



UMEÅ UNIVERSITY

PIXEL ART – THE MEDIUM OF LIMITATION

**A qualitative study on how experienced
artists perceive the relationship
between restrictions and creativity**

Gustav Samuelson

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Sammanfattning

I den här studien undersöks huruvida den tekniskt obsoleta konstformen pixelgrafik, eller "pixel art" fortfarande är ett relevant medium och vilka kvaliteter som gör det till ett självständigt praktiskt hantverk. I en kvalitativ studie intervjuas fyra erfarna pixel konstnärer om deras definitioner av "pixel art" samt deras egen praktik. Dessa analyseras sedan med hjälp av befintliga teorier inom design och praktisk kunskap. Studien finner att en anledning till att pixelgrafik fortsatt att vara relevant beror på begränsningarna som har sin bakgrund i tekniska restriktioner i gammal hårdvara ger upphov till kreativitet. Det enkla fyrkantsmönstret som pixelgrafik bygger på är lätt för nybörjare att ta till sig och stimulerar kreativ problemlösning. Begränsningarna tvingar konstnären att kompromissa vad gäller val av färg och form. Pixel art har mer gemensamt med gamla tekniker som korsstyggn eller mosaikläggning än andra typer av samtida digital konst. Själva utförandet beskrivs av respondenterna som meditativt och jämförbart med att lägga ett pussel eller att spela Tetris. Trots att det är ett medium som ofta är förknippat med nostalgi och en "retro-estetik" så är det fortfarande en konstform som utvecklas och som fortsatt att vara populär.

Abstract

This study seeks to answer what makes the technically obsolete medium of pixel art still relevant and what qualities make it into an independent craft. In a qualitative study four highly experienced pixel artists are interviewed about their own definitions of pixel art and their methodology. The answers are then analyzed through the lenses of existing theories on design and practical knowledge. The study concludes that a reason why pixel art has remained relevant is that the limitations that had their origins in the technical restrictions of early computer hardware gives way to creativity. The simple pixel-grid is easy for beginners to get a grip on and stimulates creative problem-solving, forcing the artist to compromise in regard to the choice of colors and shapes. In that regard it begs comparisons to cross-stitching and mosaics rather than most contemporary digital art. The immediacy of managing these restrictions was described as meditative and can be compared to solving a puzzle or a game of Tetris. Despite its reputation for being a backwards-gazing medium linked with retro videogames the artists insist the artform is still being evolved and elevated today.

Keywords: pixel art, design, digital art, retro games

1 Introduction

Since the hey-day of the video game and home computing revolution of the late eighties, *pixel art* has remained a cultural fixture (Dewey, 2014). Iconic images like the original 8-bit sprite renditions of *Mario* or *Megaman* are constantly being paid homage to, whether in new pixel art games (Byford, 2014) or as *perler bead* fan tributes. Pixel art has even found its way unto currency in Norway (Dewey, 2014). For being an outdated medium, it shows no sign of going away (Webster, 2014). Pixel art is a type of digital art where the square grid of pixels is very noticeable, and it can be compared to a digital mosaic (Dewey, 2014). Its origins lie in the hardware restrictions of the 8- and 16-bit era of computing when the resolutions were small and the amount of colors that could be displayed were limited. During the nineties pixel art went from being the dominant type of graphics in commercial video games to being increasingly replaced by the onset of 3D graphics as the rendering capabilities of newer hardware improved (Anderson, 2016). In the 2000s, pixel art was mostly found in handheld consoles and mobile phones and was expected to go extinct as hardware continued to evolve. But against all odds pixel art games remain popular today. The 2010s saw a boom of “*indie games*”, short for independent games, a means of video game production composed of smaller teams, often single individuals, creating games without the aid of larger corporations (Alvarez, 2016). In these games, pixel art is a very common form of graphic because of its ease of application and low barrier of entry (Alvarez, 2016). In the last decade pixel art games like *Owlboy* (2016), *Celeste* (2018) and *Stardew Valley* (2016) all achieved popularity and acclaim. So how come pixel art is still thriving? When 3D-graphics are constantly getting closer to being fully realistic and our monitors can display millions of pixels at a time. Is it all just nostalgia for fans of old video game consoles? In an article for the Verge, journalist Sam Byford (2014) interviews a number of developers of pixel art games and comes to the conclusion that it is not a temporary fad nor a static medium. Despite its ongoing popularity and sizable cultural footprint there is very little academic work about pixel art. This is something that becomes apparent on the current *Wikipedia* page on pixel art (Pixel Art, n.d). It features a scant few academic references. A quick search through an aggregator, like say Google Scholar, will find papers about techniques and algorithms for turning pixel art into hi-res vector graphics (Kopf & Lischinski, 2011) but almost none that look at pixel art as an artform that exists outside the world of video game graphics. This is a shame, because pixel art is a fascinating artform that has continued to evolve as different hardware come and go. It is more than just a nostalgic pursuit and carries with it its own idiosyncrasies that sets it apart from digital painting as a whole. It is an artform that can be considered antiquated but that has kept evolving in

fascinating ways despite that. Though perhaps due to its association with video games (Kylmäaho, 2019) it has not been looked at as its own field of study academically. In contrast, there are many online communities where theories of and approaches to pixel art have been debated for decades. Many artists now working professionally in the gaming industry got their start in these communities.

These resources are confined to the niche online communities centered around the artform. Sites and forums like *pixeljoint.com* or *pixelation.org* have kept discussions going and been a training ground for generations of artists (Dewey, 2014). I myself am one of them, a longtime member of these communities that has worked as a freelance pixel artist for several years employing skills cultivated there. Personally, I have experienced these as communities with a generous tradition of users critiquing each other through constructive feedback, and edits of each other's artwork is encouraged to explore how the pixels can be arranged in the most satisfying manner. Yet these valuable discussions are relegated to online vulnerable forums. Art scholar Charlotte Frost (2015) asserts that it is up to us to preserve and archive online art criticism because due to the fickle nature of the internet, its longevity is in jeopardy. Expanding the academic understanding of this knowledge can help preserve them for future artists and researchers.

1.1 Purpose & research questions

Pixel art appears to be an understudied field. While there has been research on the rise of indie gaming as well as on algorithms for transforming pixel sprites into vector art, very rarely has pixel art been examined as its own artform. The purpose of this study is to give a deeper understanding of pixel art as a practical craft. This will be done by answering the following thesis questions.

- Why is pixel art still a medium worth pursuing?
- What qualities set pixel art apart as an art form unto itself?

By answering these questions about the nature of pixel art. I aim to show how pixel art has value unto itself and has a reason to exist outside the world of videogame graphics and expand the embryonic discussions about pixel art as an artform in the academic sphere.

2 Method

In the following section I will present my methodology and why I chose that particular method over others that were available to me. The purpose of this study is to expand the academic understanding of pixel art by exploring why it is still a medium worth pursuing even after it has been made technically redundant and what specific qualities can be used to define it. Since there isn't a lot of academic research in that area, doing an academic literature analysis was difficult and was ruled out as a suitable method. Therefore, I chose to perform qualitative study through a freeform interview with four notable professionals in the pixel art community to inquire about their relationship with the medium. This was done to generate exactly the kind of valuable data about their decision-making and to chronicle their unique experiences that I felt was needed to explain the mindset of pixel artists.

Since the idea is to gather experiences from experts in the field, a quantitative study was not chosen as it would have been harder to accurately assess the expertise of an open survey with a large number of answers (Yin, 2011). With an open survey you also run the risk of sabotage from less serious actors. Perhaps the biggest argument against going with a quantitative study is that it isn't suited for deep, long form answers that generate the kind of data that I felt was needed to properly answer the thesis questions (Yin, 2011). It would've been possible to do a fully unstructured interview but as the purpose is to compare and contrast different approaches, I sought to limit the questions to a survey. This was so the respondents could be as free in their answers as they wanted, but still have the conversations follow a structure that would be make it easy to compare and contrast their answers in the analysis (Yin, 2011)

The unstructured free form approach was chosen as it has a high probability of generating rich and meaningful data as it emphasizes in-depth looks at personal experiences (Yin, 2011). This was important as no two means of artistic expression or experience are ever fully the same and there can be no "right" or "wrong" answers (Starrin, et.al, 1994, p.123) By giving them the option and allowing the artists themselves to define their work and motivations. The online survey also meant the artists all answered individually and had no way to know what other artists had answered and this could not influence each other's answers. Questions in qualitative interviews should primarily be about concrete experiences which are easy for the respondent to give thorough answers to (Yin, 2011). Because I wanted the artists' personal definitions on pixel art, I did not want to give them a prepared questionnaire where they would select a predefined answer that might limit their ability to express themselves. As definitions on what is and isn't pixel art can vary between artists it was important to get the respondents to define it themselves. Robert K. Yin (2011, p.136) refers in his book "*Qualitative Research from Start*

to *Finish*” to this as being “non-directive” and staying neutral as to not influence the interviewee.

To make their answers less abstract to the layman the artists were also asked to provide a piece of pixel art that they thought encapsulated the artform. With all these considerations in mind this final set of questions were devised for the survey:

Question 1: What defines pixel art to you?

Question :2 Is there a specific example of pixel art that comes to mind?

Question 3: What limitations do you set for yourself in pixel art?

Question 4: Are there any techniques you think hinder pixel art?

Question 5: What drives you to continue to work in the medium?

2.1 Data analysis

After the artists had submitted their answers they are condensed into more easily digestible text. The material was then coded according to my own notes taken and thematically sorted by looking for answers that related to other theories (Yin, 2011, p.188) about reflective design and practical experience, or to the common features of pixel art described in the few studies about the subject that has been conducted. Then the answers will be combed through for thematic similarities that appear in several answers to see if there is any common ground or surprising differences in how they choose to define and limit pixel art. By identifying the parts of the interviews where important characteristics will appear (Starrin, et.al, 1994, p.126) they can help to answer the central thesis questions; *Why is pixel art still a medium worth pursuing?* And *What qualities set pixel art apart as an art form unto itself?* By studying the terminology of experienced pixel artists and the limitations they exert on their craft some of that language and their insights can be introduced and the academic vocabulary can be expanded.

2.2 Delimitations

This study talks only about pixel art purely from the perspective of an artist, as a creative or design-oriented discipline. It does not seek to answer how pixel art is perceived by a broader public and whether that view clashes with the idea of pixel art that the respondents in this study have. To do this a different, more thorough and extensive study would’ve been necessary to complement it. Resources that weren’t afforded in this case but would be interesting to consider for further studies.

2.3 The respondents

This section gives short introductions of the respondents and a brief description of why they in particular were asked to participate in the study. It is important to stress that the selection of the respondents did hinge on my previous knowledge of their work and their history of online posting on the subject. Since I am a member of these communities, I have been following the discussions up close and the contributions made by these artists have been instrumental in generating discussion. They were approached because of their willingness to share their expertise and explain their craft online. Having narrowed it down to eight artists with differing styles on backgrounds I reached out to the respondents on their respective social media pages, and if they agreed they were asked to access the online survey. In the end four artists completed the survey. The intent here is not to promote the artists but to acknowledge the insight they have and what unique contributions they have made. The respondents are all experienced pixel artists who have been part of the online community for many years and from their interactions there, and on their social media I knew they all had different but strong opinions on the subject. In terms of vocation not everyone is a commercial game artist, some work in pixel art purely as a hobby. I have also included longstanding community members that had put together crucial tutorials or spear-headed new ways of looking at pixel art. No artist was approached solely for their reputation or artistic prowess but rather for their history of discussing their aesthetics or pixel art in general. It was important to seek out the opinions on experts as they are able to define pixel art more thoroughly and with a higher degree of validity.

Artist 1 is a pixel artist who has worked both in video games as well as illustrating comics. They have been vocal in arguing for a sometimes controversial, but also interesting take on pixel art with a focus on clusters and unbroken lines.

Artist 2 is an artist that made a popular and detailed pixel art tutorial online and that had chronicled the history of pixel art through interviews and personal research.

Artist 3 is a professional game artist whose part in online discussions about “*cluster theory*” have proved influential in shaping the current pixel art discourse.

Artist 4 is a professional pixel artist that has an interest in elevating pixel art and educating the public about it through talks and tutorials.

2.4 Ethical concerns

When studying people and animals, ethical considerations on the effects on the individuals involved must always be considered. Having consulted the guidelines for ethical research (Forskningsetiska Principer inom Humanistisk-Samhällsvetenskaplig Forskning, n.d.), this

study was to the best of my ability conducted with the privacy of the respondents in mind. Since most of them are professional artists and have public presences online they may not necessarily want to be identified in an academic context. In the study the artists were all asked how or if at all they wanted to be credited. All of their artists were told that it was okay for them to remain anonymous if they wanted to and they could themselves choose in what way they wanted to be credited, they were informed that the essay would be published online if approved following its completion. It is important to give information about the reason and topic of the study being conducted and how the information will be used (Benyon, 2014). If any question confused them or made them uncomfortable, they were told they could ignore it. They were assured that the data provided would not be used for any other purpose than the scientific and that they reserved the right to withdraw their participation at any point.

2.4 Problems with the method

A further four artists were asked to take the survey. But for whatever reason chose not to. A wider range of artists with different aesthetic expressions and backgrounds would have led to a more diverse and contrasting set of answers. All of the artists that did participate in the study have accounts on the same pixel art communities. This was not ideal, as a less homogenous sample of artists or artists from a larger pool would very likely give different answers (Yin, 2011). As it initially appeared that the number of respondents would be larger and therefore, I settled on four broader questions rather than a large number of smaller, more specified ones. Had I known in advance the number of respondents who would fail to complete the survey, a different method more akin to an unstructured interview would have been considered instead. As I myself am an active member of these communities my own bias in choosing the artists should be noted. Robert K. Yin (2011, p.270) points out that no research lens is entirely objective. To perform a qualitative study in a niche area, some pre-knowledge and expertise is required as it makes sure the researcher doesn't misinterpret their own data (Yin, 2011, p.28). It is important to remember that these artists were asked to give their own opinions. Art is by nature a subjective field. To answer the thesis questions, I needed to see where the definitions differed. But with the number of artists there is a limit to the amount of perspectives that can be presented. There are many more definitions to pixel art and there are sure to be artists that disagree with those presented in this study. Since the artists have such relevant experience and practical knowledge and any artistic endeavor is fundamentally subjective, a smaller sample can still generate meaningful data (Yin, 2011, p.91). In this case it really is quality before quantity.

3 Related research

This chapter presents research and theories which gives further background to the subject and a basis for which to be analyze of the collected material from the study. To answer the questions posed in the introduction of how to deepen our understanding of pixel art and what qualities define it you both need to understand theories on design and experience but also specific terminology and context for pixel art. Since the study consists of asking experienced artists to explain their processes a theory for reflection and understanding design was needed to interpret the data.

3.1 Defining Pixel art

Because there is a limited amount of academic writing on the subject and because the definition of pixel art varies even among its practitioners (Kylmäaho, 2019), it is useful to briefly present some points of contention as to what it takes for something to be labelled *pixel art*. Pixel art was first termed as such in a newsletter by ACM in 1982 (Kylmäaho, 2019.) so there has been a lot of time for the term to evolve and catch on different meanings. Surely a characteristic is that It must be apparent at the pixel level, otherwise it could not be identified as pixel art at all. Indeed, as one of the very earliest pixel artists, Laretta Jones proclaimed in a BBC interview as early as 1984 “If you go any bigger you cannot tell that it was made in a computer” (RetrogamerVX, 2015). This broad definition however leads to confusion as the general public refers to anything with a tiny resolution as pixel art even if that is the product of an automatized process, such as resizing a larger piece of art. Another definition of pixel art could be “Pixel art is essentially any work made with a limited color palette on a grid of square-shaped pixels” (Dewey, 2014). In the pixel art tutorial found on the online community pixeljoint.com, the following definition is given: Pixel art is set apart from other digital art forms by its focus on control and precision. The artist has to be in control of the image at the level of the single pixel, and every pixel should be purposefully placed. When pixel art is done purposefully, offsetting just a few pixels can have a dramatic effect on the image (Artist 2, 2010). However, this definition is not necessarily how the general public perceives pixel art. For instance, newer indie games often described as having pixel art graphics, like *Swords & Sorcery* and *Hyperlight Drifter*, use the blocky nature of pixel art but none of its restrictions. This is a looser definition of pixel art as the games freely mix resolutions and use automated color gradients and alpha channels. Things that wouldn't have been possible on older hardware (Alvarez. 2016). So, while the exact definition of pixel art is not agreed on by all, it can be at least agreed on that it is digital art created by manipulating pixels (Kylmäaho, 2019.) This can make discussions about the subject difficult as the participants may be defining pixel art as wholly

different things. While a universally agreed upon definition never may arise, and perhaps shouldn't, it is important to keep this in mind as to avoid conflict and misunderstanding. While not a scientific work, a great resource for learning about the experiences of pixel artists is the coffee-table book "Masters of Pixel Art" (Benjaminsson, 2019). Which features both interviews and artwork by dozens of talented pixel artists working in a number of different styles and within their own restrictions. For understanding pixel art as a diverse and current art scene it is probably the best printed work. In summary, there are multiple competing definitions of pixel art, none necessarily being more correct, but the stricter definition is often favored in the online communities dedicated to the form.

Vocabulary

To fully understand the answers given by the respondents, some cursory concepts and terminology may be needed for the layman. In this section I will lay out some common techniques and explain how they are used. The illustrative images are taken from the pixel art tutorial on pixeljoint.com created by artist Cure (2010).

Dithering.

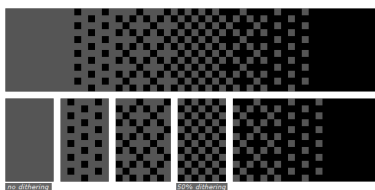


Figure 1 An example of dithering (Cure, 2010)

Dithering can be compared to the hatching in comic book inking or wood engraving. Where you create a pixel pattern to blend the transition of one color into another to get a smoother gradient (Kylmäaho, 2019).

Anti-aliasing



Figure 2 Example of how anti-aliasing smooths out a curve (Cure, 2010)

Anti-aliasing, or "AA" for short. Is the way for the pixel artist to smooth out a curve or edge by adding intermediate pixels from one color to another to make the edges as pronounced. Many

tools in modern drawing software will do this automatically, but a pixel artist will place these intermediate shades themselves as to have complete control over the final product (Kylmäaho, 2019).

Clusters

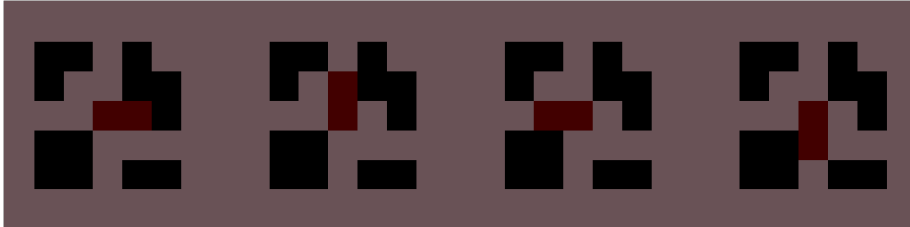


Figure 3 Examples of how a single pixel can change the relationships between shapes (Cure, 2011)

Clusters or cluster-theory is one of the newer terms that has been adopted by the pixel art community. Instead of thinking of individual “*single pixels*”, the artist should consider interlocking pixel-shapes as clusters (Helm, 2009). The more a pixel artist considers how these clusters are constructed and how they interact with other clusters the cleaner and more easily readable the end product will be (Cure, 2010).

Banding

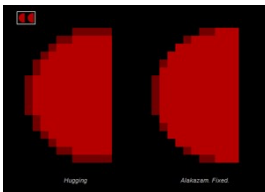


Figure 4 The effect of banding to the left (Cure, 2010)

Banding Is another concept inherent to pixel art. In regular painting or digital painting in higher resolutions there is usually not an issue to place lines next to each other. But in a small resolution those pixels stack and make the grid apparent (Cure, 2010).

3.3 Indie games

Today, pixel art is most commonly found in the world of indie gaming (Kylmäaho, 2019). As independent creators work with much smaller budgets, pixel art is seen as a viable, inexpensive medium to work in (Alvarez, 2016). It doesn't require expensive hardware and many small assets can be created in a short amount of time (Alvarez, 2016). The small size of pixel art games also means they can be played on more machines. Certainly, there is also a sense of nostalgia for people who grew up with game consoles like the *Nintendo Entertainment System* or the *Sega Genesis* (Alvarez, 2016). Many indie-games mimic those games. Especially as the developers of games like *Castlevania* or *Metroid* have stopped developing pixel art games of that type. While Pixel art is a common component in indie gaming, there still aren't that many

studies and articles about pixel art as form of expression. One of them is “*Pixel art in RPG games*” by Noora Kylmäaho (2019) is a good starting point, introducing and explaining many terms such as dithering and anti-aliasing that a layperson would need to know. In it the author attempts to create their own pixel graphics for an RPG game. This gives us insight into how a beginner approaches the artform, and the why they in particular would choose to use pixel art as the graphics in a pixel art game. Another work that touches on Pixel Art, but looks at it from an audience perspective is the study “*Pencils, Paints, or Pixels? How Aesthetic Choices of Indie Games Affect Interactive Experience*” by Gonzalo Alvarez (2016). In it, Alvarez compares Pixel art graphics to other kinds of video game graphics. The study finds that pixel art is broadly preferred and suggest that the suggestive nature of pixel art where the audience has to fill in the missing bits of information themselves is a reason why.

3.4 Design & Practical experience

In the book “*design av informationsteknik*” by Jonas Löwgren and Erik Stolterman (2004) they discuss something called “design intelligence” and explore the nature of the design process, design-ability and what they call “the reflective designer”. To reflect means to critically evaluate yourself as a designer and the ideas and conditions you are working with. They call this “design intelligence” and define it as something different from other kinds of intelligence that can be measured with *IQ-tests*. This intelligence is based around creativity, composing and a synthesis of different parts to create a whole which is what they assert design is fundamentally about (Löwgren & Stolterman, 2004). In the book they introduce four ways for the designer to improve their design sensibilities; improving the sensibility for quality, developing language, reflective thinking and retrospective reflection. A sense of quality cannot be bought. Recognizing what is good or adequate design can only be done by training the ability like a muscle. The more design processes you attempt the more lessons and experiences you will amass. Through examining what you think are examples of good or bad design new insights may arise (Löwgren & Stolterman, 2004). The book seeks to deepen the understanding of the design of information technologies. At the time of writing that was a relatively new field and what constituted the design-tenets of it were unclear. While informatics and user experience are the central techniques in the book, the design theories can be broadly applied to all manner of different mediums and pull from a larger history of design frameworks and theories about practical work (Löwgren & Stolterman, 2004)

Therefore, it can be used as a steppingstone to see what areas of design carry over and how they can be applied to an entirely different field, like pixel art in this instance.

Some of the concepts rely on theories of practical knowledge. A field of study greatly influenced by Donald Schön (Löwgren & Stolterman, 2004, p.31). They build further on Schön's theory that a practitioner of a craft develops through conversations with the problem, this is what they refer to as reflecting on a design situation. A designer engages in dialogue with the problem and through that process gets answers to their question. This communication can be reflected over, many times again and new questions and insights will arise. Schön (1983) referred to this practice as "Reflection-in-action, an explanation of how an experienced practitioner reacts to and adapts to problems in the moment, the ability to manage the limitations of a specific or unexpected situation".

Brothers Steven Dreyfus and Hubert Dreyfus were also a steppingstone for measuring expertise and competency. In their book *Mind Over Machine* (1986) an early book on artificial intelligence they discuss the different levels of expertise in a craft and describe the flow-state as being a result of a kind of reflective thinking found in experts.

3.5 Media

The author Marshall McLuhan formulated the oft-quoted idea that "The medium is the message" in his book *Understanding Media* (1964) by which he meant that the chosen medium for a message is what ought to be studied not the message itself. Something he explored through analyzing several of the mediums of 20th century like Picasso's cubism and cinema.

4 Results

In this section the questions of the survey are presented, and the answers given by the respondents are collected and summarized for a more cohesive reading experience. In a few instances, where a respondent may have inadvertently touched upon an answer to a different question, I have included that part of the response with the latter question. In the appendix the answers are presented in full.

Question 1: What defines pixel art to you?

The artists all felt to varying degrees that there were certain boxes that needed to be ticked for something to be pixel art. No matter the type or style of pixel art, what mattered more was the intent of the artist. This referred to the mindset of being resourceful with the pixels available and to be deliberate in their placement, not just simply “drawing with pixels”. Indeed, this idea of “pixel-pushing” or shifting the pieces around on the like in the puzzle game *Tetris* where you arrange falling blocks. Artist 1 and 4 both referred to the process as a struggle, where the artist keeps on pushing pixels around, nudging them until the optimal position is found. There are only so many different ways pixels can fit together on a small grid and some problems, such as curves at a very low resolution can only be represented in a specific way. The specific amount of pixel-pushing needed for something to be called pixel art will be debatable, but that “struggle”, as both Artist 3 and Artist 1 puts it, is an important aspect.

“[...] It's all meticulous work, done in solitude, by a single artist, manipulating the most opaque and granular level of their compositions, endlessly, until everything sits just right.”

-Artist 3

For Artist 1 the carefree approach of games like *Hyper Light Drifter*, and *Swords & Sorcery* can't really be called pixel art as this core concept isn't adhered to, in their opinion. Several of the artists highlight the similarity of pixel art to earlier mediums such as mosaics, or tiled woodworking with each pixel being comparable to a mosaic tile with all of them serving a purpose in the grander picture. Artist 2 contended that to many pixel artists these older artworks with carefully crafted square patterns have more in common with pixel art than most contemporary digital art. Artist 3 and Artist 4 go further into the mindset of the pixel artist. Contending that it is an attitude. Artist 4 stressed the importance of “perception is interpretation” when working with pixel art, that the small sizes force us to assume detail that isn't there. The act of trying to convey complex information in a very limited canvas.

Question 2: Is there a specific piece that comes to mind for you?

All the artists gave examples of one or several pixel art pieces that had either been influential to the artists in how they approached pixel art themselves or made them better understand different techniques or possibilities in the form. And on the other hand, some chose iconic pieces of pixel art that show how ubiquitous a well-executed simple example of it can be.



Figure 1 "Have you seen the yellow sign?" (Helm, 2005)

Pixel artist Artist 3's pieces "have you seen the yellow sign?" and "Star Witch" are mentioned as an eye-opener for Artist 2. In contrast found the simplicity and cute aesthetic of video game graphics like *Bubble Symphonies*, *Rocket Slime* or *Pokémon mini* for the *Gameboy* especially inspiring.

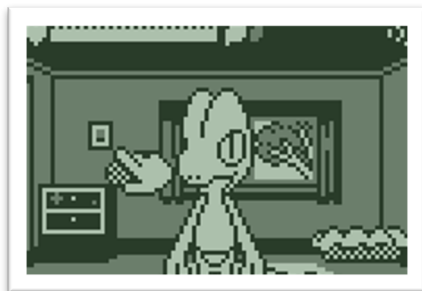


Figure 2 Pokémon mini (Nintendo, 2002)

Works of pixel art that have remained iconic and recognizable through their ubiquity are represented by the Pacman sprite from Namco's Pacman arcade game that has been re-used in street art and remixed endlessly and Susan Kare's icons for the original Macintosh computer.

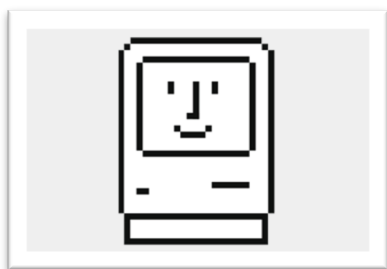


Figure 3 Macintosh icon by Susan Kare (Kare, 1983)

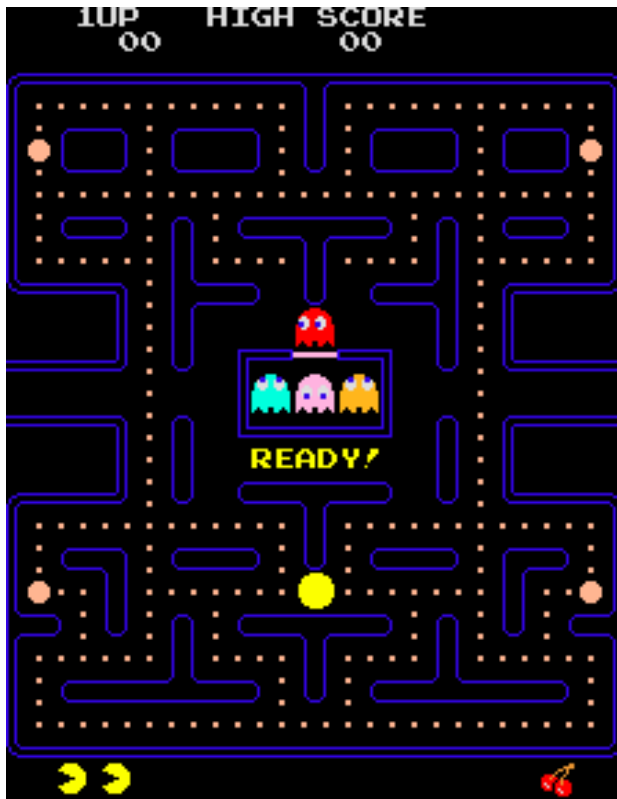


Figure 4 Namco's Pacman (Iwanati, 1980)

Question 3: What limitations do you set for yourself in pixel art?

The most common limitation expressed was the conscious decision to use as few colors as possible. The reason for this is to get a more concise and easily managed palette. A tighter palette is also evocative of the color limitations of older machines from the 8- and 16-bit era, to that end many of the artists still limit themselves to 8, 16 or 32 colors as an homage to those machines, to carry on the legacy. Another common restriction was the use of a smaller canvas. The artists explained that on a smaller canvas the grid-like nature of the pixels will become more apparent. These two limitations are connected, when working on a larger canvas a larger palette may be needed to make transitions smoother between colors or just to keep the interest of the viewer.

However, as several of the artists pointed out, the more colors used the less the pixel art evokes the memory of the old hardware and thus loses some of the nostalgic appeal and might not even be understood as pixel art at all. Artist 3 points out that the skills one acquires from navigating the limitations, the aforementioned resourcefulness and focus on clean shapes translate to other mediums beside pixel art. Though the artists also admitted to being less strict with the colors if a project demanded it.

Artist 4 mentioned that he strives to be as creative as possible within the set restrictions of each project. Even if those restrictions can look different depending on if the piece is for a video game or a personal piece made just for fun. Artist 3 posits that these self-imposed limitations inherent to pixel art have taken on a folkloric meaning in the community now that they are no longer tied to physical limitations and that the sheer amount of self-imposed restrictions are what makes pixel art different from older methods.

Question 4: Are there any techniques you think hinder pixel art?

None of the artists were particularly judgmental when it came to what techniques they didn't employ themselves. However, the use of dithering to blend between different shades of colors was singled out by two artists as a technique they did not employ and whose usefulness had diminished by newer screen technology that made the patterns too apparent and granular. Other techniques that were mentioned as being a potential hindrance was an overuse of anti-aliasing, transparency/gradient effects and the use of banding. Fundamentally, the detrimental use of these techniques boils down to the same reason, they compromise the use of carefully considered "pixel clusters". As mentioned in the vocabulary chapter, clusters are the way in which different arrangements of pixels of the same colors fit together as discernable shapes and create more carefully constructed compositions. Artist 1 even sought to avoid the usage of stranded single pixels, preferring to make sure that as many pixels as possible aligned in clusters together. By carefully considering how each cluster of pixels interacts with another banding can be minimized.

Artist 4 in turn felt that it wasn't any specific technique at all, but instead the general perception of pixel art as a backwards-gazing medium only used for video games that held it back. Since video games often aren't considered art, pixel art which has most commonly been found in that medium is not considered a proper artform either. Arguing that mediums similar to pixel art like mosaics and cross-stitching have always had a place in culture. In his answer to question 3, Artist 3 echoes this statement comparing it to old oil painting techniques as well as cross-stitching.

Question 5: What drives you to continue to work in the medium?

The act of "pixel-pushing" was overall described as very meditative and relaxing. Comparable to Zen meditation or losing oneself in a puzzle game like Tetris. With the artist pushing around the shapes until they aligned in a satisfying way. Although an artist by trade, Artist 2

does not work as a pixel artist professionally. He enjoys the relaxation of pixel-pushing and feels that when he has done pixel art commercially it becomes exhausting and loses its luster.

“I like pixels. The way how you think with pixels and the unique way pixels work.

Every visual medium is great at something and bad at other things, but once we accept this and work with the medium in the areas it's good at, great things can happen.”

Artist 4

Artist 3's relationship with pixel art has changed and evolved through the two decades he has been practicing it. At first it was defined by trying out new techniques and experimenting with them then it became about evolving his own methodology and seeing how shapes relate to each other. He also suggests that part of the general appeal of pixel art lies in how accessible it is. It requires no special tools or expensive software and is thus very democratic. The nature of the grid is easily understandable and something that even someone without a training in art can accomplish. *“Everyone can have as many coloured squares as they would ever wish just by running a program that comes with every PC, it requires no gestural, fine-art training because anyone can patiently plot every single pixel by hand (or foot, or eye, for those with movement disabilities) and the permutations of what one can do with these limited and shared tools are infinite.”*

-Artist 3

This was echoed by Artist 1 and Artist 2 who says that the pixel grid is something that the artist can feel absolute control over. The latter likening to a well-crafted piece of haiku that manages to say a lot with very few words. The both of them also credited the sense of accomplishment and victory they felt after having solved a difficult problem.

5 Analysis

This section examines some of the common themes found in the answers of the respondents that all relate to how pixel art and the creative processes associated with it better can be understood. I will also examine some interesting correlations found in the answers given in the survey and see how they map towards theories on design and practical knowledge put forth by Löwgren & Stolterman (2004) as well as Schön (1983) and presented in the related research section. An artist gains deeper understanding about the design problems and their own aesthetic through reflection over it. Which the broader questions in the survey were meant to entice.

5.1 Is pixel art even a medium?

In the answer to the first question “What defines pixel art to you?” the artist Artist 2 raises the idea that pixel art is in fact not a medium at all. Referring to it instead as a type of digital painting just with added restrictions, not a unique medium in of itself like say oil painting. In a sense this is certainly true, pixel art can be created with the same tools found in most digital painting software. And as more tools have been added to the toolbox pixel art grew into digital art generally. Yet at one point, pixel art represented the full breadth of what was possible to achieve in digital media. So how should we refer to this very restricted form of digital painting?

The author Marshall McLuhan formulated the oft-quoted idea that “The medium is the message” (1964). Take for instance, Cubism. McLuhan interprets Cubism as announcing clearly that the medium is the message. To him, Cubist art required instant sensory awareness of the whole, rather than perspective alone. With Cubism one could not ask what the artwork was about but had to consider it in its entirety. McLuhan (1964) asserts that the content of a medium, is always another medium. Could the content of pixel art then be limitations as a concept? In other word, the it is the very medium of limitation. Something that the artists all brought up was the similarity of pixel art to older mediums like cross-stitching and mosaics, to name a few. These techniques are all constructing simplified, stylized images using small colored units (Alvarez, 2016). Perhaps pixel art shouldn’t be seen in the tradition of digital art, art that often attempts to hide its resolution. Either by becoming vector art or by using such a high resolution that the individual pixels lose their impact. Maybe it can also be the final, digital frontier of something like cross stitching or mosaics. All squares perfectly uniform. The smallest piece of mosaic we could alter.

5.2 Color as limitation

The limitations in color usage were something brought up by all the respondents. They all said that keeping their palettes low and optimizing it during the creation of a piece was a something they were conscious of. Striving to use as few colors as possible. This was done to exert that absolute control over the canvas, to achieve a cohesive unity. This is a common practice in all art (Kylmäaho, 2019). The fact that the artists still often limited themselves to 4, 8 or 16-colors as a tribute to older machines that were limited to byte channels (Kylmäaho, 2019). Even those new to the communities would find themselves inspired or advised to stick to these smaller color palettes. Löwberg & Stolterman touch on these passed down methods within a design movement (2004, p.128). With many people involved they need a common language or form of expression. In that case the method doesn't just function as a language but as a coordination and planning tool. Its most underrated advantage is how often it is taken for granted, a method can give direction and carry a lot of history and competency. Even if every technique won't be useful at all times, knowledge of them and appliance of them can give a newer designer insight into more experienced artists innovations. And if one analyzes them might learn how they were developed (Löwgren & Stolterman, 2004, p.128). Because of its reductive nature pixel art can easily teach others important facets of design. When Artist 3 mentioned the folkloric nature of the restrictions and limitations in pixel art this is perhaps what he is referring to. Consider, a 13-year old beginner in the world of pixel art; They will probably have no idea why they should be limiting themselves to just 8 or 16 colors when there are thousands to pick from. They might not realize that the restrictions have their roots in 8-bit computing, but they will reap the benefits of it anyway. This community-wide discipline teaches them to make compromises and to find novel solutions. In short, makes them understand what Löwgren and Stolterman (2004) call "good design".

5.3 Limitation as a choice

Artist 1 mentions that for something to be pixel art, it has to be limited in some way. These limitations or restrictions may not have to be the same for every project or artist, but they are important for the piece to be considered pixel art. To me it becomes clear that limitations and self-imposed restrictions are key components in what defines pixel art. To work within restrictions and specification can be difficult as described in this quote from Artist 3:

"[...] It's all meticulous work, done in solitude, by a single artist, manipulating the most opaque and granular level of their compositions, endlessly, until everything sits just right."

Löwgren and Stolterman (2004) propose that to be a designer often is a struggle, but that it can be very rewarding. Artist 1 and Artist 3 both use the same word "struggle" to define the

creative pixel art progress. It is the struggle to re-examine solutions to novel design problems as they arise. It is possible to compare this to Schön's (1983) theories about engaging in a dialogue with the situation. According to Löwgren and Stolterman (2004) each design situation is unique. Therefore, it is essential for a good designer to think reflectively. What this means is that you evaluate yourself critically, but also the constraints of your current project. There is no fact sheet to tell us if a piece of art is "correct" (Löwgren & Stolterman, 2004, p. 13). While a designer always works with limitations of some kind. It is the artist's role to navigate these limitations and find creative answers to the problems posed by them (Löwgren & Stolterman, 2004). The notion that Limitation breeds innovation is almost a cliché in the world of design. It is known that many artists often limit themselves strongly, through the choice of supplies and expressions (Löwgren & Stolterman, 2004, p. 36). This can seem confusing, why would artists radically limit their sense of freedom and suggest themselves to a "struggle? But the artist isn't doing this to limit their creativity, but to enhance it. The artist needs certain choices to "be locked off", otherwise there would be nothing to react against (Löwgren & Stolterman, 2004, P. 36). This can be glimpsed when Artist 3 talks about the platonic ideal of pixels on a grid. In some way it's a struggle for control, Artist 1 and Artist 2 both suggest as much, saying that the restricted grid of the canvas is something they can have absolute control over. They have set restrictions and limitations for themselves that will inform their creative decisions. Take for example a tiny canvas where there is a limited amount of space to portray a face with just 10 pixels, what feature do you sacrifice? This creates a design problem, one that the artist can find great pleasure in solving. Mario's mustache famously came about trying to make a readable face in the limited amount of space available. That is a real-world example of one of these solutions. Creativity is a strange force that always finds its way (Löwgren & Stolterman, 2004).

Design is an aesthetic activity. Every design consists of actions and choices, this is true in every design decision no matter how small. These choices are informed by our values, our aesthetics (Löwgren & Stolterman, 2004). Often much of our creative process is said to come from intuition. People who may not be experienced in a certain artform might think that it is all about talent, a built-in competency for a certain task. A myth which certain philosophers and artists have seen fit to perpetuate. For example, the painter Picasso, innovator of Cubism, viewed his body as a tool for the expression of a creative force. There were of course aesthetic experiences that made Picasso go from a more naturalistic way of painting to abstract Cubism even if that process wasn't conscious to him. Everyone builds a vision of competency as Schön (1983) described it, our own vision of how a completed task looks. Each time we look at a piece and try to evaluate it we compare it with our own mental image. If we can learn to stimulate

and harness this vision, by creating limitations and goals that is the way the intuition grows stronger. New solutions must be born and unique ways to solve problems are invented. By clarifying the limitations and viewing them as challenges and opportunities for innovation instead of obstacles the practitioner can gain an understanding of their own aesthetic. Because restrictions and limitations are part of every artistic process, whether consciously or not. Reflection over why artist chooses to go about it in a certain way can be valuable. And often it is this process of reflection that makes us improve as artists. Even in a field of pixel art, where the improvements may run contrary to what a general audience expects of it. As Donald Schön puts it; “Practitioners are frequently embroiled in conflicts of values, goals, purposes, and interests” (1983, p.17). As pointed out by the artists there are unique things that pixel art does well, and less well. Realism is not the point of pixel art; it will come short and the larger the canvas is, the less likely the piece is even able to be understood as pixel art. However modern digital painting might be too daunting for a beginner, as there are simply too many variables. But with a smaller canvas with a very limited canvas and a hard cap on the amount of detail possible to put into the space they may find it a surmountable challenge.

5.4 Meditative puzzle solving

Not only was pixel art likened to other art forms that are similar from technical perspective, but also to a puzzle that is to be solved. Artist 3 mentions that there is something “almost mathematical” to the process and artist 1 likens it to a *Sudoku*. Indeed, the limiting nature and square shape invite to the comparisons to different kinds of games, not least the puzzle game *Tetris*, also mentioned by artist 3. The comparison of pixel art to Tetris is especially apt. Tetris is a game about sliding different falling shapes around. The aim is to get the shapes to fit together and create perfectly aligned rows. The player has no control over what piece will appear next so adapting to the situation and trying to create the best possible outcome with the pieces available becomes key. Pixel art is like a sliding puzzle, where if the artists keeps pushing the pixels available around, they might finally be able to represent a hand or a face in the very limited space. The feedback is very immediate. A pixel is either there or it isn't. The light that makes that particular tiny square of your screen visible is either on, or off. This means that changes can be made, and reverted, rapidly. Further strengthening the allegory to a video game. Another fairly obvious similarity is that a pixel cluster often takes the shape of Tetris-piece, since it just four squares arranged to form a shape. Tetris, being a game of the mid-80s, was originally a pixel art game itself. Developed for the *Macintosh Plus 1* before being ported to the game boy and becoming a massive seller (Löwgren & Stolterman, 2004, p.176). Stolterman & Löwgren describe Tetris as having almost hypnotic qualities, making the player

just coming back for “just one more round”. This ability to sink wholeheartedly into an experience often associated with creative or exploratory endeavors like writing, drawing, gaming or programming and called *flow* (Löwgren & Stolterman, 2004, p.187). When answering the question of why they continue to work in the medium the respondents all identified the satisfaction achieved and relaxing nature. Now as mentioned before the *flow-state* is not something at all unique to pixel art. Certainly, the flow-state is not something unique to pixel art or even to artists. Dreyfus & Dreyfus (1986) describe the flow-state as being a result of a kind of reflective thinking found in experts of a field. But we can perhaps hypothesize that more than drawing, painting or sculpting the immediate nature and performative similarity of pixel art to Tetris lends it particularly well for this kind of meditative activity for an artist to lose themselves in. Artist 2 who is an artist by trade, but pixels as a hobby speaks to this. The sense of fun and achievement is tainted when the problems are not solved for fun but to meet a deadline. The aspect of pushing pixels around the canvas, searching for the optimal position for each specific subject was described as an allure of all the respondents. When finding a novel solution to a problem a sense of “victory” was reported, like that in Tetris when the player has managed to find a particularly satisfactory way to deal with a tricky block. It can be argued that the inherent similarities to a puzzle game, and with Tetris especially, amplifies this aspect of pixel art and makes it easier for a beginner to consider the relationships between the alignment of shapes to composition.

5.5 Future of the artform

As mentioned in the introduction, Pixel art has proven to not be a trend or static media (Byford, 2014). While often accused of being a regressive type of art and burdened with the association of nostalgia for a period of gaming history that is over, willfully rejecting new technical advancements in the world of digital art. This clearly was not an opinion shared by the respondents. Artist 4 went as far as to say that this misconception was the single biggest hindrance to the perception of pixel art as an artform. These have been practicing pixel art for a long time, yet they are still finding ways to explore the artform and adapt their own approaches to it. A big misconception regarding pixel art is that the small scale means it is very fast to work it and doesn't require much thought (Dewey, 2014.) And therefore, less worthy of being called art. This isn't necessarily true, as while the small size means it can be produced very quickly, it is easy to lose oneself in the process of “pixel pushing” and searching for optimal shapes. The barrier of entry is low (Dewey, 2014) but to master it is harder. Yet artists like Artist 3 and Artist 4 are hopeful that there is a future for it, they are even excited by the possibilities. To that effect new pixel art games keep getting released and

if anything, the pixel art community has grown since it mostly migrated to social media. The market for it does appear to be permanent. Pixel art might just remain popular because of the fact that it is making art with the most basic components you can get. A pixel is either on or off. In this sense with the ubiquity of free drawing software like *MS Paint*, pixel art is a what can be called a democratic medium as no features or extra experiences are needed (Löwgren & Stolterman, 2004).

Perhaps artist 3 puts it best in his final answer.

”Everyone can have as many coloured squares as they would ever wish just by running a program that comes with every PC, it requires no gestural, fine-art training because anyone can patiently plot every single pixel by hand (or foot, or eye, for those with movement disabilities) and the permutations of what one can do with these limited and shared tools are infinite.”

6 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 for beginners, who in turn are helped along by the limitations imposed on them by the pixel art community. Inadvertently teaching them 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 and its similarity to a sliding puzzle or a game of *Tetris* 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. That being said, I want to emphasize that these are simply the opinions of four different artists. There will be as many definitions of pixel art as there are pixel artists out there. This is not an attempt at developing a true pixel art or an “official” definition but rather to show that it is indeed a broader medium and craft, not a just a style or purely nostalgic practice. My hope is that this essay can serve as springboard for other works talking about pixel art graphics in and outside games and give them tools to appreciate the craftsmanship and design sensibilities hidden within.

6.1 Further Research

While I am excited to see more studies done on pixel art in the field of video games, it would be interesting if the similarities to older art forms that also deal in small abstractions of shapes could be expanded upon. Are there similar rules in the world of mosaics or cross stitching? Can something be learned from examining the art forms together, interviewing experts in both fields? I would like to see future researchers tackle what kind of cross-pollination of ideas the digital meeting the physical could result in.

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