A treatise on fixing the taxonomy of home video game console generations

As a game collector, archivist, and historian, the taxonomy of video game consoles is important to me. That's why I am so bothered by the flaws with the common system of classifying console generations. In this episode of Retro Game Living Room, I will examine the issues with the current system, propose remedies through new definitions, and correctly classify home video game consoles. So, stick around![RV1]

Taxonomy is important. As humans, we have a natural tendency to classify things. In my kitchen, I have a separate area to store my dishes and utensils. Both are used for the perpetration of meals, but I don't store them together. When I put my silverware away, I separate out the forks, from the knives, from the spoons. I go even farther and separate teaspoons from tablespoons.[RV2]

In the research and discussion of gaming history, having terms to classify different game systems is imperative to establish context just as it is in geology. [RV3] If I were to give a lecture on the Proterozoic era, the audience would know that I am not going to discuss dinosaurs and mammals. If I am going to write a paper on the second generation of consoles, I can't take audience assumptions for granted because the term is so poorly and inconsistently used, to the point where its meaning is diminished.[RV4]

Before starting this video, I spent some considerable effort trying to determine the origin of the common system of classifying video game console generations. I reached out to historians, content producers, and collectors. No one knows for sure. Some experts speculated to me that it is derived from Wikipedia. Until I hear better, I share in this hypothesis. [RV5]

The first problem with the common system is the definition. [RV6] Wikipedia defines a console generation as "A set of video game consoles in direct competition for market share in a given era."

https://en.wikipedia.org/wiki/Glossary_of_video_game_terms#console_generation

That sounds simple, right? But there are some major problems with it. [RV7]

First, this definition breaks Wikipedia's own rules about citations. There is no citation for this. It's something that the anonymous author made-up. That may seem technical, but it's a big deal in the context of this issue, especially considering that Wikipedia created itself as the foremost authority on the subject.

Second, what is an "era"? The term is important in when discussing historic timeframes. As with my example from the geologic time scale, eras mean specific things. Again, we have no citation for what constitutes an era of gaming.

Third, consoles “in direct competition for market share” is a terrible metric. [RV8] Atari 2600 was marketed through 1991. Does that mean it’s in the same generation as NES?

Okay, that may sound outlandish, but let’s try another one. The Sega Genesis launched in the U.S. in 1989. It’s primary competition for market share was not the TurboGrafx-16, which never achieved a competitive edge in North America. Sega was marketing their 16-bit Genesis directly against the 8-bit Nintendo juggernaut. Nintendo had the market share that Sega was after. Sega went as far as to directly call out NES in its commercials. Nintendo’s 16-bit answer didn’t debut in the U.S. until 1991.

There is no doubt that NES and Genesis were in direct competition, just as there is no doubt that the NES and Genesis both represent two distinctly different generations of video game consoles. However, by the Wikipedia definition, it could be that Genesis and NES were in the same generation until the release of the Super Nintendo.

And what about the 3DO? It’s a powerful 32-bit machine capable of 3D texture mapped environments, but its chief competition was with Genesis and SNES.

The best thing to do is to create a new definition of what constitutes a video game console generation, one that is based on the performance, technical abilities, and actual games of the consoles. [RV9]

The first task is to define what a video game console is. I define it as “a consumer electronic device, which outputs a visual image, the primary purpose of which is to play video games that are designed for its unique hardware.”

A console must be specified as a consumer device so as to keep it separated from other devices, such as arcade machines.

A video game console must output an image. This is to separate it from game systems that do not. Like the Omni here.

I use the term “image” in order to not exclude any of the broad range of devices that use different display technologies.

For a device to be a console, playing video games must be its primary purpose. A personal computer can play video games, but it is not a console. Multimedia devices, such as the Video Information System, can play video games, but they are not a console.

Video game consoles are also not cross compatible with other consoles in the way that one model of Windows PC, or one model of Android device, is compatible with another. Therefore, they must have a library uniquely designed for their specific hardware.

Now, armed with the criteria for what defines a video game console, I can proceed to defining a video game console generation. [RV10]

“A console generation consists of a group of video game consoles that natively have similar capabilities and are able to play games in a similar style without major modifications in appearance or gameplay.”

From our previous example, we know that the Genesis competed directly against NES. We also know that it was in the same generation as SNES. Both Genesis and SNES can play Street Fighter II and Mortal Kombat. NES can play neither of these games without substantial changes to them. Genesis and SNES are in the same generation. NES is not a part it. PlayStation, Saturn, and N64 can handle a game such as Tomb Raider, however SNES and Genesis cannot. PlayStation, Saturn, and N64 are in the same generation, SNES and Genesis are not members of that generation.

There have been occasions where consoles have required additional hardware or peripherals to upgrade their ability to play certain games. The word “natively” was included for this reason, so as to preclude a console from being considered a member of a generation it does not belong to by virtue of additional chips or other hardware accessories.

With an understanding of what a console generation is, I am now ready to classify each generation of consoles. [RV11]

Pre-First Generation

I’ll begin with this clip of me speaking to Jenovi, and his excellent documentary on aftermarket games for retro consoles called “Retro Impressions: Why We Create.”

https://youtu.be/tBKDRdwAMyI?t=69

The Magnavox Odyssey is really a generation onto itself because it is incapable of replicating later produced games, not even Pong, due to its use of discrete circuitry.

Other consoles with discrete circuity are the U.K. Videomaster Home T.V. Game from 1974, the French Orelec pp-2000, as well as the Magnavox Odyssey 100 and 200.

I purposely wish to not re-order the numbers of the common system of console generation classification, therefore I’ll call these systems “pre-first generation.” [RV12]

Characteristics of pre-first generation consoles are that they rely in discrete circuitry and are incapable of keeping score.

First Generation

The first generation of consoles was truly kicked off with Home Pong, released in 1975. This was the beginning of “pong wars.” For most of this generation, dozens of companies would release consoles that are pong clones well into the beginning of the 1980s. One first generation console I own is the Bentley CompuVision, a pong clone released in 1982. This really highlights the importance of not using release years as a basis for generational classification.

In addition to pong knock-offs, the first generation also saw driving, shooting, and tank games.

There are four things that all first generation consoles have in common: [RV13]

- They are not reprogrammable
- The games are contained on integrated circuits
- They are capable of keeping score
- Cannot produce AI

Second Generation

The second generation of consoles kicked off with the release of the Fairchild Video Entertainment System in 1976 (later renamed to Channel F). This was only one year after the introduction of Atari’s Home Pong by Sears. Channel F aimed to disrupt the first generation market by introducing the world’s first reprogrammable console. Channel F could accept games on ROM cartridges and it employed a microprocessor in the form of the F8.

Several other companies followed suit: RCA, Atari, Magnavox, APF, Bally, Mattel, GCE, and Emerson. Ultimately, the Atari 2600 defined the generation, with Intellivision coming in a distant second, and Odyssey 2 with an even more distant third.

The second generation caused a market shake-up, a crash, if you will, that led to all but four of the dozens of manufactures of first generation consoles leaving the market or going out of business. Coleco almost went bankrupt in this upheaval. However, that crash is topic for another video.

This generation also features a great disparity between competing consoles. So much so, that that the Intellivision is almost a member of the next generation, and the RCA Studio II is nearly out on its own. Despite its advanced features, most Intellivision games can be adapted for play on the 2600, which is on the lower end of power spectrum for its generation. Mattel converted many of its own games to 2600 themselves under the M Network label. As for RCA Studio II, while it definitely is not capable of running the most advanced games of the second generation, innovative homebrewers have ported several to its limited hardware. The Channel F is also often dismissed as a weaker system, but despite its limitations, it enjoys a surprisingly good port

of Pac-Man, proving that it was capable of much more, and solidly deserves a place among its peers.

Other consoles in this generation not previously mentioned include, but are not limited to, the Interton VC 4000, Bandai Super Vision 8000, and Epoch Cassette Vision.

Second generation consoles have key characteristics: [RV14]

- Use ROM cartridges
- Limited colors in gameplay
- Use no more than eight sprites
- Lacks hardware scrolling
- Resolution of generally less than 256x192
- Can produce AI
- No dedicated video processor
- CPU processor speeds are mostly less than 2 GHz (the later released Arcadia 2001 is an exception)

Third Wave Generation

The next generation to discuss is one that often, incorrectly, gets lumped in with the second generation. This generation consists of the ColecoVision, Atari 5200 SuperSystem, Sega SG-1000, Casio PV-1000, Tomy Pyuuta Jr., Epoch Super Cassette Vision, and VTech CreatiVision.

Of all the generations, this one is perhaps the biggest mess. First, I will focus on the two American consoles, ColecoVision and Atari 5200. Both are regularly included as late entries into the second generation. This should make absolutely no sense to anyone. First, the 5200 is the successor to the 2600. Obviously, they're not in the same generation. Both the 5200 and ColecoVision are significantly more advanced than second generation consoles such as the 2600 and Intellivision.

For an example, here's Pac-Man running on the 2600.

Now here's Pac-Man running on 5200.

Now here is 2600 Pac-Man running side-by-side with 5200 Pac-Man.

What's clear is that the 5200 version of Pac-Man is closer to the original arcade and is far technically superior to the 2600, which is frequently the butt jokes for its technical failings and inauthentic gameplay.

For another case, let's study Zaxxon.

This is Zaxxon on Atari 2600.

Now this is Zaxxon on Intellivision.

The Intellivision version is better, but it's still nothing like the isometric shooter that Sega released in the arcades.

Now here's Zaxxon on ColecoVision.

Here it is again on 5200.

Now, for the Intellivision version.

Finally, this is Sega's own port on their SG-1000 console.

Here are all five ports running side-by-side.

The differences between the 5200, Coleco, and Sega versions are minuscule. They are nearly the same game.

The Intellivision and 2600 versions of Zaxxon aren't even really home conversions of the arcade original. They are what we'd today refer to as a demake. These are games that have the name Zaxxon and share some gameplay elements, but are in fact totally different games. This practice was not uncommon in the second generation since home systems couldn't handle the increasingly more advanced arcade titles.

This is also where ColecoVision came in to the scene. It allowed for arcade games to come to the home which couldn't be done well on older systems. That was a big selling point for it, it was the previously a selling point for the 2600, and it would be a selling point again for consoles in the future.

Another thing that makes this era of gaming a mess is that everyone knows that the common system of console generation classification is broken. [RV15]

One user on the talk page for the ColecoVision Wikipedia entry correctly points out that though the Sega SG-1000 and ColecoVision are virtually identical hardware, the ColecoVision is

classified as second generation whereas the SG-1000 is classified as a third generation console.

On the talk page for the 5200 entry, Wkipedian Indrian agrees with complaints that the 5200 is not in the same generation as the 2600, but states that the problem is that reliable sources are needed to change the entry while at the same time acknowledging that the generational confusion was caused by Wikipedia and that journalistic sources are primarily citing it.

In short, Wikipedia created the problem, and cannot correct it until people stop publishing the false information that it provided in the first place. This circular phenomenon of an error on Wikipedia being picked up by a mainstream source and then cited to the point where it cannot be undone is what is referred to as citogenesis.

Contemporary American journalistic gaming publications didn't get this detail wrong when the ColecoVision and 5200 were first introduced to the public. They recognized that the two systems represent a new wave of game consoles. They further understood that there were two previous waves (the first generation, and the second generation). Thus, they called these consoles the third wave.

In recognition of the historical term as well as my desire to not have to renumber console generations in order to fix them, I refer to these systems as the third wave generation of home video game consoles. [RV16]

One of the problems with classifying this generation is that it's the first where the United States wasn't entirely leading the field. Four of the seven consoles in this generation are Japanese. All of them came out on the same day or after the third generation console Famicom, or as it's known outside of Japan, the NES. This illustrates why it's necessary for the hardware and gameplay capabilities to be taken into account when determining generations.

Though it's true that this was a short-lived generation with much overlap into others, remember than only one year existed between the release of Home Pong and the Fairchild Channel F. Therefore, the timing of releases also cannot be taken into account. Let us further not forget about the earlier CompuVision example.

Characteristics of the third wave are: [RV17]

- Dedicated video processor
- Dedicated video RAM (4-16KB)
- CPU processor speeds mostly between 2 and 4MHz (5200 is an exception)
- Coarse scrolling

- Up to approximately 32 sprites on screen
- Resolution of no less than 256x192 (can be greater)
- 8-16 colors on screen

Third Generation

There is no doubt that the third generation of video game consoles began on July 15, 1983 when Nintendo released Famicom in Japan. Many refer to this generation as the golden age of gaming. The NES ushered in a global revival of home video game consoles. The industry would grow to be larger than it ever was prior to the crash. Mario, Zelda, and Nintendo became household names.

This is one of the easiest generations to chronicle because it's the smallest of the retro era and entirely straight forward. There were only three main consoles of the period: NES, Sega Master System, and Atari 7800 ProSystem.

Three other 8-bit consoles would join late in the game, all of which being consolized home computers. Those are the Atari XEGS, Amstrad GX4000, and Commodore 64GS.

Characteristics of the third generation include: [RV18] [RV19]

- Smooth, multi-directional scrolling
- Resolutions of up to 320 pixels wide and 240 pixels tall
- Up to 32 colors on screen
- Up to 64 sprites on screen
- Pallets of up to 256 colors
- Sprite-based, software-driven parallax scrolling

Fourth Generation

The fourth generation of consoles improves on the sound and graphics of the previous generation.

[RV20] The two most iconic consoles from this period are the Sega Mega Drive, also called Genesis, and the Super Famicom, also called Super Nintendo Entertainment System. Both were preceded by the PC-Engine, or TurboGrafx-16, and later joined by Neo Geo, CD-i, Sega CD, something called the Super A'Can.

Two consumer devices were released during this era that are by some considered to be consoles. Those are the Commodore CDTV and Tandy/Memorex Video Information System. These devices could play video games, but were marketed as multimedia devices. The CDTV is really an Amiga 500 computer and can be upgraded with a floppy drive and other Amiga peripherals. The VIS, on the other hand, had very little true video game software.

Per the definition of what constitutes a game console, the devices' primary purpose must be to play video games. Therefore, CDTV and VIS do not meet this standard.

CD-i only barely meets the definition of a video game console. While it was initially marketed as a multimedia device, Philips pivoted hard towards the video game industry and pushed it as a games machine that could also do other stuff.

Fourth generation consoles feature: [RV21]

- Color pallets of greater than 512
- Resolutions generally greater than 320x224
- At least 64 sprites on screen
- A minimum of 64 colors on screen
- Advanced sound processing
- Hardware-based parallax scrolling

Late Fourth Generation

The fifth generation of consoles is where things get really messy again. Perhaps more so than with the second generation. There are three distinct sets of consoles in this group that need to be separated out. [RV22]

This first group of console I've termed the late fourth generation. These systems are 2D powerhouses that lack 3D hardware acceleration. [RV23]

The three consoles that fall into this category are the Fujitsu FM Towns Marty, the Amiga CD32, and the NEC PC-FX. These differ from the fourth gen consoles only marginally.

Each of these three are capable of higher resolutions that fourth gen machines, just barely. The FM Towns Marty has the same color palette as SNES, while the other two can choose from over 16.7 million colors, just like CD-i.

Where this group really stands out is with their much faster CPUs, all over 10MHz. Because they are all CD-ROM based, they have high media capacity as well.

Because these systems are not designed to display 3D graphics, they are more closely related to the likes of Genesis and Super Nintendo than they are to Nintendo 64 and PlayStation.

Paleo Fifth Generation

The next group of consoles is the smallest group in this feature. The group consists of just two or three machines, the Atari Jaguar, Sega 32X, and unless you consider it a handheld, which I do not, Nintendo Virtual Boy. I call the group that these three are members of the paleo-fifth generation. [RV24]

All three machines are designed to produce polygons. Theoretical specs aside, both the 32X and the Jag can produce 20,000 flat shaded, Gouraud shaded, or texture-mapped polygons per second. Both have processors over 20MHz.

The 32X and Jaguar are clearly more powerful than not only the fourth generation consoles, but the late fourth gen consoles as well. But they don't quite match up to true fifth gen systems.

Here's a 3D game on Jaguar.

And here's a 3D game on 32X.

Now here's a 3D game on Sega Saturn.

Here's one on PlayStation.

And now one for N64.

The problem is, that neither Jaguar nor 32X can run games that are quintessential of the true fifth generation. That's why they must be separated out.

For example, take Tomb Raider. I am aware that it never appeared on N64, but N64 could've easily handled it. It did appear on both Saturn and PlayStation. This is a game that none of the proto-fifth gen consoles could handle. To that point, they could also not handle any of the three fifth gen examples I've already shown.

Fifth Generation

Moving on, we come to the real fifth generation. This generation is larger than most people think. It began in 1993 with the 3DO Multiplayer, and is best known for PlayStation, N64, and Sega Saturn, in that order. Two other consoles would later join the fray. They are the Apple-designed Bandai Atmark, called @World in the US, and the VM Labs NUON. [RV25]

Atmark is better known by the platform name, Pippin. The Bandai produced machine used a PowerPC 603 and was capable of at least PlayStation level graphics. It's not certain how much better the graphics could've gotten since the $600 console was released 1996 and pulled from U.S. shelves the next year. According to LowEndMac.com, less than 5,000 units were sold in North America.

Although Apple touted its Pippen platform as a multimedia device, saying consumers wanting "just a console" would be "better off" looking to Sega or Nintendo, Bandai pushed it as a gaming machine, especially in its native Japan, where it had more direct control of the marketing as well as a long history of making consoles.

Like Pippin, NUON was the name of a platform, not a specific console. VM Labs was quite a bit more successful than Apple in getting its technology to market. DVD manufactures such as Toshiba and Samsung released video game capable NUON-enabled players. Motorola even released a compatible set-top box.

VM Labs promised the world it would revolutionize gaming, which it did not. NUON is often included as a member of the sixth generation of gaming, which it is not. It's graphical abilities fall somewhere between those of a PlayStation and an N64, as can be seen here. Claims that it was a "128-bit" console were just marketing fluff. In reality, the heart of the machine, the Ares chip, featured a 32-bit main bus and a 32-bit communication bus.

Subsequent Generations

The following generations are relatively straight forward…

The sixth gen began in 1998 with Dreamcast, which was joined by PlayStation 2, GameCube, and Xbox.

The seventh generation saw the release of Xbox 360 and PlayStation 3.

The eight generation saw Xbox One and PS4. [RV26]

Wii, Wii U, and Switch

So… Where do Wii, Wii U, and Nintendo Switch fit into this? I'd argue that those three consoles are extra-generational. None of the three were part of a homogenous ecosystem of home video game consoles, and therefore they exist outside of the console generation model. Nintendo

themselves support this position, and believe that they are not in direct competition with the Xbox and PlayStation brands, and have not been for some time.

What about some other consoles?

There are a lot of consoles not named in this video. Some of them, like the second generation Radiofin 1292 Advanced Programmable Video System, were not mentioned for time and there were more important consoles to cover, namely, ones that need better classification or serve as anchors for their respective generations. [RV27]

Others, such as the Worlds of Wonder ActionMax, a VHS-based console released in 1987, are extra-generational, and exist as gaming products outside of generations, and fall neatly into no one category. In order to place a console such as ActionMax, it's important for the term "era" to come into play.

Console Eras

We can determine the era of a particular console by simply looking at the market leaders of the year. Given ActionMax and its '87 release as an example, when it came out the NES was dominant, and Master System and 7800 were vying for market share. This means that in 1987 the third generation was underway, therefore the ActionMax, while itself not being a third generation console, is a third generation era console.

A console can also be released in one era and belong to another hardware generation. [RV28]

Take the Funtech Super A'Can. I previously included this in the fourth generation of consoles. It has about the same capabilities as a Super NES. There is no disagreement that I've ever seen with the fact that it is indeed a fourth gen console. However, it was released in 1995, putting its release squarely in the beginning of the fifth generation era as Sony and Sega were battling it out with PlayStation and Saturn, with 3DO was desperate to remain relevant, and Nintendo's Project Reality looming on the horizon. The Super A'Can is a fourth generation console that was released in the fifth generation era.

Looking at the Atari 2600, it is a second generation console released in 1977. It was sold until 1992. Being on the market during the fourth generation didn't make it fourth generation console or even a fourth gen era console. It was released in its own era, but it ended its life fourth generation era.

Console generations do not end where a new one begins. They don't look like this. They overlap, and look like this. A console generation begins when the first member of the generation is released. And it ends when the last member of the generation ceases both production and official software support.

When discussing Wii and Wii U, even if they exist outside of the generational paradigm as I propose, they are without a doubt seventh and eighth generation era consoles, respectively.

As we move forward, some say we may be moving into a post-generational era. The seventh generation lasted 10 years, far longer than any other. We are now in a time where console manufacturers are choosing to release upgraded versions of their hardware, such as the PS4 Pro and Xbox One X, instead of refreshing their hardware outright. But just as PC graphics cards gradually increase in power and include legacy support, so will consoles, and eventually, we'll be at a point where we realize a new generation has dawned. As with all technology, that will never change. [RV29]

But wait! Did I totally forget about handhelds?!

I did not. My treatise on handheld console generations and divorcing them from home console generations is a future video. So, stick around!