[ANONYMIZED]

Comm 362 -- Assignment #1

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Creativity in artistic expression often comes from the limitations of technology. During the 1970s, when video games were still in their infancy, graphics were limited in visual detail due to the primitive hardware at the time. In hindsight, the technical limitations of early video games like *Pong* helped more than it hindered because it forced developers to "create user interfaces that were radically simple and intuitive"(Isaacson, 2014). Today, *Pong* is instantly recognizable and accessible due to its minimalistic design and straightforward gameplay. Creative expression through limitation can also be observed in digital image formats, it is important to consider how both technical affordances and limitations contribute towards the way a format is used and its overall representation.

The photographs taken from the 1930s and 40s that have been converted to digital files are examples of raster images. Raster images are images that are "made of hundreds (or thousands or millions) of tiny squares of color information, referred to as either pixels or dots"("How To Explain Raster vs. Vector To Your Clients", 2012). The strengths of raster images come from its numerous pixels, which allows for precision editing in software like Gimp, and the ability to display a large amount of detail. However, the downside is that raster images have a finite number of pixels, which means that increasing its size doesn't create new pixels, it only enlarges existing ones which decrease the quality of the image. For example, when increasing the pixel size of the sunflower graphic, it looks blurrier and the edges become more

blocky. Raster images also tend to have large file sizes so they often need to be compressed, losing their original quality(Chastain, 2019). Overall, when taking into consideration the strengths and weaknesses of raster images, the format is best used for detailed pictures with a fixed scale.

Vector graphics work better in situations where an image needs to be dynamically scaled and keep its visual clarity. Changing the size of a vector graphic does not change the overall resolution since they are made up of points, lines, and curves instead of pixels. This simplicity helps with managing an image's file size since it would only need "four points of data to recreate a square versus 300 individual pixels for a raster image"("How To Explain Raster vs. Vector To Your Clients", 2012). However, due to having less image data, they cannot realistically be used to create detailed images that require pixel perfect coloring. Overall, vector graphics work best for logos, shapes, and other simple graphics, like the ones created in Inkscape, which can be dynamically scaled without losing visual clarity.

Although raster and vector graphic formats are usually associated with images, another form of media that incorporate both are video games. In the early 1980s, the two most common graphical styles for video games were pixels (also known as sprites) and vectors. Games with vector based graphics were displayed on vector monitors, giving them a cleaner and less jagged look. Unlike normal monitors which were subdivided into pixels, the surface of a vector monitor was "one big layer of phosphor which emits light wherever excited by electron impact"(Beyman, 2019). However, as technology grew more advanced and game graphics evolved from ambiguous shapes, the visual limitations of vector graphics emerged and pixel graphics became more common. Like raster images, pixel graphics could display more visual detail which is

important in a medium that is centered around effective visual communication to the player. By the mid to late 1980s, pixel graphics dominated the video game market, but they still had one last hurdle: creating 3D polygons. 3D graphics were not practical using pixels due to memory limitations and lack of adequate pixel density on monitors at the time; vectors graphics, on the other hand, did not rely on pixels to create images and took up less memory. Therefore, 3D games found a home on vector machines long before pixel graphics could catch up(Beyman, 2019). In the medium of video games, pixel and vector graphics both had their advantages and disadvantages that ultimately determined what kind of games could be created using them.

In conclusion, a format's technical limitations are equally as impactful on its representation as its affordances. The disadvantages of raster and vector formats determined what they could be used for; as a result, different digital formats were discovered to work better in certain situations than others. The pace of technological advancement is as fast as it is because weaknesses are used as a learning experience to rule out what is possible, allowing efforts to be refocused on strengths.

Works Cited

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