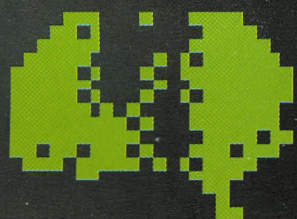# THE MAKING OF...

SPACE SPACE INVADERS

In a rare interview with Japan's godfather of videogames, **Jonti Davies** speaks with Tomohiro Nishikado about the birth of the game that triggered a revolution 30 years ago.

» Ex-Taito visionary, Tomohiro Nishikado.

F or a man who single-handedly turned his country into a nation of videogame junkies, and without whom Shigeru Miyamoto claims he would not even have joined the game industry, Tomohiro Nishikado is a surprisingly unassuming and down-to-earth kind of chap. Since 1996 he's been running his own operation, a 22-strong development studio called Dreams, just down the road from Sega in Tokyo. It's a quiet and unnoticed developer that seems to be deliberately avoiding the limelight – the discography on Dreams' website is nothing more than a list of generic terms: 'Action game for PS2', 'Communication game for DS', and so on. So it's quite odd to think that 30 years ago, when in his tenth year at Taito, Nishikado alone produced a global phenomenon in the mesmerising and boldly innovative *Space Invaders*.

Let's head back to 1978. "At the time," says Nishikado, "the block destruction [*Block Kuzushi*] game *Breakout* was really popular in Japan, and I was hooked on it myself. I'd made a few games up until that point, but when I experienced *Breakout* it made me want to drive myself to develop a game that would surpass it." But where many developers would have been more than content to code a superior clone of *Breakout* with a few clever enhancements (which is precisely what another Taito designer, Akira Fujita, would do a decade later), Nishikado took a completely different stance as he sought to surpass the addictive 'bat, ball and block-breaking' system of Atari's 1976 classic. Thanks to his keen perceptive powers, Nishikado was able to see beneath the surface of *Breakout* and identify the mechanism that was causing him and so many other young Japanese to put their 100-yen coins in the slots of Atari's cabinets.

"For me," Nishikado elaborates, "the really interesting element of *Breakout* was the art of deciding on a number of targets and that sense of achievement you'd get from destroying a whole group of blocks simultaneously to clear the stage. I analysed the exhilaration players felt when playing *Breakout* like this, and I eventually decided to capitalise on this [gameplay design] by trying my hand at a shooting game where *Breakout*'s quadrilateral targets would be replaced with targets that had more interesting forms."

Had Taito's top man not told Nishikado to make changes to the design of his project, *Space Invaders* would have ended up with people taking the roles of those "interesting forms" Nishikado was looking for. "During the development process, I had the enemy targets set as humans," he reveals, "but Taito's then-president told me to stop using humans in such a way. I initially thought, 'Okay, if I substitute the humans with monster-like creatures, that should work out fine'. But then I saw a newspaper article saying that *Star Wars* had been extremely well received in America, so I decided on using space aliens instead of monsters. *Star Wars* had just hit the theatres in America and was about to be premiered in Japan, so there was a bit of a 'space boom' happening. And that's why I opted to make my game's targets aliens from outer space."

With that settled, Nishikado continued with his work as an independent entity within Taito, which is how he liked to operate in those days (even today, he seems to value autonomy: his Dreams outfit works with/for 20 or so Japanese soft cos, maintaining complete independence). Apart from
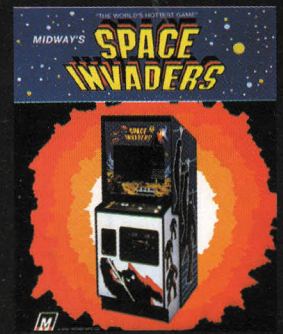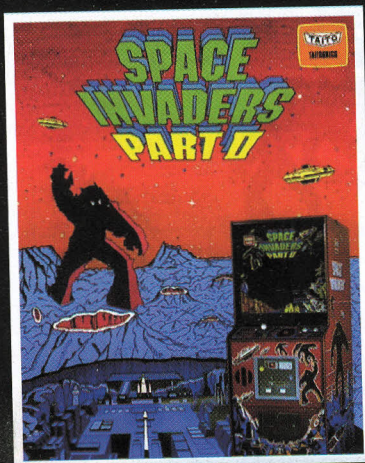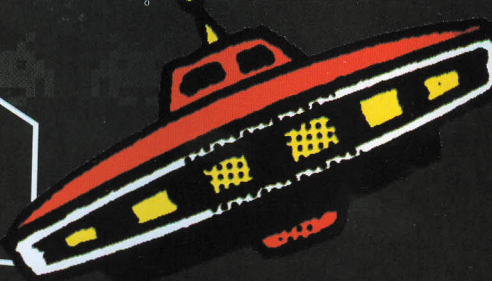
" Star Wars had just hit the theatres in America and was about to be premiered in Japan, so there was a bit of a 'space boom' happening ... That's why I decided to make my game's targets aliens from outer space "

NISHIKADO REVEALS THAT GEORGE LUCAS'S WORK HAD AN EFFECT ON SPACE INVADERS, AS DID H.G. WELLS AND MARINE LIFE...

the cabinet design and some sound work, *Space Invaders* was exclusively Nishikado's baby: "I let a new employee work on the sound source and produce *Space Invaders*' audio effects, but apart from that, all of the other work – namely the planning, the design, graphics design, coding the software, building the hardware – I did entirely by myself." He managed to turn the game around in remarkably quick time, especially given how his first job was the daunting task of producing his own development tools specifically for this project: "From the initial conception of the idea right through to the completion of the game," Nishikado confirms, "*Space Invaders* took me approximately 12 months to produce." That was the year that was.

Having joined Taito with a degree in Engineering from the electrical engineering-focused Tokyo Denki University, Nishikado was apparently seen within the company as something of a go-to man for any hardware-related tasks. His first three games for Taito – 1970's *Skyfighter* and its sequel the following year, and 1972's *Borderline* – were all mechanically operated creations; games without

screens. Nishikado's great skill was to improvise with existing materials and create something that was entertaining and challenging. With *Space Invaders*, however, he realised that his new project was too ambitious for the technology and software he had to hand – new tools would be required, and who better produce them than the engineer-programmer himself?

"There really was no microcomputer hardware in Japan during the late 1970s," Nishikado laments, "so I used American hardware [including the Intel 8080 CPU] as a reference point and then took it upon myself to remodel it. Also, there was no game development environment to speak of, so I began to create my own development tools from scratch. I drew up a rough specification document and started programming while consulting that paper, but I was thinking about the efficiency of the tools I was making more than anything else, which complicated things. Because of that, I would create and program an original development tool and then realise that I'd soon need another tool as well, so I'd build that from scratch next... in the end, this process took up about half of *Space Invaders*' entire development period."

Those six months of preparatory work were, of course, quite worthwhile. The limitations of 1978 vintage hardware and memory capacities caused Nishikado no end of headaches, though. As he worked towards realising his *Star Wars*-inspired dreams of a game to tap into the space boom, he was also faced with the realisation that capacity and power were at a strict premium. Still, Nishikado accepted that he had to work with what was available, reconfiguring and reworking until he had the tools and hardware required to get the *Space Invaders* he could see in his mind's eye onto a monitor. Ever the innovator, he quickly moved on from the most primitive of methodologies to something altogether more forward thinking: "At first," Nishikado says, "I drew a plan for the screen layout on paper and then put that up on the screen, but if I wasn't happy with it because it didn't look good, I would have to start drawing a new frame action and put that up as a replacement, and so on. That was the process I was using – I really wasn't able to
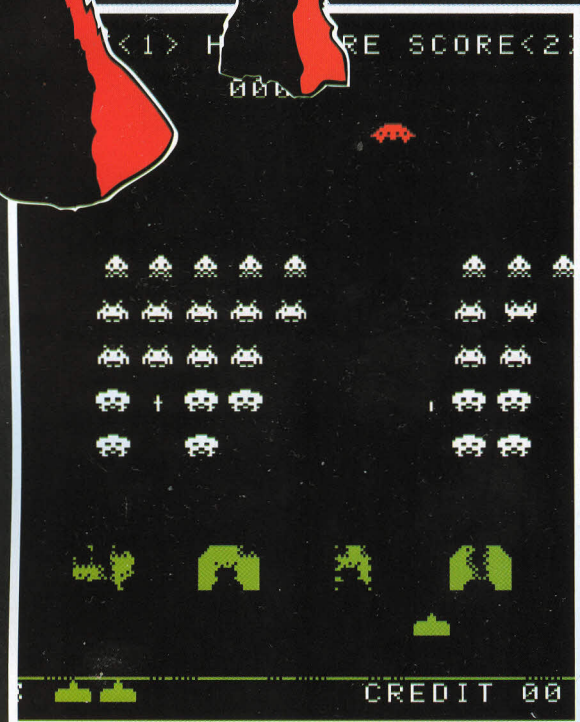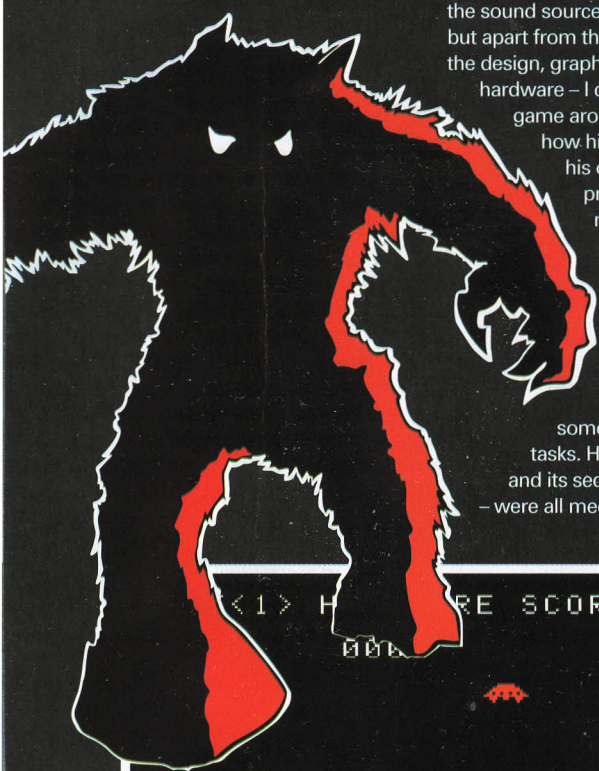
» *Space Invaders* spawned many copycat games, but far from irritating Nishikado, he takes an 'imitation is the greatest form of flattery' approach
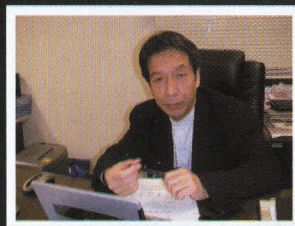
» The 'Nagoya shot' technique in action: finding invulnerability as the Invaders encroach was one of the tricks discovered by Japan's fanatical players of the game in 1978.
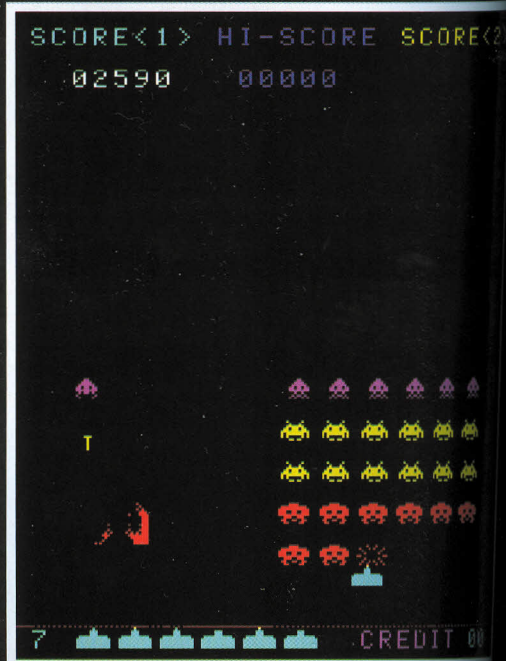
draw any good results that way, though. So in view of that, I created something that these days we take for granted: paint tools, whereby I could use a light pen to easily make corrections to the graphics. This enabled me to complete the graphics with ease and in relative comfort. I think that, at the time, this was a groundbreaking development tool."

Thanks to his inventive time-saving measures, Nishikado was able to work with greater efficiency once the groundwork had been done and his development environment had been established. And as his processes became smoother and less jarring, it became much easier for him to express influences other than *Star Wars*. In particular, the enemy forms in *Space Invaders* began to take on new subtleties and idiosyncrasies. Nishikado explains: "I took the octopus-like aliens from H.G. Wells's *War of the Worlds* as a starting point, to influence the design of the biggest enemy targets in the game. For the targets in the middle of the screen, I modelled them on the image of a crab, and for the uppermost enemies I was thinking of squids. I was imagining the enemies as marine life. The aliens' movement was basic because of the low memory capacity I had to work with, which meant I could only program two patterns [of movement]. But I felt that in some ways, simple was best."

It's probably just as well that Nishikado was content (to a point) with simple design, because the specs of the *Space Invaders* hardware would allow nothing greater. Getting the hardware properly and advantageously configured was in itself a great and time-consuming challenge: "For the base CPU board, I remodelled an existing game board," Nishikado recalls. "I replaced the ROM section with RAM and then developed Monitor ROM. This enabled 16 blocks of data to be input using the keyboard, which meant it was possible to use the keyboard to execute programs. I made various functions and features in the Monitor ROM, including an option that would let me save any programs I made to cassette tape. Of course, I also included a function so that I could produce graphics while looking at the monitor. I used the one kilobyte of static RAM available at the time to compose 64 units of eight kilobytes each lined up for

» The population of Japan took the title screen's encouragement to 'Insert Coins' to excess, children and adults alike.

Space Invaders Twelve
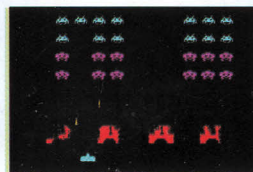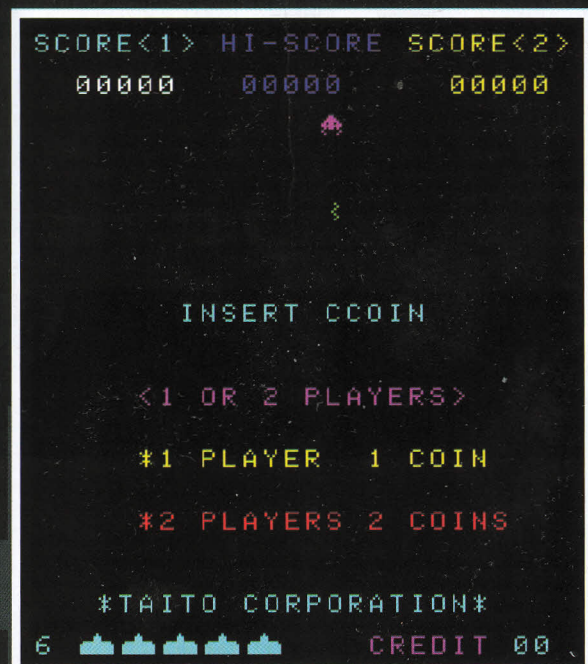
SPACE INVADERS PART II (Arcade, 1979)

Tomohiro Nishikado's first direct sequel to *Space Invaders* was, he admits, not as big a hit as the original. Still, it had some interesting features, including increased complexity to the movement of its enemy targets.

RETURN OF THE INVADERS (Arcade, 1985)

Although Nishikado was no longer at the helm, Taito went ahead with a jazzed-up *Invaders* sequel in 1985. *Return of the Invaders* again increased the variety of Invaders' movement patterns, as well as brightening things up.

MAJESTIC TWELVE: THE SPACE INVADERS PART IV (Arcade, 1990)

Known as *Super Space Invaders '91* outside of Japan, this introduced scrolling backgrounds, shields and power-ups. It also featured a series of stages in which you needed to protect cattle from UFOs…

SPACE INVADERS DX (Arcade, 1993)

Featuring a traditional Space Invader Mode, a two-player split-screen Battle Mode and a Parody Mode, *Space Invaders DX* was an experimental game whose best features would be better developed in *Space Invaders '95/Akkanbeder*.


AKKANBEDER / SPACE INVADERS '95 (Arcade, 1995)

This great *Space Invaders* parody took a pun to arrive at its title: 'akkanbe' is what kids say as they pull one eyelid down and stick their tongue out to make a funny face at another kid, a teacher or a parent.

SPACE RAIDERS / SPACE INVADERS: INVASION DAY (PS2, 2002)

This Sammy-developed *Space Invaders* spin-off brought the series into *Earth Defense Force* territory, arming a few heroes with big guns and telling them to kill Invaders who have already landed on Earth.
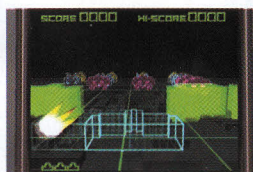
SPACE INVADERS ANNIVERSARY (PS2, 2003)

Notable for including an original 3D Mode, *Space Invaders Anniversary* was an unremarkable collection of variations of *Space Invaders* and *Part II*. The PSP attempt would prove much more worthwhile…


SPACE INVADERS POCKET (PSP, 2005)

This neat compilation contains four variations of the original *Space Invaders* (namely black and white, colour, cellophane colour effect and upright cab styles) as well as *Part II*, *Return*, *Majestic Twelve* and *Akkanbeder*.

SPACE INVADERS REVOLUTION (DS, 2005)

Nishikado himself developed *Revolution*, using the opportunity to incorporate touch-screen controls (digital controls remain far superior), 13 Invader types and a variety of new power-ups and settings.
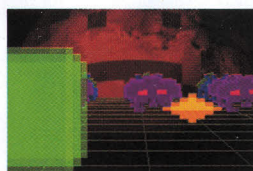
3D SPACE INVADERS (Mobile, 2006)

Providing the option to turn *Space Invaders* into a first-person shooter of sorts, the Taito-developed *3D Space Invaders* is surprisingly ambitious given that it is a game you can play on your mobile phone. Defending on the go!

SPACE INVADERS EXTREME (DS/PSP/XBLA, 2007)

Arguably the best *Space Invaders* sequel, *Extreme* is probably what Nishikado has in mind when he says: "I think that shooting games have become too difficult and too centred on catering to enthusiasts."
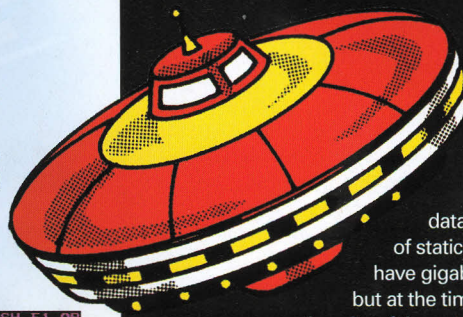

SPACE INVADERS GET EVEN (Wii, 2008)

This recently released WiiWare exclusive turns the *Space Invaders* principle upside-down by putting the player in control of the Invaders, with the objective being to complete a successful invasion of Earth.

Attack of the Clones

How many times will we get away with using variations on the same pun?

INVADERS (BBC MICRO, 1982)

IJK Software's *Invaders* was one of the earliest computer format clones of Taito's international hit. Monochrome and colour versions were released (the latter only for Model B computers).

AVENGER (C64, 1982)

Another early attempt at bringing *Space Invaders* home was Commodore's *Avenger*, which managed to reproduce the coin-op's formula with only a minimum of cuts and compromises.
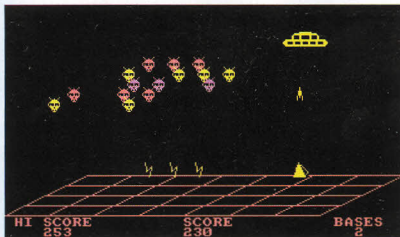
3D INVADERS (CPC, 1984)

More 'quasi-isometric' than three-dimensional, this effort at replicating/improving the original *Space Invaders* formula really struggles to imitate the playability of Nishikado's game.
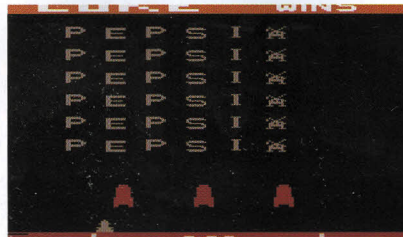
PEPSI INVADERS (ATARI 2600, 1983)

This limited-run promotional 'advergame', commissioned as you might guess by Coca-Cola, replaces *Space Invaders'* alien enemies with the letters P, E, P, S and I. Very clever, that.

SPACE INVADERS: FUKKATSU NO HI (PC ENGINE, 1990)

This great PC Engine conversion also includes a 'New Version' of the game, where the protective bases are removed as your ship gains the assistance of a shield.
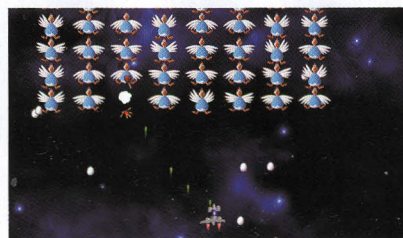
CHICKEN INVADERS (PC, 1999)

Chicken Invaders is a 1999 vintage poultry-based clone of *Space Invaders*, complete with eggs and drumsticks in lieu of laser fire. As it's freeware, you might like to give this game a shot. Don't be a chicken, etc.

SPACE INVADERS (WONDERSWAN, 1999)

This port of *Space Invaders* for Bandai's WonderSwan handheld replicates Nishikado's original work, only inverted as black sprites on a clear background.

SWEET INVADERS (MOBILE, 2006)

In one of the least imaginative and most shameful conversions of *Space Invaders*, 2006's *Sweet Invaders* 'innovates' by displaying bitty 'stunners' in the background of its 'erotic' take on the game.

the program area, but the performance was very bad and I remember occasions when data would become corrupt because of static noise. Nowadays, developers have gigabytes of memory to work with, but at the time I only had kilobytes…"

In spite of those trying limitations, Nishikado must have realised that he had a hit on his hands when groups of Taito employees began gathering at his desk for a go on the prototype version. "Once the game was close to being finished, quite a few people from [Taito's] development division were so pleased with it they began to play it regularly," he smiles. "However, because they were playing *Space Invaders* using my development tools, I wasn't able to get any work done while they were playing, which bothered me a lot. Having said that, although I developed *Space Invaders* alone, I think that in the end it was improved and perfected thanks to consultation with the people who were playing the game around me."
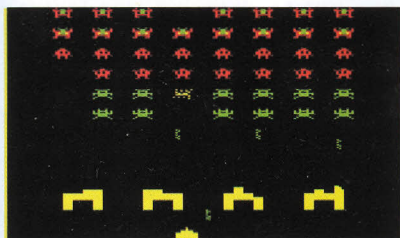
While the floor-level workers at Taito were rightly impressed with *Space Invaders* and were the first people in the world to become hooked on it, the 'Suits' were, according to Nishikado, a picture of doubt and scepticism: "In those days I was given complete freedom to work on games as I saw fit, so at the start of the project no one expressed any opposition to the idea. Along the way, though, I had to explain – mostly to businesspeople and salespersons – the game's shooting system and how there was nothing else to compare it with at that point. I had to outline how being invaded by these aliens would result in a game over, how enemies would shoot at the player and so on. That was difficult; they generally didn't give *Space Invaders* a good evaluation – they didn't seem to rate it very highly."

Part of the execs and salespersons' problem with the game was that it did something unusual; something they either couldn't comprehend or simply didn't see as an appealing factor in a project they were backing: "Up until *Space Invaders*, shooting games didn't feature enemies that would attack the player," Nishikado explains. But that wasn't the only feature that met with doubting voices: "Also, even if you still had missiles remaining, if the Invaders got to the bottom of the screen and successfully carried out their invasion, it would result in a game over. To tell you the truth, both of these features were vehemently opposed by the sales and businesspeople…"

The final build of *Space Invaders* satisfied its creator to an extent, but Nishikado had some regrets even as soon as the game was in the wilds of Japan's 'game centres' (the places we'd call arcades). "The capabilities of the *Space Invaders* arcade hardware were really low," Nishikado sighs. "I wanted to produce colourful images, but it just wasn't possible with that hardware – so as soon as the game was complete, I began to develop a plan for new high-level hardware." Initially, that wasn't possible, so the game appeared in monochrome form. Eventually, Taito came up with an ingenious solution that went some way towards placating Nishikado's desire for a colourful game: multicoloured cellophane screen overlays were placed over the displays of existing cabinets. Over in the States, Bally/Midway would pull the same trick with its upright cabinet.
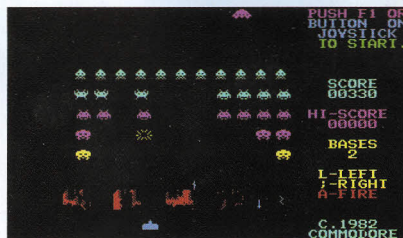
While *Space Invaders* was by no means a rushed job – in spite of completing work on the game in just 12 months, Nishikado was not working to a set deadline as such – the limitations of the technology at his disposal meant the final build was not quite where he wanted it to be: "For one thing," says Nishikado, "I really wanted to include a feature in the original *Space Invaders* where the Invaders would split up and form groups… but at least this ended up appearing in *Space Invaders Part II*."

If Nishikado was slightly unimpressed by his own production, the same could not be said of Japan's population at large.
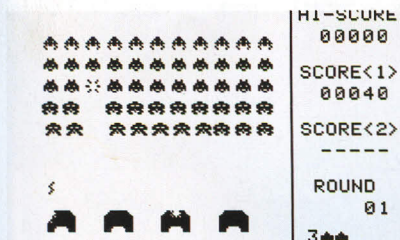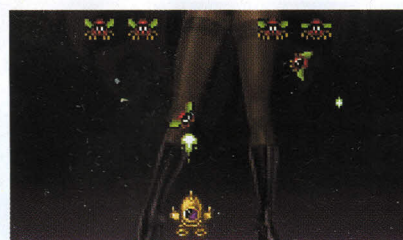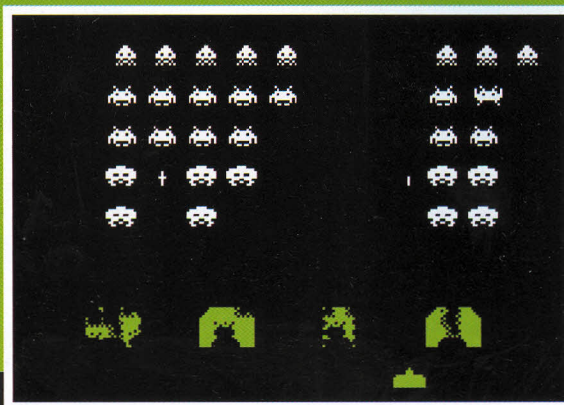
» Space Invaders' clear outline of its high-score system ensured that players would try to play cleverly and keep on returning.
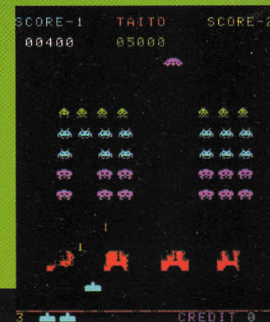
« Businesspeople and salespersons … generally didn't give Space Invaders a good evaluation – they didn't seem to rate it very highly » THE SUITS COULDN'T SEE A GLOBAL HIT EVEN IF TOMOHIRO NISHIKADO DEMONSTRATED AND EXPLAINED IT TO THEM

» Tomohiro Nishikado's work remains relevant 30 years on from its conception, marking the game out to be, what we already knew, one of the greatest ever to grace our planet.

DEVELOPER HIGHLIGHTS

» SPEED RACE DX
SYSTEM: ARCADE
YEAR: 1975

» SPACE INVADERS PART II
(PICTURED)
SYSTEM: ARCADE
YEAR: 1979

» LUNAR RESCUE
SYSTEM: ARCADE

Tapping into the tremendous local interest in science fiction, Space Invaders was very much of its time – a 1978 vintage game for the inhabitants of Japan in 1978. The coin-op was an instant hit, zapping games right into the core of Japanese culture and even reportedly causing a shortage of 100-yen coins as a by-product of its phenomenal success. When we mention this myth/legend to Nishikado, he seems like he wants to laugh it off as a fanciful exaggeration, but it definitely holds an element of truth, as he concedes: "The effect of Space Invaders was certainly noted among businesses using 100-yen coins a lot, but I don't know whether the coins actually became less common because of the game…"

Nishikado can't take credit for the housing of his PCB, mind, as he had nothing to do with the coin-op cabinet's design: "The cabinet was designed and produced by a separate team," he says. Like the Western versions of Space Invaders manufactured by Bally/Midway, Taito's Japanese Space Invaders cabinets were eventually presented in different flavours – some upright machines, some in a cocktail-table style. After some comparison work, Taito's preference was for the table format, as Nishikado relates: "Originally, the cabinet was intended as an upright design. The table-type cabinet saved a lot of space, though, so that version ended up supplanting the upright model." T.T. Space Invaders, as it was dubbed by Taito in Japan, was a sensationally popular machine. Later on, however, Taito would release an upgraded version of the upright, which would ultimately prove to have a longer life in Japan's quickly changing game centres. The later addition of proper colour graphics (a notable improvement on the 'black-and-white graphics with colour overlay' solution) cemented Space Invaders' place as a 'safe bet' in bars, game centres and other locations.

The legacy left by Space Invaders is so immense and multi-branched that it's almost impossible to quantify the game's influence on the world. It has appeared in countless TV shows, either by way of a passing reference or as a central theme; it has provided the impetus for numerous musical projects (search Google Images for the sleeve to 1981 dub LP Scientist Meets the Space Invaders); it has even inspired artistic movements. Yet in Japan, the game itself was – like most trends here, it has to be said – a relatively short-lived phenomenon. On the one hand, Nishikado reckons: "Sales of Space Invaders were really much higher than I had anticipated." But on the other, matter of factly, he tells us: "The following year, once sales of the game had started to decline, I was asked to produce Part II, which I developed dutifully, but it wasn't such a big hit [as the original]."

1978 was a hugely significant year for Taito and games in Japan in general, but in terms of the volume of notable games, it would be superseded year on year thereafter. As early as 1979, Nishikado was seeing his compatriots gaining ground, even if much of the basis for their successes had been laid by Space Invaders and what Japan collectively termed the 'invader game' boom: "When I saw how smooth the movement was in Namco's Galaxian – and how colourful it was, too – I remember thinking Space Invaders had lost [the battle]. There were many shooting games that used Space Invaders as a basis after that," Nishikado concludes, although he doesn't sound at all bitter about that situation. Without Space Invaders, there's a chance that Japanese shoot-'em-ups would not have developed, or at least not in the amazing way they did during the 1980s and 1990s. It's not merely Taito that owes Nishikado a (metaphorical) debt, but also the other Japanese developers (Namco with Galaxian included) who took inspiration from Space Invaders and, on a global scale, the millions of people whose first experience of the power of videogames was the heroic act of saving the Earth from invasion by pesky aliens who were wont to scuttle their way towards the planet's surface.

Nishikado isn't keen on the latest examples of shooting games – "In recent years, I think that such games have become too difficult and too centred on catering to enthusiasts," he tells us – but he remains committed to the enduring phenomenon that began in his office at Taito in early 1978: "I still want to make simple shooting games," he smiles.