

Escaping the World: High and Low Resolution in Gaming

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The white block bounces across the screen, deftly deflected by your vertical warrior. Minutes bleed into hours, yet your eyes never leave the TV. Suddenly, the block caroms off of the ceiling, redirected at the last moment by a flick of your sweat-covered palm on the joystick. A close save.

Flash 32 years into the future. The industrial complex is old and creaky, made even spookier by the suspicious absence of any personnel save yourself. You raise up your rifle and peer around a corner; a light fixture swings from side to side, painting the dark corridor in splotches of misty light. You head down the passage to glimpse a monstrous shadow on the wall, preceding the abomination that leaps out of his hiding space and lunges for your throat. A few frantic steps

back, a few shots to the forehead; you collect your thoughts, and move on to the next encounter.

While *Pong* and *Doom 3* have next to nothing in common, the experiences enabled by these games share the same philosophy—to immerse the player in the game. As the next generation of super consoles prepares its imminent arrival, the question of graphics is on everyone's mind. On 2 May 2005, game developers from New York and New Jersey met in the New School's Tishman Auditorium to discuss this issue, taking sides in a debate between those in favor of unconventional and contextually appropriate graphics, or the low-resolution advocates, and those in support of realistic, true-to-life imagery, or the high-resolution team.

Low-resolution argument

After an introduction to the event by organizers Bill Folsom and Ellen Scott, the game development and enthusiast community in attendance watched the low-resolution team make their case. In their PowerPoint presentation, beginning with a screen depicting *Halo's* Master Chief facing off against Mario circa his first Nintendo Entertainment System (NES) outing, the low-resolution team established their comical yet competitive tone, especially after Mario lobbed a fireball at *Halo's* hero.

Each member of the low-resolution team took turns presenting their case, using their opening minutes to establish a proper definition for the term *high resolution* by disproving its common misconceptions. The prevalent thought of 3D denoting high resolution was dashed with a slide of the original *Star Fox's* crude 3D images, and the temporality of graphics benchmarks was taken into account with a still shot from the original *Doom*, heralded for its high-resolution visuals when it debuted in 1993. The low-resolution

Editor's Note

Advances in graphics have done more than just revolutionize the computer game industry—graphics themselves have come to define the entire industry, surpassing even gameplay as the singular identifying characteristic of all games, regardless of genre. These spectacular developments are even more remarkable when we consider the almost ruthless constraints imposed by an industry needing to deliver high performance to a demanding computer-savvy group of users.

A core issue involves low- versus high-resolution graphics. As multimedia technologies continue to mature, the debate between high and low resolution takes on more urgency. What is the most effective way to convey an emotion or information? Is it just pure realism or is it an artistic device? Always searching for the most effective way to provide an immersive experience, game developers still have no consensus on what rendered graphics should really look like. Ben Serviss covers a discussion last May as two camps of developers met in New York to debate these issues. His article provides insight into the game industry as well as discussing this topic in the context of other visual media such as art and film.

—Dorée Duncan Seligmann

team defined high resolution as the best “state-of-the-art representational graphics” available, with representational meaning true to life.

Armed with a clear mindset of the terminology, the low-resolution team then posited why anybody would want to develop with less realism. Practicality had the biggest influence on their conclusions as they stated the increased load on the processor and inflated development budgets as justifiable reasons for shying away from hyper-realism. The team discussed the issue of context for the hypothetical game in question as another reason to head away from realism. One PowerPoint slide showed a mock-up of a hypothetical sequel to *Katamari Damacy* called *Katamari Damacy 2: Total Carnage*, depicting a photograph of a destroyed highway with a Katamari ball rolling away in the background (see Figure 1).

Continuing with this topic, the low-resolution team made additional arguments as to why high-resolution graphics aren’t always appropriate or desirable. Another slide showed Superman in his comic book form, a still from his *Superman 64* rendition, and a picture of actor Brandon Routh in the famous suit from the upcoming film *Superman Returns*. The audience unanimously expressed their preference for the comic book version when prompted, adding weight to the low-resolution argument.

Citing robotics expert Masahiro Mori’s famed Uncanny Valley theory (see <http://theuncannyvalley.org>), whereby the emotional reaction to artificial representations of people dips sharply when faced with not-quite-right facsimiles, the low-resolution team showed a screen shot from the recent CGI film *The Polar Express*. Calling the superrealistic imagery inappropriate for the film’s content, the low-resolution team suggested that a more cartoon-like aesthetic truer to the original source material would have better served the film in place of the realistic approach it used.

Lastly, the team gave further insight into the issue by relating game graphics’ struggle to that of the art world. Unsatisfied with the never-changing pursuit of realism, a few daring artists decided to branch out into different aesthetic treatments designed to pierce the viewer on a purely emotional level, experimenting with techniques such as Pointillism and Surrealism—varying styles in communicating visual information that have, for the most part, yet to materialize in video games.

High-resolution argument

Following the low-resolution team’s collabo-



orative presentation, high-resolution representative Nick Laing, a producer at Hypnotix, took the stage to display his team’s visual aid. “We didn’t prepare a presentation,” Laing said, “because we didn’t need to.” Reflecting the divide between the two camps, the high-resolution team’s offering was simply a trailer of the Xbox release of *Doom 3*. After letting the moody, atmospheric footage speak for itself, the high-resolution team established its own definition of the term.

The team’s definition sprang from the old standbys hi-fi and lo-fi, meaning an increase in general performance not limited to realism. Dimensions such as size and scope of the visuals and even color palettes factor into separating the lo from the hi, elements that have a large impact on the game’s overall immersion level. Describing video games as “important, integral, and immersive” at their best, the high-resolution team drew parallels between the rift between the abilities of cell-phone games and high-profile console titles like Bungie’s *Halo* series to draw their players into the experience.

Jason Schreiber, chief executive officer of Powerhead Games, commented on the practicality of taking the high-resolution route. Because a game’s “dynamics, mechanics, and aesthetics” need some way to differentiate the whole product from the rest of the market, the most obvious method is to throw resources at the visuals in hopes of attracting the greatest amount of players possible.

The team then delved even further into the core truths of game production. First, they explained

Figure 1. The simple yet effective style of Namco’s Katamari Damacy uses Impressionistic techniques to make crude shapes appear familiar.



Figure 2. Vib Ribbon by NaNaOn-Sha and Sony used minimalist vector graphics. This allowed the entire game to be cached into memory while retaining a distinctive look.

the *backward development* process, a common practice in which the developer is handed a property license, budget, and release date, with the actual game coming together from these disparate elements. The opposite philosophy, favored by high-profile developers such as Nintendo and Blizzard, is known as *forward development*, where the development team builds a rough gameplay structure, then adds to it as much as possible while constantly tweaking the core functionality in pursuit of the elusive fun factor.

As idealistic as forward development appears, the reality of development is that not every studio can afford to release a single killer title every six months (or even longer), making backward development a necessary evil of game production. Investing in realistic graphics, according to the high-resolution team, is just another aspect of this way of life, as the team basically builds the back of the box during development in search of the widest audience appeal.

Visual techniques

How did game graphics get to this divide in the first place? While we could argue that the jump from 2D to 3D technology spurred the creation of the low-resolution and high-resolution camps, basic choices in aesthetics and style have helped shape the two sides early on in gaming. Take the *Super Mario Brothers 3* versus the original *Metal Gear*—both appeared on the NES in the same generation, both featured 2D visuals, yet the cartoony atmosphere of Mario is still worlds

apart from Snake's gritty espionage-fueled reality.

The disparity as we know it can be traced to the introduction of new technology that allowed for striking, never-before-seen graphics, such as the cel-shading technique. Debuted in the obscure Dreamcast racer *Wacky Races* and popularized by *Jet Grind Radio*, the main idea is to render thick, black lines around the edges of characters, achieving a cartoon-like visual style that operates in three dimensions instead of two. The quirky design, once delegated to curious Japanese imports, has since spread across a wide berth of mainstream releases, encompassing a smattering of genres including adventure (*The Legend of Zelda: The Wind Waker*), first-person shooter (*XIII*), role-playing games (*Musashi: Samurai Legend*), and even racing (*Auto Modelista*). As the preeminent artsy graphics style in games today, cel shading has helped pave the way for other alternatives to realism, such as *Unlimited Saga's* marriage of hand-drawn animation with 3D models dubbed "Sketch Motion," in attempts to stand out from the herd.

While innovating for the sake of innovation is respectable, coming up with unheard of solutions under immense pressures and limitations is even more admirable. *Grand Theft Auto's* low-detail characters serve as caricatures of the urban stereotypes they aim to lampoon, striking a balance between functioning legitimately in the game while parodying themselves. Not only does this visual style serve the gameplay and explains why random acts of violence in the game incite chuckles instead of horrified gasps, it also serves the game practically as well—the relatively light graphical load on PlayStation 2's hardware lets the game's engine generate whole city blocks on the fly, keeping the player immersed.

The minds at NanaOn-Sha, makers of the Japanese rhythm game *Vib Ribbon* (see Figure 2), purposefully pared down the graphics to simplistic vector images so the entire program could be cached on the original PlayStation's memory. The player would guide Vibri, a crudely animated rabbit consisting of just white lines on a solid black background, across a 2D path of obstacles generated by the music playing in the background. Between stages, the player would switch the game disc out for music CDs to generate random game levels based on the chosen music's tempo, allowing an unprecedented level of interactivity while giving the title its own unique aesthetic.

Even the image of Nintendo's infamous gaming icon Mario was borne out of limitations. In the original *Donkey Kong* game, Shigeru Miyamoto slapped a few black pixels on the plumber's face, establishing the famous mustache as something to simply differentiate Mario's head from the rest of his body.

Yet even in the face of hardware limitations and design obstacles, many developers are still striving for realism in their graphics. Taking a cue from the high-resolution team's argument, it seems that photorealistic visual styles appeal the most to the game-buying public, a market that continues to increase yearly. So does the low-resolution argument have any relevance in today's marketplace? To find out the answer to the age-old debate of bigger and better versus carefully cultivated, we need to compare the games industry to the art world itself.

Art history vs. game graphics history

The art community remains divided between true-to-life realism and the dozens of available alternative artistic styles. In recent years, avant-garde modern art has emerged as the favorite, with photorealistic portraits and still-lives viewed as common and uninteresting by prevailing art critics. Of course, it wasn't always like this.

The famed Renaissance period of the 15th and 16th centuries saw the pursuit of realistic imagery over all else, with grand depictions of religious and secular figures as true to life as was possible for the time. The neoclassical period of the 17th century experienced a rebirth of classical sensibilities, with artists acknowledging the responsibility of their art form to the public during the Age of Enlightenment. Nevertheless, realism remained the mainstay of the art world until the mid-19th century.

Within a relatively short period of time, painters began to rebel against the traditional photorealistic pieces that the art world had come to expect and struck out against convention to create daring new methods of looking at life. The Impressionist movement, so named because the finished pieces look like sketches or incomplete impressions, was the start of moving away from the dominant school of thought, followed by George Seurat's pointillism offshoot.

Later on, Picasso would introduce the unconventional technique of Cubism, along with its basic philosophy—that to truly depict the essence of something, you must show it from as many dimensions as possible. Surrealism and Dadaism sprang from a desire to rebel against the

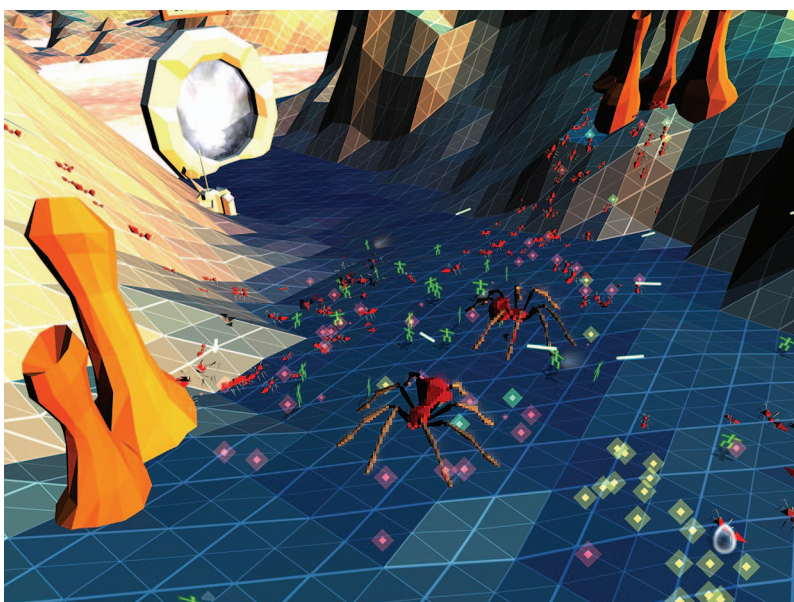
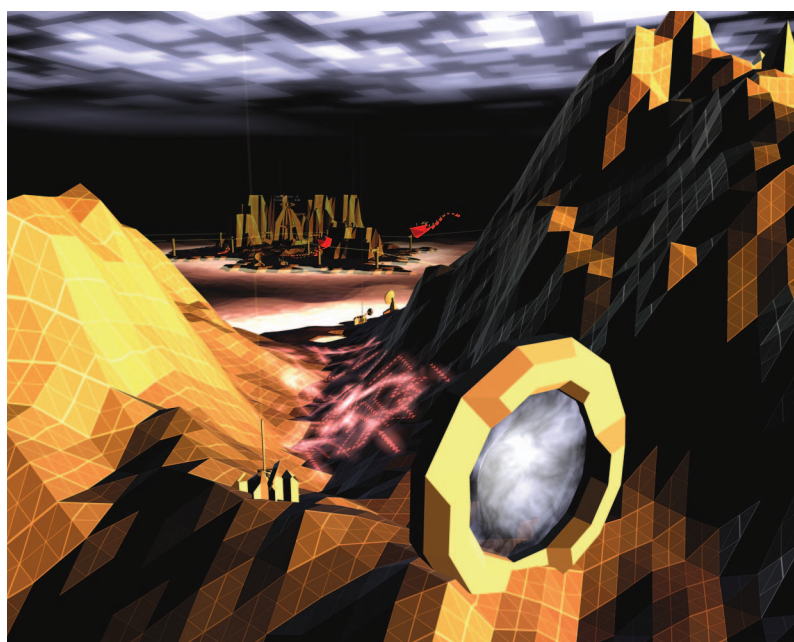


Figure 3. At first glance, Introversions' Darwinia looks like a piece of 1990s software art. This pseudoretro style was adapted to communicate the feeling of being inside a computer.

monstrous nature of humanity after the events of World War I, assaulting a hypocritical culture that takes refuge in beautiful art yet commits daily atrocities in reality. With all of these alternatives to realistic depiction, inquisitive souls may still wonder why the video-game world has yet to capitalize on its own artistic methods, much less borrow from those of the conventional art world. An exception to this is Introversion's game *Darwinia* (see Figure 3); compare it to Mod-

ern artist Eina Bems' *Emergence of Life* (see <http://www.einabems.com/Ac-02.htm>).

The answer to why the video-game world doesn't borrow more from conventional art lies in the basic tenets underneath each medium. The world of the painter, subject to the will of a single opinion, proves malleable in the face of adversity and can be readily adapted to an artist's changing vision—be it rebelling against the status quo, discovering an innovative new technique, or being different just for the sake of it. The world of the video game is unquestionably more involved, requiring the successful collaboration of many different disciplines such as programming (math), writing (literature), and graphics (art). What's more, painters are rarely motivated as strongly as their video-game counterparts by the desire to succeed financially.

Games vs. film

A more appropriate comparison is that of the video-game industry to the film industry. While leaders in the game development community have approached this comparison with various levels of suspicion, since significant differences exist between the two mediums' target goals and distribution methods, major similarities remain. Both are massively visible, commercially minded industries that are in the business of art, not of art as a business. Likewise, both industries are driven by technology. Although nowhere as drastic as requiring new hardware every five years to film a feature, as new advances were rolled out in Hollywood they were quickly integrated into the mainstream—first with the advent of sound and color, then special effects; culminating with today's computer-generated imagery and digital film and projection capabilities.

While a small amount of art films continue to rebel against the mainstream conventions, using the aforementioned technologies only when it serves the artistic vision best, they remain largely relegated to the fringes of the mainstream. This separation of mainstream (or high-resolution) from the art (or low-resolution) is paralleled in the game industry to a lesser extent, as successful crossovers from the fringe are more common than in the film world.

New dimensions

The question of the fate of graphics in games is still unanswered. Will the market experience a kind of critical mass of realism, once the next

generation of consoles proves capable of rendering images indistinguishable from reality? Best-sellers *Half-Life 2* and *Gran Turismo 4* are already disturbingly realistic in their representations of reality, yet the march of technology shows no signs of slowing.

Maybe a limit will be attained in realistic imagery, in the same way that frame rates have topped out in recent years. Sixty frames per second—the highest frame speed detectable by the human eye and the industry ideal for years—was achieved repeatedly within the PlayStation 2 generation, with any speeds above that benchmark deemed unnecessary. While footage from upcoming next-generation console games has once again proven to be beyond anything yet seen, the leap from PS2 to PS3 is still not as dramatic as the transition from PS1 to PS2.

Maybe, as technological resources continue to increase, the key is using that technology via new and innovative methods instead of the staid pursuit of recreating the real world. Immersion in games is a fantastic thing; perhaps the next step in the evolutionary cycle is to explore new ways to incite emotions, capture feelings, and involve the player in brand new capacities. The domain of sound, previously ignored and underused, is slowly moving to the forefront of the game experience as additional processing power becomes available. Moving past the benchmark of in-game 5.1-multichannel Dolby surround sound, developer Team Tarsier is poised to break new ground with their next-generation title *Metronome*, in which players can record in-game sounds and play them back to be used as weapons or items.

This approach to handling the next wave of hardware's capabilities offers the most promise. By shattering the mold of preconception and exploring dimensions other than the aesthetic, the potential to transform game experiences into transcendental, engaging events is made all the more clear. After all, gaming at its core is a practice designed to escape the limitations of the real world. Once those are broken, developers will have a whole new set of obstacles in creating memorable, involving games—their imaginations. **MM**

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