THE STORY OF...

PAC

PROGRAMMER TOD FRYE MADE VIDEOGAME HISTORY WHEN HE DESIGNED THE ATARI 2600 VERSION OF PAC-MAN. BUT NEARLY 40 YEARS LATER, THAT INTENSE EXPERIENCE, THE GAME'S RECEPTION AND GHOSTS OF THE PAST ARE STILL CHASING HIM

In early 1981, Atari assigned a brilliant, formerly homeless, high school dropout to one of its most important games ever – the home version of its mega-hit *Pac-Man*.

Pac-Man's pop culture invasion began a year earlier, when an army of little yellow dot-munchers stormed the arcades, pool halls and convenience stores of America. The wildly-popular arcade game smashed demographic barriers around the world with its approachable, non-violent game design. Players of all ages and walks of life were drawn to one of the first character-based videogames. *Pac-Man* was a genuine phenomenon, selling an estimated 400,000 cabinets worldwide. The game also spawned a merchandising bonanza, with the character's image emblazoned on bedsheets, drinking glasses, T-shirts, stickers, cereal, a Saturday-morning cartoon, and even a pop single.

Atari was betting gamers would play *Pac-Man* at home, too, when it acquired the home videogame rights from *Pac-Man*'s parent company Namco. The arcade game's popularity guaranteed that it would come to living rooms on the popular Atari 2600, the home console.

The job fell to programmer Tod Frye, who was regarded as a brilliant, but undisciplined, software engineer at Atari. In high school, he cut classes – hiding in a closet to smoke pot and program on a Wang 3300 computer to produce a text-based adventure game with the player cast in the role of drug dealer. "I wasn't drawn to athletics," he remembers. "I wasn't drawn to acting. I was drawn to programming. It just found me." Tod could look at code and see "a problem to be fixed", and writing code offered him "a godlike power to make things right, to bring order to chaos – to create something that wasn't going to be there if you didn't make it".

MAN

ON ATARI 2600

PAC-MAN

10 OTHER ATARI 2600 ARCADE PORTS

SPACE INVADERS
■ This translation of the monumentally popular arcade game was instrumental in resuscitating the struggling Atari 2600 in 1980, turning this timely port into the industry's very first killer app. *Space Invaders* at home was a strong port of the original that made Atari's first home console a huge success.
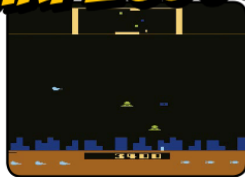
DEFENDER
■ While this port has been maligned in some circles for its simplified game design, programmer Bob Polaro did a yeoman's work in reinterpreting the complex arcade controls for the Atari 2600's single-button joystick. While it's not as difficult as its arcade predecessor, it captures the original's essence well.

MISSILE COMMAND
■ Atari's apocalyptic arcade game was translated beautifully for the Atari 2600, despite cutting some of its bells and whistles. It removes the final, haunting mushroom cloud and ominous 'The End' titles of the game's finale, but otherwise captures the zeitgeist from the original Cold War-era classic.
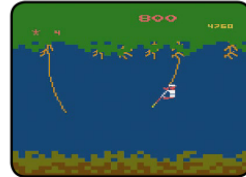
JUNGLE HUNT
■ This vine-swinging adventure game stacks up well, even to another jungle-themed classic such as *Pitfall!*. *Jungle Hunt* on the Atari 2600 tightly reproduces the four unique game screens of the arcade original in a way Atari's home console can handle, even with the inclusion of some subtle parallax scrolling.

CRYSTAL CASTLES
■ The eye-popping isometric maze graphics and animation of the arcade game are missing, but the game plays well even in its slimmed-down version. The mazes are unique and the game plays fast and fun, especially if you can replicate the arcade feel with the console's separate Trak-Ball controller.

CREATING PAC-MAN
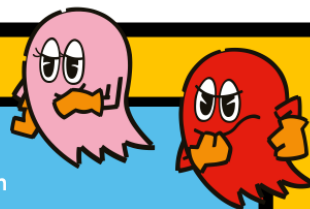
The differences between arcade and 2600 Pac-Man

MAZE AND DOTS
The 2600's graphics limited the number of dots on screen, and increased their minimum size. Atari compensated by calling them "video wafers" in the game manual. The vertical maze orientation had to change to fill the more horizontal 4:3 ratio of vintage televisions.

CHARACTER ANIMATIONS
To conserve memory, Tod simplified animations, removing details like Pac-Man's vertical rotation, and the more complicated ghost animation, which had to be condensed into two-frame animations for the 2600.

FLICKER
Tod utilised a flicker technique that strobed the ghost character graphics so that all four appeared on-screen at once – something that had never been done on the 2600 before. He also justified this approach, noting that the ghosts were ephemeral spirits. Though the method was successful, players complained about the constant flicker. Atari grilled Tod about it after the game's release. Tod explained that the 4K memory prevented him from using a solution other than flicker. Not coincidentally, *Pac-Man* was the last of Atari's 4K games.

MAZE COLORS
The Atari 2600 version of *Pac-Man* includes maze colours that do not match those of the original arcade game, which was a sore point for fans. The colours were Tod Frye's own decision. "What I think is really interesting about that is that no one knew that a necessary part of the *Pac-Man* signature was the colours," he says. "And it's easy for people to say, 'Oh, it was obvious!' But you know what? It clearly was not obvious."

ARCADE SOUND
The delicate 'waka waka' eating sounds of the arcade *Pac-Man* were replaced with the blunt bonking sounds generated by the 2600's primitive sound chip. The urgent, jarring siren background sound was absent altogether.

TWO-PLAYER GAMEPLAY
Later adaptations of *Pac-Man* and *Ms Pac-Man* dropped the option of two-player gameplay, a feature that Tod Frye refused to eliminate. The decision would have saved him precious bytes to utilise elsewhere, but he deemed it essential in capturing the spirit of the original.

FRUIT VS VITAMINS
Arcade *Pac-Man*'s levels are often designated by the different fruit – cherry, strawberry, orange and the rest. The bonus fruit are worth varying point totals, but had to be eliminated from the Atari 2600 version because of memory constraints. In their place, Tod used a rectangle within a rectangle shape, which Atari's manual writers dubbed a 'vitamin'.

CUTSCENES
A unique storytelling aspect of *Pac-Man* was excised when the game translated from arcade to the 2600 home console. The whimsical animated interludes, a fun and brief respite from the fast-paced game itself, were removed to preserve memory for the crucial gameplay.

Tod dropped out of high school in his junior year, and his father kicked him out of the house. Rebellious and homeless on the streets of Berkeley, he panhandled until finding work on a construction crew, eventually becoming a master carpenter. Later, a high-school friend helped him get an interview at Atari, and Tod returned to the only calling that had captivated him. He began work as a game programmer in 1979, at one of Silicon Valley's hottest companies.

His initial projects included a handheld *Breakout* game and the Atari 400/800 version of *Asteroids*. Like many others, he enjoyed the freewheeling culture of Atari, where employees mixed the business of game programming with chemical pleasure. On fellow programmer Howard Warshaw's first day, Tod introduced himself by lighting up a joint in his office and inviting Howard to smoke with him – only "the good stuff".

Tod also showcased his oddball side. He earned the nickname of 'Arfman' for barking like a dog as he roamed the halls. The tall programmer would literally scale Atari's walls, too, placing a foot on each wall of the narrow hallways of the company's Sunnyvale headquarters, then cantilevering his way down the corridors several feet off the ground.

» [Atari 2600] The 2600's maze was created using blockier, lower-resolution 'playfield graphics' mirrored across the vertical axis.
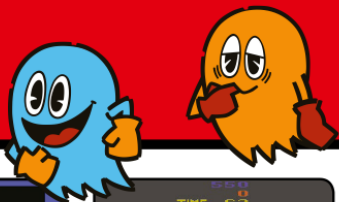
TRACK & FIELD

■ Atari preserved the fast-paced experience of this Konami classic on the 2600. The game challenging both with the standard joystick, and using the pack-in arcade style controller. Much like its excellent Olympic cousin, *Decathlon*, *Track & Field* is as physically demanding as a classic console game gets.

DOUBLE DRAGON

■ Credit to programmer Dan Kitchen for even attempting this popular arcade game near the end of the 2600's lifespan. It has two-player action and multiple levels, but the game is crushingly difficult because its crucial special moves have been distilled into awkward combos on the 2600's single-button joystick.
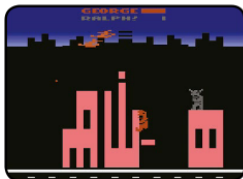
RAMPAGE

■ Some arcade translations are too ambitious for their own good, and this particular Atari 2600 port sheds too much of the original's charm. In trying to preserve *Rampage*'s signature two-player mayhem, the 2600 conversion falters with poor collision detection issues and a weak graphical style.

CENTIPEDE

■ Atari managed to capture the frenetic pace of the arcade in this Atari 2600 counterpart, and it plays even better with Atari's Trak-Ball controller. The graphics are a significant step backward from the arcade original, but the pure and compelling gameplay almost makes up for that loss.

STAR WARS: THE ARCADE GAME

■ It's almost shocking how well this iconic space shooter looks and feels on the Atari 2600. The colour vector graphics and immersive cockpit cabinet are missing, of course, but the 2600 does a fine job of replicating the dogfights and trench run from the arcade original.

"THE EFFORT WAS TO CATCH THE ESSENTIAL FEELING, THE ETHOS, THE SPIRIT – THE SOUL OF PAC-MAN"

TOD FRYE

» [Atari 2600] Tod's *Pac-Man* added an eye for the onscreen character before any other game had done so. Call it a wink.

His wall-walking habit ended abruptly when he smacked a ceiling-mounted sprinkler with his forehead, requiring 23 stitches.

With talent and quirkiness to burn, Tod appeared to be a perfect match for Atari. But during a crucial review, Tod's boss suggested that he wasn't fitting in well – and should consider looking for another job. "He said, 'Look, you're probably a real good programmer, but you're not putting out,'" Tod recalls. The conversation stunned the young game designer and left a lasting impression. He smoked one more joint, and threw up. Tod then went completely sober for almost a year while working on *Pac-Man*. The game was a chance to prove his worth at Atari. "I buckled down," he remembers.

Translating the hit game to the 2600's primitive hardware was a serious challenge, and the programmers knew it. Colleague Bob Polaro passed on *Pac-Man* because he thought it impossible, selecting another arcade conversion instead – the popular *Defender*. Tod accepted the *Pac-Man* assignment, spending 80-hour weeks over the next six months trying to create a worthy version of the game on lesser hardware. "I was sufficiently unprofessional that I gave my very best," he says. The difficulty of the task sharpened his work habits and dedication.

The Atari 2600 was initially created to play *Pong* variations and *Tank* games, staples of the Seventies arcade era. The machine wasn't designed to play sophisticated arcade-style games that Atari was now trying to create. So, it was quite a technological achievement to tackle *Pac-Man*. "There's a lot of tradeoffs involved," Tod explains. "It's a very, very constrained system."

Hindsight makes the translation seem like straightforward, but that is surely revisionist history. The coin-op *Pac-Man* machine used a custom-made arcade system board with hardware running three times as fast as the 6502 microprocessor which powered Atari's 2600. The arcade game contained 16K of ROM, 2K of video RAM and 2K of general RAM, whereas the *Pac-Man* 2600 cartridge was limited to 4K of ROM in total – one quarter of the arcade machine. The 2600 also had less ability to display background graphics, which meant that any maze Tod created would have to be simpler and blockier, utilising chunky playfield graphics. In designing this version, he'd need to execute some clever programming tricks just to make it happen.

Faced with extensive (and necessary) compromises, Tod took a pragmatic view of translating *Pac-Man*. "I was thinking of it as an abridged adaptation," he said, "and the effort ▶
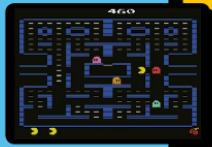
FIVE HOMEBREW VERSIONS

The best from the new wave of Pac-Man conversions

PAC-MAN 4K

■ Programmer Dennis Debro sought to create a version of *Pac-Man* for the Atari 2600 that was more faithful to the arcade game while still remaining within the same 4K memory limit as Tod Frye's original game. The results are nothing short of impressive.

8K PAC-MAN

■ Daniel _____ (DINTAR816) took 2600 *Pac-Man* one step further and designed a *Pac-Man* game that utilises 8K of ROM and includes all the bells and whistles of the original arcade game, like animated cutscenes, improved sound and incredibly faithful ghost AI.

PAC-MAN COLLECTION FOR COLECOVISION

■ A version of *Pac-Man* was planned for the ColecoVision, but was never completed. Eduardo Mello of Opcode Games took it upon himself to remedy that with the homebrew *Pac-Man Collection* containing versions of *Pac-Man*, *Ms Pac-Man* and another hidden game.

JR PAC-MAN FOR ATARI 7800

■ The side-scrolling mazes of this overlooked *Pac-Man* sequel are challenging on any platform, and Bob DeCrescenzo brings a faithful rendition of the game to the Atari 7800 with a variety of player-friendly difficulty settings.

CRAZY OTTO FOR 7800 HOMEBREW PAC-MAN

■ *Crazy Otto* was an unlicensed enhancement kit for *Pac-Man* arcade machines developed by General Computer Corporation. GCC worked with *Pac-Man* licensee Midway to turn the game into the beloved sequel, *Ms Pac-Man*. Programmer Bob DeCrescenzo hacked Atari's 7800 *Ms Pac-Man* game to better match GCC's original game.

▶ was to catch the essential feeling, the ethos, the spirit – the soul of *Pac-Man*. *Pac-Man* was known to be a repeated pattern game. So, I worked out a very precise, repeatable logic for how the ghosts worked. It was not the one [arcade *Pac-Man* creator Toru] Iwatani used, but that wasn't computationally possible for me. What that actually means is, like coin-op *Pac-Man*, my *Pac-Man* produces completely reproducible patterns. If you do the same thing every game, it will do the same thing every game. And that's actually the level at which I understood the ethos or spirit of *Pac-Man*. It's a fundamental. I really honestly intended my *Pac-Man* to be as faithful a representation as I deemed possible and necessary."

The game arrived to much fanfare, and its initial performance did not disappoint. Sales were stratospheric, and *Pac-Man* would go on to be the bestselling Atari 2600 game of all time, moving a reported 7.7 million cartridges and earning nearly $200 million in gross profits for Atari. But a growing discontent began to fester beneath the glowing balance sheet. On 11 May 1982, *Electronic Games Magazine* published its first-ever bad review for an Atari videogame, saying, "Considering the anticipation and considerable time the Atari designers had to work on it, it's astonishing to see a home version of a classic arcade contest so devoid of what gave the original its charm." *Softline* computer magazine wrote that the 2600 version looked "less like Midway's original than any of the pack of imitators".

Tod's concessions to the 2600's hardware were obvious to devoted fans. The maze colours were different, the characters less detailed, and the game seemed to underscore the console's advanced age. For his part, Tod was unaware of the criticism, already working on his ambitious *Swordquest* series. "I didn't really know about all of the bad press for a long time," he says. "I was doing the next thing." The 2600 version of *Pac-Man* would

» [Atari 2600] Tod Frye used a pseudo-random number generator for the game logic, which made the ghosts act in consistent, repeatable ways.

eventually unfairly acquire the reputation as a half-hearted effort, a corporate cash-in. Early video game journalists certainly didn't rush to Tod's aid, either. Harsh reviews were just "part of the meat grinder *Pac-Man* went through", he later decided.

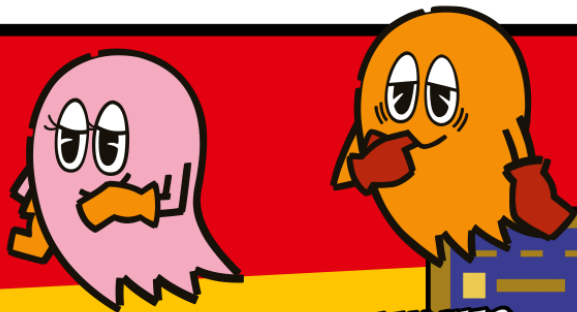**Y** ou know what I say? Fuck the press," Tod retorts, now with 37 years of reflection. "*Pac-Man* was very, very credible. The things the press doesn't like were just the fact that it was the first. We would have fixed the obvious, easy-to-fix things that people harp on, if anyone anywhere in the human species had known at that point. No one knew. History was being made. We were just finding out what the rules were. That's what it is to be a pioneer."

Some within Atari felt the game wasn't ready for prime time. Atari's marketing manager of coin-ops, Frank Ballouz, said in a 1998 interview, "I took a look at this bullshit game and told Ray [Kassar, CEO of Atari] that no one's going to want to play it. But he didn't listen to me." But that seemed to be a minority opinion, as many Atari programmers were impressed with Tod's translation and what he was able to squeeze out of the aging 2600.

"The idea of what it meant to be a faithful representation of *Pac-Man* was not established," Tod says. "It did not exist at the time I wrote *Pac-Man*. No one else in that whole process really knew it. [Later], we, as a culture,

"FUCK THE PRESS. PAC-MAN WAS VERY, VERY CREDIBLE. THE THINGS THE PRESS DOESN'T LIKE WERE JUST THE FACT THAT IT WAS THE FIRST"
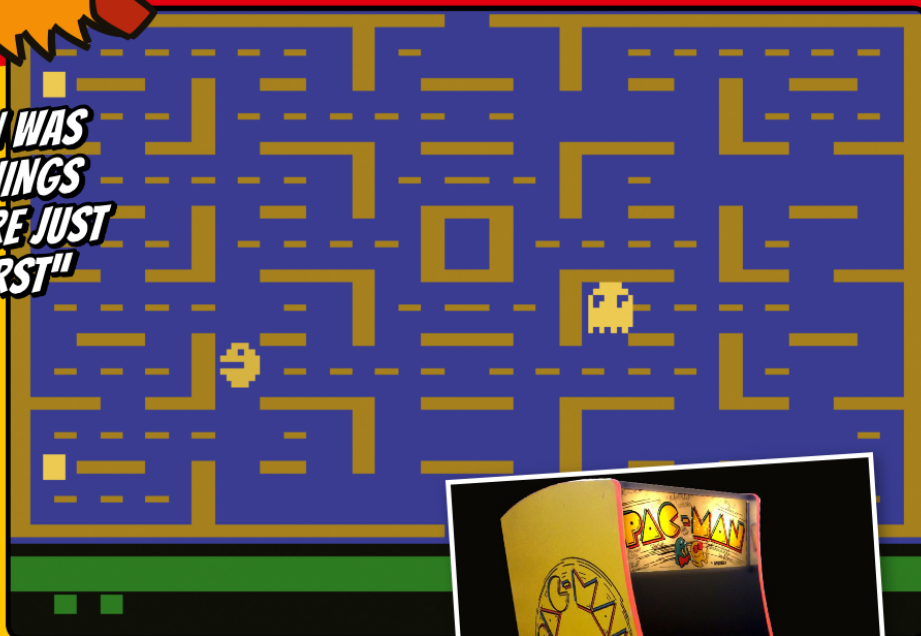
TOD FRYE

» [Atari 2600] Tod Frye believes empathy makes a good game designer, "Being able to project what it will feel like to play that game if you're someone else."

invented the idea of a meaning and created a definition of what an adaptation was. There is a direct connection between 2600 *Pac-Man* and arcade *Pac-Man*, and I was influenced by arcade *Pac-Man* when I made mine." Details like colour fidelity and maze design might seem like obvious decisions in retrospect, but Tod is adamant that those pioneering days left zero road maps for game development. "Not only did I get to be a case study," he says, "but I got to help make the rules, to help find out in that back and forth, which is only done through whole product development cycles."

It's also probable that the marketing hype behind the game heightened anticipation to unreasonable levels – which led to a rubber band reception when the game didn't perfectly align with expectations.

During Tod's development of *Pac-Man*, Atari initiated a program of profit sharing ("incentive compensation bonus") to prevent senior game programmers from leaving and becoming competitors – as in the case of third-party developer Activision. This reward system wasn't instituted until after *Pac-Man* was completed, but it was life-changing for Tod. The agreement would award him $0.10 for every *Pac-Man* game sold. After its wild success, Tod was suddenly very rich, eventually earning more than $1.3 million in incentives.

The financial windfall was both liberating and overstimulating. "It was overwhelming. It's like winning the lottery," he said. "I was a little defiant, and I was a little out of touch. You don't deal with that as a 26-year-old. It was a lot of marijuana and cocaine. It completely changed my life." Tod struggled with this wealth. "In those three years I went from a salary of $19,000 a year to a $320,000

» [Atari 2600] Atari's 2600 version of *Ms Pac-Man* benefitted from critical hindsight and a larger 8K memory limit to faithfully adapt the arcade game.

royalty check. It did bend my brain, and it did honestly put my life in danger. But I survived. There are things I would do differently if I could have."

He taped a photocopy of his first royalty check – $320,000 – to a public bulletin board at Atari HQ. "I have no idea why I did that," he says. "I really don't. It was a long time ago. It sounds like something I shouldn't have done. Fuck if I know. I was only 26."

od bought 15 vintage guitars, new suits, two Alfa Romeos, a ranch in New Mexico and more. With the pressure release valve of such success, more of Tod's blunt intelligence came out, and to some colleagues, it seemed like arrogance. Did that resentment go both ways? "Some people viewed me as a genius and some saw me as a clown," Tod explained in a 1997 documentary. The license plate of his new Alfa Romeo Spider read 'PACMAN'.

By 1985, most of the money was gone. Bad advice and poor choices drained him financially. "I was on a downward spiral," he said. "It was too much money, too fast. It was more power than responsibility, and it broke me."

Some reviewers claim that 2600 *Pac-Man*'s critical failure started a landslide that began Atari's downfall. While *Pac-Man* might have forced game buyers to look more cautiously at new releases, its negative impact has been overblown. "They say, '*Pac-Man* and *E.T.* ruined a whole business!'" Todd laughs, "If I had that kind of power, I would productise it and retire! It's foolishness. A lot of times people want a story – not even a particularly believable story. But they want a story."

Yet he does realise that now, 37 years later, with an impressive software engineering career working on everything from videogames to solar power and AI – he'll always be known for *Pac-Man*.

"*Pac-Man* was such a big part of my biography that I'm going to be living with it for the rest of my life," he says. "I feel different ways about that. The amount of critical scorn it's gotten and the swarms of tribal fanboys pissing all over it are not an ego booster. It actually is a self-esteem challenge. Some people want to say '*Pac-Man* sucked!' and I gave them that opportunity." After *Pac-Man* and the *Swordquest* series, Tod continued making games, both for the Atari 2600 and other later-generation consoles. But creating *Pac-Man* for the Atari 2600 is an experience that will never leave him. It was more than just another project. Its cultural significance, popularity and reception made a lasting mark. "In some way," he said, "who I am touched all those tens of millions of people."

In the final analysis, 2600 *Pac-Man* deserves a place in videogame history. Tod managed to capture the game's essence in hardware that was nearly 100 times lesser than its arcade predecessor. "I have regrets," he concludes. "But fundamentally, I'm proud. They tell me it's a waste of time to defend *Pac-Man*. I've got time to waste."