

Music-based Videogames

While the title of this paper would, to many, seem self explicative, throughout its reading it will become apparent that there are some difficulties in assessing what exactly it means, or for that matter, whether such a thing as *music-based videogames* really exists.

A number of cases will be presented as to introduce some background in the topic. However, the purpose of this paper is more than a quest for establishing semantic exactitude or a new taxonomy in the video games universe (although a little exercises in this respect will help in making up the case for our ultimate pursuit). We are interested in digital entertainment of the like currently offered by videogames where audio is the main vehicle to support the experience, and as the following pages will prove, it will become clear that a new paradigm for digital entertainment lays in the waiting.

We are talking about the case for a ludic-aesthetic electronic experience solely based in audio.

What is considered music-based videogames?

It is tempting to define our topic as something opposite to games where the experience is mostly sustained by the visual component; that is, games where the audio could be turned off without drastically affecting the gameplay.

However, in accepting this approach we may inadvertently bring problems to most of the current music-based videogame paradigms when applying the inverse: switching off the video. In fact, many of today's best examples would not work without the visual component. In these games the gameplay is at its best reliant on music, but nonetheless, it is absolutely dependent on graphics.

So even if we were successful in defining our subject of research, would it still be considered a *videogame*? What about *musicgame*? Hum no, then computer based ...

Admittedly lot of ink could be spent before even coming close to strictly characterize our topic. We shall move on faster then if we start considering some examples that fall within what already certain taxonomies (and our intuition) indicate in the realm of our attempted definition. Let's have a look at the different incarnations that our subject of research has taken throughout time.

Demos: the forefather of sound-based computer entertainment

In the early days of personal computing, multimedia resources available to programmers came in relatively limited numbers. As it was the case of the very first computers occupying whole rooms, their purpose was more or less justified if they were able to provide speed or automation in tasks for which a text (or no) display would suffice. This changed when computers started to be used for games; one of the first games ever programmed was **Space War**.

*(In **Space War**) "two spaceships are displayed in motion on the screen, controllable for thrust, yaw, pitch and the firing of torpedoes. Whenever a space ship and torpedo meet, they disappear in an attractive explosion." (Brand)*

The original **Space War** came to existence in 1962 at MIT after the efforts of a group of students (D. Edwards, A. Kotok, P. Samson, S. Russel and J. M. Graetz) interested in demonstrating the capabilities of the machines (TX0 and later PDP-1) at their disposal. One the first product of this confluence was **Bouncing Ball**.

"Bouncing Ball may be the very first computer-CRT demonstration program. It didn't do much: a dot appeared at the top of the screen, fell to the bottom and bounced (with a "thock" from the console speaker). It bounced of the sides and floor of the displayed box, gradually losing momentum until it hit the floor and rolled off the screen through a hole in the bottom line" (Graetz)

These experiences laid the foundation of what may still be considered the principles of demonstration programs, or *demos*. In their words, *"a good demonstration program ought to satisfy three criteria:*

1. *It should demonstrate as many of the computer's resources as possible, and tax those resources to the limit;*
2. *Within a consistent framework, it should be interesting, which means every run should be different;*
3. *It should involve the onlooker in a pleasurable and active way – in short, it should be a game." (Graetz)*

Demos are ranked against each other according to the esthetic results achieved over the constraints of the used platform. Being resources limited, all of its components are highly optimized (programming usually in assembler or machine language, able to run on very low RAM settings and generic system specifications), therefore nothing appears to be included without a valid reason. When *demos* showcase a sound component, they stand true to that principle.

Eventually, music would become a "game" of its own when some of it started to be distributed standalone in *musicpacks*, *musicdisks* and *diskmags* (distribution channels of the *Demo* scene).

All the same, for most of its audience, a standard *demo* package includes: “sound, music and a light show, usually in 3D.

Demos are very fun to watch, because they seemingly do things that aren't possible on the machine they were programmed on.” (Trixter).

Ultimately hardware evolves, and so may the features offered by computer applications. But to work around the limits of what can be attainable remains a primary goal of the *Demo* scene, stretching through the history of computing hardware, in particular of the PC line including: Sinclair, Commodore, Apple, Atari, IBM-PC, and lately also Linux and programmable handhelds.

And that this goal is also shared by the game community should not come as a surprise for it is now clear that the history of early demos and video games is intertwined.

Platform specific evolution

The concurrence of ‘demos’ like ***Space War*** and the possibilities of interactive fiction revealed in MUDs (Multi-User Dungeons) like ***Advent*** (1972), together with the nascent personal computer business were part of what had yet to be the video game industry. *Demos* remain somewhat a non-profit enterprise of a different scale and means of expression; loosely grouped as an underground community with yearly meetings and icons of veneration. Some of them are becoming commonplace, like screensavers. In some cases, both share the tendency towards achieving ever better graphics and sound capabilities as good as the platform they are using.

But while the PC frenzy was still building up in the late seventies waiting for the arrival of the **Apple II** computer and others, some companies took the initiative of bringing home (and cashing along with) this proven enthusiasm around electronic entertainment as early as 1972.

- Atari

Atari was one among these companies creating specialized hardware for video game purposes. It merits close mention in this paper for the success of one of its platforms and because it also marketed music related entertainment from its very beginning.

A year after the success of their first product in 1975 ([Pong](#)), **Atari Video Music** came out. Marketed as an audiovisual experience, this was a stand alone unit to which an audio signal could be connected via RCA connectors and its output sent to the TV. By playing around with its control panel the user could create certain kaleidoscopic effects on the screen “that would dance, bounce and gyrate to the beat of the music you are playing” (Atari)

Another device was **Touch me** (1972), named after its Arcade coin-op predecessor. The game would show a pattern in sequence of up to 4 blinking lights, and you would have to repeat them using the buttons on the game. As the game progressed, the patterns would become more complicated, with more and more blinking lights. This concept proved more successful on the Milton Bradley's **Simon**.

By far the best seller product of Atari is the **Video Computer System** or [Atari 2600](#). A number of music related titles were published for this console. Some of them are [Key **Title** (developer)]: **Grover's Music Maker** (Atari): [compose your own songs using the keypad or play one of the](#)

pre-loaded songs already programmed into the game. As the song plays, Grover will dance around the screen, **Music Machine** (Sparrow): a song is played every time a falling heart is catch yet Pudgeons must be dodged, and **Strawberry Shortcake Musical Matchups** (Parker Brothers): mixed up parts of a character must be fixed in order to being awarded a song.

Atari also produced through the early nineties a high end line of general purpose personal computers (series [400/800](#) and 520/1040ST) that became favorites with musicians because of their better than average sound chip and built-in MIDI interface. Some professional applications for audio editing were developed (i.e.: Emagic's Logic) as well as games.

- Intellivision & Colecovision

While no specific music titles were found for these platforms, they are worth mentioning for their intent in surpassing Atari's hegemony in the console market through technological prowess. Their products showcased better sound than was available in the Atari VCS series, thus elevating the presence of audio in the gameplay's balance. Intellivision's **Space Spartans** is one such example using computerized [speech](#) for the first time in a video game. During 1984-5 a slump in the video game market cut short the release of more games using this technology. In these games (i.e.: **Magic Carousel, Space Shuttle, Convoy, Quest**) the audio part was absolutely predominant with the player being guided by computerized speech.

- Apple

While most of the appeal drawn by the consoles mentioned before was based on the idea that they were computers (that is how they were called anyways), in fact they were missing a key component that was present in the early systems: programmability.

The *Apple I* inaugurated the so-called “home computer” era, allowing users to write their own code and run various applications. Not until the *Apple II GS*, audio support was powerful enough to compete with the capabilities of contemporary game consoles, yet a number of applications were written for the Apple II through the eighties. At the same time, around 1987, their line of Macintosh computers, precursors of the windows-like graphical desktop metaphor and the use of a mouse as a controlling device, was coming into life.

Some of the titles during the early years include: *Music Construction Set* (Harvey, Electronic Arts) and *Music Studio* (Activision): [both interactive music composition and learning tools that allow the user to create music or experiment with an included music library –previously released on the Atari ST series](#), *Diversi-Tune* (Diversified Software): [a sing-along program showing lyrics together with the accompaniment](#), and *Jam Session* (Broderbund): [an interactive music program where the users’ performance input is used to control the accompaniment](#).

- Commodore

Commodore arrived near the beginning (1977) in the PC arena with its Personal Electronic Transactor (PET). Similar to the early stages at Apple, this model had no sound, but its next two products, the *Vic-20* (1981) and the *Commodore 64* (1982), compensated for that. Especially the latter which boasted a sound chip (SID 6581) ahead of its time. This chip featured three voices generating [complex](#) waveforms with 16-bit pitch resolution and programmable filtering. This trend towards delivering a better than average computer in audio (and graphics) terms achieved its peak with the *Amiga* (1984-91) series, which featured 4 channels of [digitized](#) sound.

The *demo* scene flourished with the Amiga computers. It was not only that very close to real sounds could be achieved in these computers, the video capabilities too provided thousand of colors and processing speeds that were unheard of.

“The Amiga is (...) the first true multimedia platform available to the average consumer. The Amiga inspired many with its rich sound and elegant graphics capabilities. An Amiga demo is the best testament to the Amiga's power, providing a combination of graphics, sound, and complex code.” (Amigascene)

But besides its impact on the demo scene or the ability of, let's say, spreadsheet programs to include fancy sound effects, this machine brought a new level of conscience as to the meaning of sound based electronic entertainment. We will not single out any specific type of application, but the fact that starting with this series of computers, the number of music making aficionados and professionals alike (although the latter were already using bigger machines) grew immensely.

Amiga was definitely a great accomplishment in the PC market for multimedia applications. Yet, with its departure, most of its improvements would be missing in hardware specifications of mainstream PCs for almost a decade

- PCs

International Business Machines (IBM) introduced in 1981 the Personal Computer (PC), hailing a new era in the computer market based on an open-ended configuration that could be user –customizable (although for most of the eighties its sound specs remained mostly unattended).

Platforms mentioned before also qualify as personal computers, but after IBM's inception of the word PC, this would become synonym of their sort of platform, one which came to be populated by many other brands following the same specifications.

The first significant addition to the PC sound configuration was the SoundBlaster card manufactured by Creative Technology of Singapore in 1989 which incorporated the ability to play and record digitized sounds, plus a game port for joysticks or game pads. Its acceptance as a standard by the game industry made other manufacturers reckon that their products would be 'SoundBlaster compatible', a label that can still be found today. Successive support for MIDI, CD ROMs and software sound synthesis through the nineties completed the pool of options for sound creation on this platform.

The size of the PC user base, originally constituted of machines for office use, made developers and users, specially the multimedia savvy, slowly migrate to the PC platform. A PC demo scene was made its own, at first through porting of Amiga versions, then native versions started to appear. Sound related software did not take long to position itself in this platform. Some examples are: ***Pieces of Music Games*** (Cybermedia): [package of 3 educational games titled: Music Matching, Music Bingo, and Music Missing](#). In the shareware version, only Music Bingo is activated. These games teach the names of music symbols, ***Multimedia Music Games*** (Voyetra Technologies): [Music Quiz, Note Blaster and Rhythm Master help reinforce knowledge and build musical skills](#), ***Tweenies play to the Music*** (BBC): [using a microphone and dancing mat, sing/dance along and make tune while the game character travels around a maze,](#)

These games run on either MS-DOS or some versions of the Windows OS, which operates on most of the PC platform. However it is worth mentioning that Linux, a UNIX operating system for PC, is also becoming increasingly popular, thus creating its own *Demo* scene and game market.

- Arcades

Putting aside Pinball machines and other coin-op machines that populate Arcades, the music-related video game scene seems to be, for reasons beyond the scope of this project, Japanese territory. When it comes to floor space in Arcades, music simulation machines are very prominent, and their prevalence over the last 5 years is indicative of its importance and the different ways the business is conducted in Japan. But because in that country the console market is well developed and most of the Arcade games quickly find their way into the living room, it may be worth to focus our resources in that direction. It must be noticed, however, that lately some non-Japanese developers have started to create this sort of games too.

- New Consoles

After the initial slump suffered by the game industry in 1984 most of the console manufacturers that populated the late seventies and early eighties suddenly disappeared. While there are economic reasons behind, the interest in electronic entertainment had not vanished. PCs were becoming increasingly popular and some games could be played on them, but the quality of gameplay obtained by specialized consoles could not yet be surpassed.

New circumstances then paved the way for NINTENDO in 1985 and a handful of other Japanese companies like SEGA and SONY to introduce their platforms. Later Microsoft would follow suit. Software development for these platforms reflects less on these national differences.

As of 2002 there remain three major competitors in the game market, namely: Sony's ***Playstation I & II***, Nintendo's ***GameCube and GameBoy***, and Microsoft's ***X-Box***.

The current paradigm of music based (video) games

The following titles represent only an arbitrary selection of “videogames” where the idea of a “music based experience” is conveyed prominently. Their lifespan lasts some 6 years, coincident with the arrival of the Playstation 1 console. Arguably, some inclusions offer very little gameplay or interaction, but they are still labeled within certain taxonomies as music games. Key: **Title** (developer, publisher, platform, players, first launch date): [description of game action control](#).

Parappa The Rapper I-II, Um Jammer Lammy and **VibRibbon** (NanaOnSha, SCE, PS1 & 2, 1/2P, 1996-2002): [buttons in game controller are depressed according to visual patterns that match the beat in the music’s lyrics. Progress through levels of difficulty comes if done in the right order. VibRibbon takes any CD as music source and adapts the gameplay to it.](#)

Mad Maestro (SCEJ, Eidos, PS2, 1P, 2001): [same as above w/o lyrics.](#)

The Adventures of Cookie and Cream (From Software, Agetec, PS2, (1)2P, 2001): [same as above, yet patterns are to be produced between two controllers in a collaboration mode.](#)

Bemani series and **Dance Dance Revolution** (Konami, Konami/SCE, Arcade/PS1 & 2/i-appli (JavaME), 1/2P, 1997-2002): [same as Parappa. DDR can be played on a dancing mat w/feet.](#)

Unison (Tecmo, Tecmo, PS2, 1-3P, 2001): [same as DDR but patterns have to be memorized.](#)

Guitaroo-Man (KOEI, KOEI, PS2, 1/2, 2002): [same as above yet using also the analog stick.](#)

MTV Music generator, Music 2000 and **Music** (CodeMasters, SCE, PS1 & 2, 1-8P, 1998-2001): [combine riffs, beats, background sounds and special effects with tempo and volume control to create your own songs and music videos. Samples can be imported via USB.](#)

Spice World (Psignosis, SCE, PS1, 1P, 1999): [players remix pop Spice tracks, choreograph a Spice dance routine, and record an animated Spice video.](#)

Space Channel (United Game Artists, Sega, DreamCast, 1P, 2000): same as above w/o *Spice*.

Frequency (Harmonix Music Systems, SCE, PS2, 1P, 2002): players remix songs through each eight different instrument types. If remixed correctly, players freestyle to create their own music.

ModernGroove –The Ministry of Sound Edition (UbiSoft, UbiSoft Europe, PS2, 1P, 2001): same as above; music in mp3 format thus enabling a collection of more than 5 hours of samples in 1 DVD.

Fluid and **Baby Universe** (SCE, SCE, PS1 1P, 1998): guide dolphin through various themed worlds to collect sound patterns in order to compose and remix music of varying genres. No victory or defeat, it can be played endlessly, like **Baby** which is just a kaleidoscope for the PS.

Rez (United Game Artists, Sega, DreamCast/PS2/i-appli, 1P, 2000-2002): first person shooter with music and sound effects; a reviewer says: *“The music is the best part. (...). The shooting itself adds to the music. Just turn up the surround sound, pop the disc in, and prepared to be blown away! You'll want to keep playing the same levels over and over again. (Rez)*

PopStar Maker (Eidos, SCE, PS1, 1P, 2001): simulation of a pop star manager but also provides creation of one owns music

PCDJ (VisioSonic, Universal Music, PC, 1P, 2002): (application added to music CDs -formatted as CDextra- enabling them to be listened normally on a CDplayer or to be remixed on a PC)

A preliminary taxonomy

This research has been as comprehensive as possible in listing all possibly relevant titles for the platforms covered. The idea behind this account is to provide historical background to our initial thesis, that regarding a ludic-esthetic electronic experience whose closest representation today is the videogame paradigm. However, in order to define its conditions, it will prove itself useful to know what has been already addressed by today's archetype.

Our initial conclusion is that titles appearing here are games whose relation to music or sound falls within one or more of the following broad types:

- puzzle-like games requiring skills in completing musical patterns
- music creation metaphor
- educational: musical instruction (dictation, performance, theory) or quiz games based on historical or theoretical knowledge of music
- any kind of games with musically elaborated rewards

Yet any combination of the above is also associated to the degree of auditory information that is being conveyed through the user interface. This is the real measure of a game's reliance on audio, and how close we can get today to that new entertainment paradigm.

Let's pick for example two of the first games mentioned for the **Atari 2600: Music Maker** and **Music Machine**; they are good examples for they are complementary. The goal of the former is to produce an auditory experience leading towards a visual reward ([compose songs that Grover will dance around the screen](#)). The latter, on the other hand, rewards an auditory experience if the right steps on the visual domain are taken ([a song is played every time a falling heart is catch yet Pudgeons must be dodged](#)).

Most games in this list are trapped in this dialectic between the visual and the auditory worlds. Games that would otherwise fall in other categories like action, adventure or educational are considered music-based only because a musical component stays on either side of the equation.

The first group of games listed between **Parappa...** and **Guitaroo Man**, including **Mad Maestro**, **The adventures...**, **Bemani** series, and **Unison** fall within the first category listed: **puzzle-like games requiring skills in completing musical patterns**. Sound plays a role in providing certain logic to the patterns that have to be matched with the controllers and observed through the GUI.

The second group listed between **MTV...** and **Fluid**, including **Spice World**, **Space Channel**, **Frequency**, and **Modern Groove** fall within the second category: **music creation metaphor**. It must be noted that the last item **PCDJ** does not require a game console requiring only a PC. As its name suggests, this group is the closest to the music creation metaphor of all, despite a strong dependence on a GUI. *Karaoke* simulations also fall in this category.

Some of the titles mentioned in the **PC** section are **educational** and this is perhaps the most populated category of all across PC platforms. **PopStar Maker** (like **Spice World**) is clearly a simulation game with a music theme so that together with **Rez** they collectively respond to the last category of: **any kind of games with musically elaborated rewards**.

It must be said that there is nothing wrong with these games as it is with the inception of such a loose category as *music games*. These games are not necessarily something new, but the twist of the music component provides an appeal that may have not been otherwise.

"This new breed of melodic, non-violent games appeals to a different class of player than the prevailing driving and shooting titles. In Japan, the lure of music games has proven sufficiently strong to tempt females into the traditionally male-dominated arcade." (Karaoke)

Then what's wrong?

Nothing really. This entire music-based videogame situation is actually opening the road for the ultimate goal of this research, which will be expanded ahead.

Another vector from the above dialectic of audio and video runs transversally opposite: between a video/video and an audio/audio extremes. Most videogames nowadays comfortably tilt near the video/video extreme; even some of those accounted here as music games.

While there is nothing that prevents a game designer to go on the opposite direction, there are many advantages in heading towards the video/video extreme: one of them, invariably, is the types and quantity of expressions which can be easily conveyed visually than auditory.

But sound localization techniques are well documented and with machines that are powerful enough, it is possible to mull over producing auditory representations of many things that were considered visual metaphors only.

Just like text based narratives invite our imagination to compensate for the simulation of action that it can only depict but not provide, with enough cues, our auditory system is able to render and immerse us in a world robust enough to support various narratives within.

Spatialization effects are beginning to be exploited in some games, as they are becoming standard practice in movies. This coupled with a trend of availability of multichannel audio equipment in the living rooms surely invites for more experimentation.

Why bother?

As the convergence between Cellular phones and PDAs continues, most users of either one will switch to a single device with enough capabilities to handle both their communication and mobile computing needs. While the targeted use of these technologies is the business user, in fact anything that can bring revenue to Wireless providers will be considered appropriate use for them. It won't be long before a very large user base of mobile computers becomes a reality.

"The mobile phone is an ideal device for entertainment services and applications. Proof of this is the 128.4 million Nokia phones sold in 2000, which made them the top-selling personal entertainment device. In 2002, Nokia targets to sell 50 million Java™ phones, which further broadens the opportunities for mobile entertainment.

While business and information services are necessary, there is also a need to brighten moments of boredom. By filling idle moments with a bit of fun, independent of time and place, we add an important dimension to individuals' mobile worlds".(Nokia)

The truth of the matter is that mobile technologies like the ones anticipated above cannot offer large enough displays to support most of today's existing paradigms of entertainment, not to mention audio based entertainment of the current type.

On the other hand, there is an intrinsic advantage in using systems with telephone features as the use of its audio interface is something for which no new skills need to be learned. Old and new metaphors could be recreated through audio based interfaces.

A new paradigm for digital entertainment lays in the waiting requiring a marriage of skills in digital audio signal processing, music and game design. I'm for it...

What are we waiting for?

A number of *old* technologies must mature first for this paradigm to take hold.

- ✓ flexible physical modeling of most musical instruments,
- ✓ voice and sound effects towards a real time and interactive rendition of the gameplay,
- ✓ multilingual speech recognition, computerized speech and source separation,
- ✓ platform and environment independent surround sound specifications,
- ✓ hardware support in handsets

Conclusions

At worst, this project has done little else than criticizing the state of the art in music-based video gaming. Optimistically it has shed some light into the perspectives of a *real* audio-based electronic experience.

The account of early incarnations from music-based videogames was helpful in understanding the limits of the technology and the attempted workarounds at every time. Although just a fraction of the amount of games ever created, perhaps the latest successes might increase the awareness of the music theme, or even better, of what entails good sound quality.

Lots of expectations, ...

Future directions

Besides what is mentioned above regarding audio technologies, the following list describes the necessary steps for this project to bear some fruits:

- ✓ A definition of elements that build a ludic-esthetic metaphor (character, scene, music, diction, thought, plot?)
- ✓ A set of compelling metaphors designed to work solely on audio
- ✓ A formal framework integrating these components into a successful audio-based electronic entertainment system.
- ✓ A proposal for system independent implementation architecture which is scalable and able to integrate currently available technologies
- ✓ A testing environment

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