve true three-dimensional depth. Other “3D” graphics of the time were

~~were facemasks, this was going to feel~~  
new, like nothing anyone had seen.

Besides, a monochromatic display hadn't hurt the Game Boy. Within weeks of its launch in the U.S., Nintendo had sold a million of the underpowered handhelds. Expectations were high for Yokoi's next project. Three years would pass before they unveiled the mysterious system to the public.

Hopes escalated within Reflection, too; at the time, Nintendo's products dominated the gaming market. The Dragon Project seemed like a sure bet. Reflection's board of directors included Nicholas Negroponte, co-founder of MIT's Media Lab and the first investor in *Wired* magazine. Even Nintendo bought a minority interest in the group—their first-ever investment in a U.S. company.

The deal spanned oceans. Unfortunately, one of the parties would sink.

In November 1994, Nintendo showcased its newest innovation at the Shoshinkai Exhibition in Tokyo. The long-rumored device, known only as “VR3D”, was finally unveiled as the Virtual Boy. Announcements touted the system as a 32-bit portable with 3D visuals. Promotional material called it “the first VR system for the masses.”

Only it wasn't portable, barely 32-bit, and nothing close to virtual reality. This is what the



Virtual Boy was: a large rectangular hunk of red plastic, outfitted with a black foam visor holding two plastic lenses. The device sat on a stand—you had to peer into the system itself, and play the games using a two-pronged controller plugged into the main unit. Deep inside the system, two tiny screens sent vivid red-on-black images to each of your eyes, causing the illusion of three-dimensional depth.

Initial reaction to the machine was tepid. Sure, the 3D actually worked. But between the red-only graphics and the need to slump your head into a clunky pair of goggles, many were disappointed. Or worse: uncomfortable. Others kept the faith. This was Nintendo, after all—surely the end product would impress.

The Virtual Boy released in Japan the following July, and one month later in the U.S. with an MRSP of \$179.99. Four titles were available at launch: *Mario's Tennis*, the U.S. pack-in; *Teleroboxer*, a *Punch-Out!!* clone with giant robots; *Red Alarm*, a wireframe space shooter; and *Galactic Pinball*. Hiroshi Yamauchi, president of Nintendo Co., Ltd, said he expected the Virtual Boy to sell over two million units worldwide by the end of that fiscal year. Then people played it.

Besides the small array of mediocre games, the Virtual Boy just wasn't pleasant to use. Sticking your face in its red plastic goggles made for hunched shoulders and a strained neck. Warnings in each game advised you to pause after 20 minutes. Rumors proliferated that it caused massive headaches. An urban legend spread that one person died after an extended play session. In October 1995, Nintendo lowered the price to \$159.99. After a dismal Christmas season, retailers like Toys "R" Us slashed the price to as low as \$25. Soon after, Nintendo killed the Virtual Boy, stopping production and cancelling all games



in development. Even with the 80-percent price drop, stock of the unwanted system languished on store shelves for six months. Fifteen years later, *Time* Magazine would list Nintendo's 3D experiment as one of the 50 worst inventions ever.

Along with Becker, Ben Wells and Nate Goldschlag were the original members of Reflection Technology. I met Wells at his workplace in Lincoln, Mass. "After the Nintendo thing failed," Wells told me, "[our] company went into an interesting death spiral." Now in his sixties, he owns and operates Wells Research, which makes optical testing equipment for products such as gun sights or microscopes. A thin grey beard covers his face. Two things cover the walls in his jumbled office: framed awards, and pictures of disaster.

Above his desk hangs a plaque from *PC Magazine* touting the Private Eye as a finalist for Technical Achievement in 1990. As he sits down to work, the award is outside his periphery. In his line of vision are two photographs stuck to a cabinet: A Beachcomber airplane, turned upside-down on the tarmac; and a black-and-white picture from 1895 of a train engine

that had crashed through the wall of Montparnasse station in Paris. On top of the cabinet is a red plastic pair of goggles atop a black stand, a demo unit he says he rescued from the wreckage. Later, he'll say it looks like "an ugly spider." But first he places the device on the table. I sit down, stick my face into a foam visor, and soon I'm floating in a red-and-black cosmos, soaring through the stars.

This is a trade-show demo called *Space Pinball*, a rudimentary version of what would become a launch title for the Virtual Boy. In its final release, *Galactic Pinball*, the titular object is more of a disc, and every time it nears the flipper it inexplicably slows down, making awkward, unaligned shots the norm. In the demo, the action is much faster and more realistic. The playfield is littered with floating pyramids, rotating stars, and rings arcing up into the player's vision. Everything looks so smooth, and oddly vibrant. I understand how investors and developers alike could become smitten with the device's potential.

Wells sits down across from me, my face still planted in the machine. "When [Nintendo] did the deal, nobody thought it would fail," he says. Reflection received \$5 million for

**"It was the kind of toy to make you think, 'This is what we can do now!'"—Shigeru Miyamoto**

exclusive rights to its display, and \$10 million in upfront royalties. They waited to take the company public until after the Christmas '95 season. This decision proved to be disastrous.

Fred Bamber was on the Board of Directors throughout Reflection's entire run. Had they gone public after the announcement, Bamber explains, but before the product's launch in August '95, they might have raised another \$50 million. Founder and CEO Al Becker thought the launch would prove so successful that to go

public early would mean leaving money on the table. Bamber, a good friend of Becker's, conceded. Such patience often reaps great benefits in the digital world. (In 1998 Bamber became an original investor in E Ink, whose technology is now used in the Kindle and other eReaders.) So they took a risk and waited.

Then came the Virtual Boy's stillbirth at retail. Going public in the wake of such poor sales would benefit no one. Instead, Reflection raised around \$10 million via private auction—a fraction of their initial estimates. Meanwhile, Wells worked on a new version of their screen display using red, green, and blue LEDs to create full-color images. They flew to Japan and pitched it to Nintendo. "They politely sat through the demo," Wells told me. "I remember this dinner where we went out to a very lovely restaurant, very fancy restaurant, and they said, 'No, you guys don't get it. This thing has died.' I don't remember what they said, but that's what I took away. 'It's very lovely what you've done. But we're not interested.... This thing's dead. Let's move on.'"

The lack of funds and the failure of its follow-up project (a portable fax-viewer/modem that enabled on-the-go full-screen messages

*long before smartphones*) forced Reflection Technology to close its doors in September 1996, just over a year after the Virtual Boy's launch in America. The original team scattered. Wells started his optics-testing company. Goldschlag became involved with Veterans for Peace. Becker,

visionary leader and founder of Reflection Technology, kept on trying to solve problems, working with Ovation on a sewage-filtering system to help bring clean water to third-world countries. He died unexpectedly in 2002, the failure of Virtual Boy a distant memory.

Failure, though, is a relative term. An estimated 800,000 systems were sold. If you're a toy manufacturer, that's like hitting the lottery. If you're Nintendo, arguably the most successful videogame maker on the planet, that's a big



swing-and-a-miss. Shigeru Miyamoto himself stated in a recent interview that the Virtual Boy situation was mishandled.

"It was the kind of toy to get you excited, and make you think, 'This is what we can do now!' I imagined it as something that people who were on the lookout for new entertainment, or who could afford to spend a bit of money, could buy and enjoy even if the price was a little expensive. But the world treated it like a successor to the Game Boy system." As such, the Virtual Boy overpromised and underperformed.

It was also an embarrassment, especially for those centrally involved. Some maintain Gunpei Yokoi—creator of the Game Boy, producer on *Metroid*, mentor to Miyamoto—resigned due to guilt over the Virtual Boy's disaster, though numerous officials within Nintendo report otherwise. Regardless, Yokoi's story remains incomplete. A car accident ended his life in October 1997, taking away an innovative genius while a high-profile mistake loomed over a lifetime of accomplishment.

But was the Virtual Boy, then, a mistake? In the years since its untimely demise, the machine has gained something of a devoted following. Used systems sell on eBay for many times their final sticker price. Planet Virtual Boy is an enthusiast site—one of its taglines reading "home to Nintendo's lost son"—that somehow adds new content regularly. A burgeoning homebrew community even exists. Stick your head into that black foam visor and you may well find yourself among the converted. The experience of playing the Virtual Boy is unlike any other.

Despite its name, the Virtual Boy overlaps less with our collective notion of VR than it does with arcade cabinets of the early 1980s. Contemporary consoles hook to our television at home, and we play them on the couch or the floor. But the Virtual Boy is a self-contained unit: hardware, screen, and speakers in one, much like an arcade cabinet. Moreover, many arcade games featured not just a screen, but an entire environment in which the player would enter the gaming world—think of *After*

*Burner's* cockpit or *Hard Drivin's* deluxe seat or *SubRoc-3D's* periscope. To participate, the player would have to leave the exterior world and enter the game's interior, to be surrounded by simulated landscapes and sound. The Virtual Boy goes one step further: A visor covers your peripheral vision, blocking out all external stimuli that might distract from the action on-screen. Even the most immersive arcade cabinet could not block out the electrical storm of flashing light and throbbing music blasting from nearby games. What appears to be a central design flaw in the Virtual Boy, then, actually perfects the unmet goals of a prior generation.

The problem was that players in 1995 were not looking for the platonic Arcade Experience—they were looking for *Super Mario 5*, or *Sonic 4*, or the coming onslaught of polygonal 3D games promised by Sony and Sega (and eventually Nintendo itself) with the impending next generation of consoles. Gamers who saw Eidos' *Tomb Raider* and Sony's *Battle Arena Toshinden*, both featuring complex character models and full three-dimensional movement and control, did not want to revisit the sprites found in Virtual Boy games such as *Mario Clash*, an update of the original *Mario Bros.*, or *Nester's Funky Bowling*. When the Nintendo 64 finally released in September 1996, and with it, the revolutionary *Super Mario 64*, the transition was complete. The Virtual Boy, once ballyhooed as the Next Big Thing, was left to die an ignoble death. A scant 14 titles were released in North America.

Today, 3D is everywhere. Nintendo has re-entered the 3D fray, launching its Nintendo 3DS handheld across all major markets. Again, hopes are astronomical. Doubters whisper "Virtual Boy 2.0" in dismissive tones. But maybe this time, things will be different. Maybe Yokoi's vision will finally be realized. Maybe Becker's promise will live on. Maybe those 14 Virtual Boy games were just a hint of what is now being fully realized: Like the stones of Ryoan-ji, hiding the invisible 15th stone until the viewer is ready, able to see what is not seen, willing to imagine the impossible. 🎮