

Research on the Application of Pixel Art in Game Character Design

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ABSTRACT

This paper analyses the trend, design fundamentals, and design principles of contemporary character design from digital game. It discusses that even though the design styles of today's digital art era are flourishing with diverse thinking and visual approach, the classic pixel art style will never go out of style. The fundamental element of artistic design in pixel art style is a single element, a pixel. Many designers prefer using the single pixel style as the fundamental element of their artistic design, which has led to the creation of various intriguing design categories. Despite the prevalent use of full high-definition 3D rendering images in contemporary digital game design, the pixelated style remains a timeless tribute to the classics with an enduring impact, given its promising development prospects. Pixelated design is now being applied to practice by more designers and artists, and it has gradually become a unique form of artistic visual expression.

Keywords: pixel style, game character design, retro game design

INTRODUCTION

The Video games are a unique form of work. No other art can create its own world, with narrative, drama, music and visuals while giving players the power to influence the world in the game. While this has the potential to be an interesting experience, it also comes with its own set of problems. The user interface is an important thing that allows players to interact with the game world. GUI plays a very big role to be able to bridge how the UI is. The clarity and usability of the GUI is essential to enjoying the game, allows for a connection between the player and the game world, and will play a role in deciding what role the player will play.

Pixel art is an art and aesthetic style that is often applied in the visual design of a game. Pixel art was the only option available for computer graphics from the early days of digital game consoles and PCs to the mid 90's. This is a type of digital art where a square grid of pixels is highly visible, and can be compared to a digital cross stitch or mosaic. Its origins lie in the hardware limitations of the 8 and 16-bit computing era when resolutions were small and the number of colors that could be displayed was limited (Lyon, 2006). As technology evolves, pixel art is changing from the dominant graphic type in commercial video games to being increasingly displaced by 3D graphics as the rendering capabilities of newer hardware improve. In the 2000s, pixel art was mostly found on handheld consoles and cell phones and is expected to become extinct as hardware continues to evolve. But against all odds, games that use this style remain popular. Pixel art is not a single image, but a style with sharp borders, jagged pixels, vibrant colors, and a borderless style with little monochromatic squares (Wei & Wang, 2021).

Pixel Art as Graphic Tool

As a unique art style, pixel art presents images intentionally limiting to a certain Resolution. In particular, the dithering pattern adds a bold and expressive style to the image and gives aspiring character designers and new media designers to experiment freely. The fact that pixel art has never before emerged as a kind of art is a strong incentive to keep it as a tool in the hands of artists. As unique character designers have appeared pixels in their designs. here is the will to produce designs by using computer graphics to create amazing designs.

Pixel art is the technique of creating images and animation using pixels. Pixels are single coloured squares, the smallest unit of colour that a computer can draw. The concept goes back ten years before the SuperPaint system was used to produce pixel art images for television. The SuperPaint system was created by Richard Shoup, 1972.

Some traditional art forms follow the same system and technique as pixel art, such as mosaic, beadwork and cross-stitch embroidery. All styles are constructing simplified, stylised images using small coloured units. Pixel art as a graphical style was once a necessity on computers and digital game consoles because of the strict size limitations of the DPI (dots per inch) to the screens and the limit of content that fit on the cartridge or CD. The Nintendo Entertainment System (NES) released in 1983 was restricted to only 54 pixel colours and could only display 25 colours on the screen at a time. The NES had a total screen resolution of 256x240pixels. By 1990 Nintendo released the Super Nintendo Entertainment System (SNES) and the technology had improved enough to manage 32,768 colours thanks to layers and transparency and 256 colours simultaneously. To create retro styled pixel art today the artist will simply put similar limitations to the resolution of the image and the colours used (Grahm, 2013).

In modern pixel art any limitations to the amount of available colours, the amount of animations playing at one time, the length of animations and/or the resolution of backgrounds is strictly an aesthetic choice. The style is popular partly because of the nostalgic association with the older games but it is also easier to create a coherent style, less demanding in size of staff and different roles in the graphical content creation process. It is therefore cheaper to get a good result than many different art styles. The less complicated the animations and camera angles of a game are, the more pixel art shines. The style demand practically no investment in hardware or software, only time and skill (Grahm, 2013).



Figure 1. Image caption.

Pixel Art Techniques

Due to the fixed palette and limit of available colors, the pixel character designer developed several dithering techniques to mix colors and add shadow and depth. The most common dithering effect is to draw two colors in a checkerboard pattern. Changing the density of any of the colors will change the tone of the area. Stylish dithering is two or more colors that disperse spontaneously, small rings are also common. Creating a partially transparent image for use in video games is commonly referred to as spriting. Images are usually used for foreground and character animation or still images called sprites. Sprites are sometimes used to describe the act of creating pixel art, although sprites can also be high-resolution 2D graphics. Due to the origins of its activities, in some communities “sprite art” is synonymous with “pixel art”.

Sprites can also be used in a 3D environment, this is called billboard. It gets its billboard name from how the sprites are positioned to always face the camera, just as billboards are strategically placed to always face a car on the road. billboard is used for both aesthetics and performance optimization. Pixel art is preferably saved and used in GIF and PNG file formats. These are both lossless data compression file formats. This means that the files will remain exactly the same when reconstructed from the compressed stage. If you use a lossy compression format, such as JPEG, the file can be compressed smaller but when used the computer will smooth the image. In high resolution this is barely noticeable, but in pixel art it will blur the image, spoil some dithering and cause discoloration and artifacts.

To use pixel art saves money and requires fewer people, but of course they need to have enough skills to produce good work. Because the style is very limiting in size with low resolution every detail becomes very important for the appearance of the character. In early pixel art, it was a matter of file size and available colors. Nowadays, the retro look and the impression that every pixel is placed for some reason disappears if the sprites are too big and detailed.

Character Design

Character is the main thing in the story presented; soul that animates the story. In a film, a character will take the audience along with their adventures, following them until the film ends. In a game, characters are often avatars whose appearance and attributes can be modified, based on player preferences. The characters will then face challenges, which take place at levels that have different levels of difficulty. A character is designed based on a story idea or storyline. Character designers are professionals who constantly challenge themselves to explore their imagination to find the perfect and unique character that is different from the existing ones. Character designers typically work with walls full of drawings, piles of sketches, and references from books, music and films, photographs, and research data.

The whole process is a long one to get the soul into the character and bring it to life. The goal of a character designer is to create a character that meets the needs of the script, scene, game, or story and fits the storyline. The image that has the most potential to attract people to read the game description is the game character. After they click on the character icon, all game features will be displayed, from description, version, game detail information, game developer, some game level preview images, to customer ratings and reviews. Both the characters and the visual appearance of the game create a journey of visual experience that allows people to experience adventures and challenges in the virtual world.

The characters in the game play a unique role. It is a representation of the player as it happens in a virtual world full of adventures and challenges. Players can find different adventures and challenges in each level of the game. The appearance, attributes and even personalities of some game characters can also be controlled and customized. Design characters and other game assets are included in the game art. Games tend to differentiate themselves first by their visual style, then by their gameplay mechanics, and finally by their narrative. The visual style might appeal to people, but if the gameplay isn't fun, the characters won't help. If the game is fun and exciting, then players won't really mind the weak story. Ideally, all elements are equally strong, but this is rare. A good game character is one that enables and supports a great game.

This is much more important than a strong marketing image. Character is also something that reveals itself gradually to a player. Characters in the game are divided into several types, one of which is a character who is the embodiment of the imagination and wishful thinking of players who play themselves in a game. Although these characters do not represent the real life of the player. Some examples include figures such as racers, elite squad leaders or knights on horseback. Another type as stated by Scott McCloud as an iconic character. McCloud applies this to comic characters but we also find it in game characters, even famous game characters like Mario are present in that form.

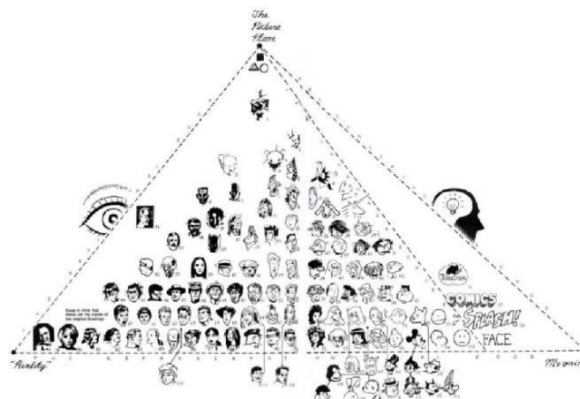


Figure 2. Range of Style
(McCloud, 1993)

Player Character

The player-character's personality and appeal stems from his movements in response to the player's real-time controller actions as well as watching elaborate cut-scenes. Most of the time spent with the player character will take place over time in the game. The strongest player characters are deeply rooted in visceral and cognitive layers and that their social and fantasy selves emerge from these roots rather than being conveyed through a linear story superimposed on existing game genres (Isbister, 2006). A Game character designer should take the time to set explicit criteria for each of the four layers:

- 1) Deep. How does it feel to move as this character? What's fun about that? What powers does a player have that he might not have in real life? How does it feel to see this character move (if the character is visible)?
- 2) Cognitive. Do the player's own instincts about what to do next in the game match the cognitive strategies this character will have? Does the character feel like a natural mental skin to players, given the mechanics of the game?
- 3) Social. Does the character's social persona match the basic game play style and motivation? Are social personas interesting and appealing to players? Does it fit the NPC cast and their social roles? Can the player perform the social action he wants, based on his character?
- 4) Fantasy. Is this a character that players want to try out? Do the characters' backgrounds and motivations match the game itself—is it a fantasy persona that really fits into the core game mechanics?

Non-Player Characters

NPCs have various objectives in the game. An NPC may have various abilities that are useful to players. Beyond the ability to provide physical or mental assistance in battle, solve puzzles, or simply in learning the ropes of the game world, friendly NPCs may also be able to provide moral support in achieving game objectives. NPCs can also act as companions for players or can provide social motivation in the form of someone who needs to be saved. Even unfriendly NPCs have abilities that enhance the player experience, providing resistance and conflict that enhances the player experience. NPCs in neutral roles can provide social validation for players when they approve of their actions.

NPCs in games are often positioned (through backstory and ongoing cut-scene exposition) as having a preexisting social connection to the player. An NPC may have a kinship role toward the player's character (e.g., the Prince's father in *Katamari Damacy*) or some form of personal and/or social investment due to past circumstances—colleague, companion in arms, childhood friend, or the like. This means that the player already has a sense of obligation toward and investment in the NPC based on their imagined past, and the NPC has been designed to have “obligation” as well. Obligations and investment also grow during the course of the game itself—the most powerful NPC interactions and connections can arise from the building of obligation and investment through mutual actions during game play (Isbister, 2006).

METHODS

The most basic goal of game design is to create and create a user experience, which is inseparable from the most basic user experience. Game design with great player experience is the best design. There is a level in the interaction between game mechanics, game dynamics and aesthetics and at the same point there is character design (Schell, 2008). Every visual aspect in a game is a tool that translates the programming language into part of the player experience and can further create immersion (Terzioğlu, 2015). From the perspective of psychological meaning, the interface can be divided into two levels: perception (visual, tactile, auditory, etc.) and emotional. Games are designed based on the results of human-computer interaction and programmed information (Neiva & Romano, 2007). The aim of this research is to broaden the academic understanding of pixel art by exploring some games so that we can get an idea of how the pixel style can stand out among the other styles.

RESULTS

While it is undeniable that 3D images have become the design mainstream, the pixelated style still has an indelible influence. The pixelated design, as an exploration between retro and trend, also attracts the hearts of many young consumers with its unique charm. In design, the pixel style is independent and permeates all aspects of people's lives. Small blocks are put together to abstractly show various forms, but they also have a unique beauty. Pixel art is like cross stitch, where if the character designer keeps pushing the available pixels, they may end up being able to represent a hand or face in a very limited space. Limitations give birth to innovation in the world of design. It is known that many character designers often limit themselves strongly, through their choice of equipment and expressions. This creates a design problem, a problem the artist must be able to solve. Whenever we look at a work and try to evaluate it, we compare it to our own mental image. If we can learn to stimulate and harness this vision, by creating boundaries and goals, then intuition will grow stronger. New solutions have to be born and unique ways to solve problems are found. By clarifying boundaries and seeing them as challenges and opportunities for innovation, not barriers, practitioners can gain an understanding of their own aesthetics.

Pixelated visual language is the painting of choice in the age of mechanics. Indeed, pixelation is a product of the times. It also represents a combination of rationality and sensitivity, as well as digital media and artistic creation. Pixel style has appeared in painting, graphic design art, etc., depicting people's attractive world of imagination. Because boundaries and boundaries are part of every artistic process, whether we realize it or not. Reflections on why the character designer chose to do it a certain way can be invaluable. And it is often this process of reflection that makes us grow as artists. Even in the realm of pixel art, where the enhancements may run counter to what the general public might expect. Basic knowledge of how to design a character is fundamental because with pixels we have to reduce design elements to a minimum level. In the discipline of character design we can use the silhouette technique to define shapes for easy identification (Matessi, 2008). There are so many different styles in character design, in general the image styles that can be applied are realistic styles, semi-realistic styles, and iconic styles. Unlike in the past when pixels were a solution to technological limitations, now technology has been able to produce realistic images, even to photographic images, this affects the resulting visual form, meaning that we can create semi-realistic pixel art, even realistic ones.

As we know that basically a game consists of foreground, middle ground and background components which are one unit in the scene. Of course, most of the games that we know have a main character who is part of the journey of the game itself which is usually a series of obstacles in achieving the goal (Schell, 2008). It is not about a good or a bad decision but it have to be about how far the picture can claimed as a pixel art. The picture art is supposed to be an integration of every elements in the picture. It is not a montage of several picture in pixel art style with different resolution. We can see some similarities or as we called it syntax in the characters that used in the game as we can accept the limitation and the uniqueness form of those character and have no doubt whether it is a pixel art.



Figure 3. Visual Style
(McCloud, 1993)

We can see the character designs which are a single common thread which is then translated into pixel art. The chosen iconic form will blend with the visual experience and mental reflection of the player even though the form presented is not a real form that can be found visually in everyday life. By borrowing the term that was conveyed by Scott McCloud, we can see a glimpse of the picture when applied to a character in a game that uses a pixel art style.

Changes in shape as stated earlier when we decided to use pixel art are not shapes that imitate reality and project them with realistic shapes. Pixel art will lose its uniqueness if you do that. Many visual artists are trying to pixelate realistic images and make pixel art realistic, it seems there is a problem in understanding the diversity of styles.

As a cross development, it may produce new forms, but the thing that must be maintained is that pixel art is a method that does not refer to the visual style of its predecessors, but refers to forms that can be achieved with the existing technological conditions at that time.



Figure 4. Visual style



Figure 5. "Infectonator" Toge Production
(<https://www.togeproductions.com/games/>)

CONCLUSION

Pixel art is a medium worth pursuing because it still resonates, both with audiences and creators well worth further examination and discussion in the academic sphere. The reason it has managed to stay relevant is that while the limitations may have their origins in technical restrictions of decades old hardware, they now breed creativity. The simplistic and understandable nature of the pixel grid makes it relatable, who in turn are helped along by the limitations imposed on them by the pixel art community. Pixel art is about things like color conservation and composition, traits that are helpful in other artistic pursuits as well. It is easy to pick up but hard to master. Requiring an understanding of the tools and techniques that can only come from experience and reflection. Learning how to best adapt and compliment the limitations that comes with the medium.

Whether it be in the amount of colors or the size of the canvas or strict adherence to the compositions of pixel clusters. Indeed, it is these very limitations that set pixel art apart from other forms of digital art, like say digital painting, with which they share an evolutionary tree. Contemporary pixel art is a knowing sacrifice of more advanced tools. It can be argued that Pixel Art has more in common with other types of art like cross-stitching or mosaics as they are all constructing simplified images using small colored units. The nature of the grid, the immediacy makes creating pixel art an especially relaxing and captivating medium for artists to work in. Despite often being associated with nostalgia for older video games the techniques and approaches within pixel art are still evolving.

Pixel styles are more prevalent in other areas of art design, such as graphic abstract painting, film and television elements, games, etc. The most classic and famous is the gameplay aspect. The pixel style itself is based on arcade games in the 1980s. Contemporary pixel art is a known trade off of more sophisticated tools. It could be argued that Pixel Art has more in common with other types of art such as cross-stitching or mosaics because they all build simplified images using small colored units. While often associated with nostalgia for old video games, the techniques and approaches in pixel art are still evolving. There will be as many pixel art definitions as there are pixel character designers out there. This is not an attempt to develop true pixel art or an official definition, but rather to demonstrate that it is indeed a wider medium and craft, not just a nostalgic style or practice.

REFERENCES

- Lyon, R. F. (2006). *A Brief History of "Pixel"*. IS&T.
- Grahn, E. (2013). *Modern Pixel Art Games : A study in GUI aesthetics for modern pixel art games*. Blekinge Tekniska Högskola.
- Isbister, K. (2006). *Better Game Character by Design A Psychological Approach*. San Francisco: Morgan Kaufmann Publishers.
- Matessi, M. (2008). *Force Character Design from Life Drawing*. Burlington: Focal Press.
- McCloud, S. (1993). *Understanding Comic*. New York: HarperCollins Publishers, Inc.
- Neiva, E., & Romano, C. (2007). The Semiotic Immersion of Video Games, Gaming Technology and Interactive Strategies. *Public Journal of Semiotics*, 1(2), 31–49. <https://doi.org/10.37693/pjos.2007.1.8819>
- Schell, J. (2008). *The Art of Game Design*. Burlington: Morgan Kaufmann Publishers.
- Shi-Ling Tian, T. W. (2019). Study on the influence of Game Character Design on Users' Continuous Immersion. *Journal of Digital Contents Society*, 1097-1104.
- Terzioglu, Y. (2015). *Immersion and Identity in Video Games*. Purdue e-Pubs.
- Wei, X., & Wang, Y. (2021). Research on the Application of Pixel Style in UI (User Interface) Design. *Proceedings of the 6th International Conference on Arts, Design and Contemporary Education (ICADCE 2020)*. <https://doi.org/10.2991/assehr.k.210106.109>