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A Study of Music Representation Spaces in Virtual Worlds **La música en los mundos inmersivos. Estudio sobre los espacios de representación**

Sites for representing music have been classified by the equipollence between their expressive value and transmission value. In this dialectic game, the media have had a determining influence as an intervening space, from music imagined on the radio to its visual representation on a screen to today's multimodal display created through the integration of current existing media that expand music's potential both in terms of production and consumption. An interest in 'cross-media' is the basis for this research which focuses on its most integrated and interactive aspect: immersive worlds. The aim is to classify the environments of immersive worlds through analyzing those most used as spaces for musical representation. Documentary research techniques have been used in order to obtain: a) a census of current immersive musical environments, and b) a functional analysis of important cases. Through this analysis, various proposals are made for uses for immersive worlds, from both a technical perspective as well as from their potential as an interactive medium. In the conclusion, the possibilities for musical representation offered by these metaverses are assessed and possible future scenarios are discussed.

Los lugares de representación de la música han estado definidos por la equipolencia entre su valor expresivo y su valor de transmisión. En este juego dialéctico comunicativo, los medios de comunicación han jugado un peso determinante como espacios mediados: desde una ensoñación musical radiofónica a una visualización de la representación de la música en la pantalla hasta llegar a una exposición multimodal merced a la integración de los medios existente en la actualidad en donde la música se ha visto amplificada tanto desde su actividad productiva como de su consumo. Es precisamente en este «cruce de medios» donde surge el interés de esta investigación y en concreto en su extensión más integradora e interactiva: los mundos inmersivos. Como objetivo se pretende realizar la caracterización de los entornos inmersivos musicales a partir del análisis de los más utilizados como espacio de representación. La técnica documental ha sido el método usado con el fin de obtener: a) un registro censal de los espacios inmersivos musicales actuales, y b) un análisis funcional de casos significativos. A partir de este análisis se exponen diversas posibilidades de aplicación de los entornos inmersivos tanto desde un punto de vista técnico como desde su capacidad como medio interactivo. Como conclusión se lleva a cabo una evaluación acerca de la oportunidad que estos metaversos ofrecen a la representación musical en la que, en forma de discusión, se plantean nuevos escenarios futuros.

Metaverses, representation, musical, music, cross-media, Second Life, virtual, Internet.
Metaversos, representatividad, musical, música, crossmedia, secondlife, virtual, Internet.

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1. Introduction

It is an axiom to state that music is communicative in nature. Throughout human history sound, as artistic performance, has been of great importance and exerted a vital influence on human beings as a communicative power, regardless of the age, culture or place where it was performed. The communicative value of music has benefited from the arrival of the mass media, particularly in terms of its representational potential. We have progressed from radio, as an imagined musical space, or TV and cinema as ideal locations for visualising musical representation, to the current third phase where this communicative potential has been expanded. The concept of cross-media has transformed and revolutionised all forms of audible representation, making a union between different approaches and the expressive possibilities of music feasible.

The street, the castle, the countryside, the palace, the theatre, café, temple, assembly hall... These are just some of the different places where music has been performed throughout history. Exceptional places for hosting a particular musical sound, a style, a genre, or an instrumental and/or vocal performance defined by the characteristics, fashions and taste of each age and/or people.

Before the arrival of the media, spaces dedicated to musical representation were necessarily places known by the listeners. Music, always performed live, began as a symbolic representation of different societies: a window through which it was possible to see a glimpse of a people's character.

These allegories spread with the arrival of radio, granting music the power of the media, a power which had been growing throughout the 20th and 21st centuries. Music from across the world, classical or modern, performed in familiar and new spaces were all heard from a single audible source: the radio receiver. At the dawn of radio broadcasting, music was transmitted from the traditional locations (theatres, assembly rooms, opera houses etc.). Over time, radio stations began to create new spaces with suitable acoustics which could accommodate different types of music groups. These new representational spaces helped create new types of music that were tailored to the radio stations' characteristics and to listeners' demands, cultivating principals of loyalty at the same time.

This led to the emergence of symphony orchestras specialising in specific genres or styles that were linked to certain radio stations and demonstrated the creativity of new composers of the time, as occurred in the majority of German radio orchestras that specialised in contemporary music (Stuttgart Radio Symphony Orchestra, 1945, Bavarian Radio Symphony Orchestra, 1949, Berlin Radio Symphony Orchestra, 1923, WDR Symphony Orchestra Cologne, 1947). Many of these orchestras, originally linked to private broadcasters, were absorbed by the state, as was the case with the French National Radiobroadcasting Orchestra, known as the French National Orchestra today.

At the same time as these orchestras performing 'highbrow' music were spreading and proliferating, radio broadcasting of folk and popular music also emerged with remarkable force. Popular music differed from folk as it was not linked to a nation or specific ethnic background and was also distinguished by its short and simple compositions performed by musicians without formal studies who found their best allies for broadcasting their music in the mass media.

Musicians of all kinds can find a space of shared interests in radio that will give them the best coverage. The listener, in turn, participates by listening, but his/her perspective is still limited to fantasising about the audible story and imagining the represented place.

As Bertolt Brecht stated, before the arrival of the internet and more interactive media, radio should have two-way communication: «Radio has only one side where it should have two, it could be a true democratic medium where the listener not only listens but speaks; not to isolate him but to connect him» (Brecht, 1932-1981).

2. Background. The screen: an effective space for musical representation

Neither Constantin Perskyi, who coined the term «television» nor Paul Nipkow, inventor of the first ever television set, could have imagined the social impact it was going to have as a means of communication. For over 70 years, since the first television broadcasts made in England in 1936 and later at the New York Universal Exhibition of 1939, television broadcasting has acted as a catalyst for the thoughts, feelings and even likes and pleasures of a vast majority of people around the world.

Television became an extension of what was already occurring on the radio, and for the field of music it was the perfect broadcasting companion: a multi-environment stage capable of reaching millions of seats that could never fit in one theatre, cinema or stadium. Watching a performance of Richard Wagner's *The Ring of the Nibelung*, going to a Beatles concert or seeing the gestures and movements of a belly-dancer are just a few examples of musical representation that can be enjoyed on television, a medium that rises up like an international skyscraper housing different genres and musical styles alongside each other: modern groups and classical orchestras, the highbrow and the popular, Carnival and Lent.

Since then, television, in all its formats, variants and technological changes, has been an essential exponent of music in its various manifestations and representational forms (the Eurovision channel was created in 1953

using microwave transmission to exchange information and programming between European television stations. Satellite links arrived in 1960, leading to the creation of Mundovision. Teletext and stereo emerged in the 1980s and high definition was introduced at the beginning of the 1990s and is still being developed today, the age of digital television).

Despite this, television finds itself in the same situation as radio: its one-way nature means that real interaction is impossible. Negroponete stated that «we need to stop thinking about television as «television», its future is on the computer: [...] Television will benefit most if it is considered in terms of bits... The television of the future will be the PC.» (Negroponete, 1995:67).

The term cross-media refers to the integrated nature of each and every type of media which, like an ecosystem, make the worldwide multimedia representation and broadcasting of music possible. Cross-media expands the potential of musical representation even further. Technological advances and developments have made this situation viable, whereby WebTV, SMS messages, mobile phones, the iPod, videogames or digital radio have become an intervening spider's web that connects and traps the user, regardless of the media being used.

This media convergence has not displaced any individual elements because media vary and audiences and social status changes; if a medium has functional expressiveness, makes a connection and creates practicable communication; it survives independently of the rest, as can be proved by the endurance of sound and voice recording (Piscatelli, 2004). In fact, completely the reverse is true; the convergence has strengthened the potential of each individual element, each of which has changed and adapted to the whole, creating a web of multimodal diversity, for example: podcasts, videos, twitsessions (which permit the user to attend concerts as a spectator in real time, directly interacting with the artists, requesting songs, sending greetings etc. (www.twitsessions.com)), web portals dedicated to re-broadcasting live concerts (e.g. Central Musical (www.central-musical.com) where concerts are re-broadcast from various venues around Spain, el musikazuzenean (www.musikazuzenean.com), a website aimed at live music from the Basque Country or the Galician network of live music (www.clubtura.com)), social networking sites that promote live music such as NVIVO (www.nvivo.es) which has more than 280,000 concerts stored in its database covering styles as varied as rock, pop, hardcore, drum and bass, hip-hop, ska, heavy metal, techno, dub, flamenco etc. and is accessed by 250,000 registered users.

3. Study and analysis of musical representation in immersive worlds

In general, interactive media have different degrees of digital immersion. The experience is based on different strategies that combine transnational, symbolic and sensorial factors. Studies have shown that immersion in a digital environment improves learning in at least three ways: multiple perspectives, situational learning and transferral.

The user's experience in virtual immersive worlds is far better when they become actors performing on a stage. The imagination occupies the place of physical reality, demonstrating its use in the ways different immersive environments are accessed. They help «the relationship between the real and the imaginary by creating something new where problems can be solved; they work as a channelling element that develops the abilities to think and create that are so important for the acquisition of musical skills» (Gértrudix & Gértrudix, 2011: 51).

3.1. Characteristics and classification of immersive environments

As Manrique states, a virtual world is an environment simulated by a computer, inhabited by users represented by avatars. Avatars are considered to be the representation of the user on the computer, are generally three-dimensional and are used as an icon in any public internet space. They live in a real or fantasy world with existing or invented rules, some of which have their own economy (Manrique, 2009).

The following series of characteristics or identifying qualities are common to all virtual worlds: a) Shared space, b) Each participant has a user's graphic interface, c) A sense of immediacy as everything takes place in real time, d) The high level of interactivity that allows the user to continuously construct, regulate, recreate, change and inform personalised content, e) Persistency: the world continues even if you are not connected, and f) Socialization and community: interest-based communities organised around content and/or information.

One of the problems when trying to analyse this type of environment is the sheer number of classifications that have emerged since the birth of these worlds. Initials such as MOO (Object-orientated text-based virtual world that uses a chat application), MUD, TinyMUD, IRC (Internet Relay Chat), VR (Virtual Reality), VRML (Virtual Reality Modelling Language) all refer to the definition of their multiuser virtual environment characteristic.

Virtual worlds were studied from Alan Klietz's Wizard, the first MUD, considered to be the first internet multiuser game, to the foundation of the first social network, known as 'TinyMUD', by Jim Apnes in 1989 (Bruckman, 1997), to the latest immersive environments established in the Second Life metaverse, using the

following classifications a) the nature of access or ownership, with open or private code, or worlds that are designed in private environments but with free access (e.g. Second Life), b) the way the multimedia digital content unfolds, whether it uses web navigators or 3D animation motors, c) the capacity for interaction with other services such as social networks (Facebook, Twitter) or through another content management system (CMS, Moodle) and d) the environment's final design, from an 8-bit poetic narrative to the most sophisticated 3D design.

3.2. Second Life and other metaverses

Experiencing music in immersive virtual worlds is on the increase. Second Life is a platform hosting multiple virtual worlds with a proliferation of environments (more than 3,500) in which the main content is music, particularly live concerts given by amateur and professional musicians who perform their songs from their own computer and even earn money for doing so (in August 2006 Suzanne Vega became the first artist to sing in a virtual concert). Financial transactions on Second Life in the first quarter of 2009 «reached over 120 million dollars, connection totalled 124 million hours and there was a peak attendance of 88,200 users» (Álvarez García, 2010: 320).

From nightlife venues (bars and pubs) to locations themed around different musical styles and genres, to places dedicated to learning music, users of this metaverse can find a significant amount of options to enjoy a music-orientated experience.

Within Second Life, live performances are classified by the following seven categories: 1) spoken word (poetry, fiction or other reading), 2) live performance artists or musicians (singers/instrumental musicians with or without backing tracks, 3) theatrical representation (plays, dramatic productions), 4) dance, 4) DJ/Scratch, 6) Stand-up comedy, and 7) digital improvisation.

By examining the characteristics of each different environment it is possible to see a clear trend towards those musical genres related to popular music. This situation can also be seen in the Second Life directory where 144 music locations are distributed as follows: 25 live music (see Table 1), 9 cafés and cabarets, 6 folk music, 27 electronic and dance music, 5 hip-hop, R&B and reggae, 7 indie and alternative, 24 blues and jazz, 17 pop and 14 heavy metal. There is only one space dedicated to classical music: Music Island.

On top of this universe of events can be added live festivals with multimedia connections (e.g. Moebius Surfing Festival) or steamed performances by live groups as highly acclaimed as AC/DC, the Rolling Stones or Pink Floyd.

One problem with this type of music event lies in the limited number of participants, as attendance by over twenty spectators dramatically reduces output producing large audio and visual delays for viewers. An immersive musical space called «Reslive» was created in August 2010 which has partially solved this issue; it can support 150 avatars at the same time and, even with a system making copies of the virtual world, could have the capacity to host up to 5,000 attendees of the same show.

Besides these virtual worlds, a metaverse was created in September 2008 that tries to create mirror worlds that are exact copies of real cities. This immersive 3D medium has been named 'Twinity'.

To date, the cities that have been constructed are: Berlin (September 2008), Singapore (August 2009), London (December 2009), Miami (July 2010) and most recently New York, in October 2010. Among the many different events on offer are live performances by DJs that have been held every Tuesday since February 2010. Everything is run from inside Twinity, from the creation of an avatar to website promotion on Myspace or Metalabel.

Classical music has also been represented, to a lesser degree, by periodical events in immersive environments. There has been the odd isolated concert, as way of an experiment, such as that given by the Royal Liverpool Philharmonic Orchestra in a virtual replica of its concert hall where attendees could chat with the conductor in a virtual bar after the concert.

Mention must also be made of the Music Academy Inworld, a platform within Second Life. It is an interactive 3D environment that aims to generate interest in classical music on all levels, including music education, music appreciation and particularly the promotion of new music and new composers. The island has museums, interactive exhibitions, audio-visual classrooms, conference halls, projection rooms and an open space for concerts where a variety of activities take place such as concerts, recitals, conference and private classes. The space is located in the Second Life Utwig Sim and, since its creation in 2008, has run different events revolving around musical representation, including highlights such as: a Gustav Mahler festival, attended by 1,000 spectators, yearly Two Worlds festivals which last for nine days and focus on different themes related to virtual worlds and their potential for furthering knowledge about classical music or the introduction of a new artist, and collaborative projects with real concert halls to transmit live concerts etc.

4. Applications and musical uses of metaverses

This study has explained how wavelengths helped create an imaginary space of musical representation and how this proved to be a revolution in terms of communication and awareness of previously unknown sounds.

Secondly, how television projected this imagination towards a visualization of the audible space and finally, how today cross-media is helping to make music broadcasting more dynamic with more opportunities thanks to the extensive availability of connected media.

Immersive worlds have become a unique platform of opportunities for musical representation; one more step in the «panoply of media that shape the contemporary spectrum of social communication, this never-ending flow of media-based texts that flood our reality» (Gértrudix & Gértrudix, 2010: 102). These are Invented worlds, semi-impossible places to perform music, such as under the sea in the submerged world of Oceanus, in the sky (Skytage) on top of a mountain, or in worlds that mirror real places (cities, theatres, stadiums, concert halls etc.).

The musical experience is a constant feature of immersive environments and Second Life, with more than 10 million inhabitants, has become the most popular metaverse in recent years and continues to grow. In contrast with other metaverses, it is entirely at users' disposal and it is they who create and own all of the content.

There are other coexisting virtual worlds which also have musical representation as one of their underlying principals, including Worlds.com, There.com (similar to Second Life but aimed at adolescents), Multiverse, Virtual Vancouver, Entropia Universe, Active Worlds, the Metaverse free code platform. In Worlds.com, acclaimed artists such as David Bowie and Aerosmith have developed interactive, immersive environments specifically for their fans. Aerosmith, for example, have built a futuristic city, an exotic temple, a roadside restaurant and a stage for their concerts.

It is also important to understand exactly who the target users are who live and cohabit in these immersive environments. According to Alfonse González, in demographic terms, 26% of Second Life inhabitants are young people between 18-24 years of age, 38% are between 25-34, 22% are between 35-44 and the remaining 12% are over 45. Approximately 25% of Second Life gamers are women. The 'typical' Second Life gamer spends between 20 and 40 hours a week on the game. It certainly seems that it is the first successful example of what futurists have called 'metaverses', or «virtual worlds inhabited by real people» (González Herrero, 2010: 122).

5. Conclusions. Speculating on a possible future

«The Internet is constructing the world, not only by being mimetic in nature, but through the possibilities of fictionalising life itself. [...] In the metaphor of virtual worlds [...], the Internet is not a second life, it is a fiction of life, but not even this lessens the implications of its irremediable connection with reality» (García García & Gértrudix Barrio, 2009). We agree with Francisco García and Manuel Gértrudix on the postulated metaphor existing in immersive worlds. This condition is increasingly emphasised due to ever more perfect technology and advances to the immersive element which permits the user to interact with the machine without the need for physical contact through a keyboard, mouse or traditional videogame controls. The body's own movements, the use of voice to send messages and even eye movements are the best (natural) extensions when interacting with a virtual world: body movements and/or voice instructions that translate into actions and movements in the avatar within the metaverse. The user's experience becomes far more seductive and accessibility greater due to this inclusive interaction.

A good example is Nintendo who introduced the Wii into the market, although a set is still required in order to interact. Microsoft have followed their lead with Kinect, a free game and entertainment device that recognises gestures, voice commands, objects and images through a natural user interface. Tests using Kinect within Second Life have already been run. The University of South California Institute for Creative Technologies has made it functional within the metaverse and currently any user that has a Microsoft set can use it within Second Life's virtual worlds, thanks to the advantages of OpenNI technology.

This is a key technological advance for musicians. That the hand and finger movements of a violinist, or a pianist, or the movements of an orchestra conductor could be made real in time and appearance has positive repercussions not only for the specific needs of musical representation but also heralds positive effects on the teaching-learning process, on creation or on music consumption, all thanks to this optimum immersion level. Immersion is both visual and aural, in 3D and surround sound, achieving a completely personalised audible experience.

Immersive media are the ultimate showcase for musical representation. However, this is merely the beginning; in the future present the search for solutions has not finished. Technological advances will help develop new but ever-changing strategies.

Terrestrial digital media will tend towards absorption and/or disappearance in favour of dynamic internet communication that will be selected and analysed by the user. The arrival of devices that affect all of the senses (including touch and smell) will help the experience be even more inclusive. It will be possible to share memories, experiences and feelings with other avatars in virtual worlds.

Predictions for immersive virtual worlds suggest dramatic, exponential growth. The number of users in 2013 has been predicted to reach 1,900 million (33% of the world population), meaning that one in three people

will have a virtual world avatar. This figure almost exactly matches predictions made by consultancy IDATE that the internet mobile phone penetration rate will be 37% of the world population.

Proportionally, this suggests that the number of immersive worlds dedicated to music will grow and therefore the possibilities for its representation will grow too. Furthermore, today it is a fact that any user is a potential 'prosumer' and actual consumer, so in the sphere of music he/she becomes a performer (whether by dancing, singing or playing) and spectator at the same time.

In this positive future there is no space for creative individuals but, given that all music «is immediately accessible, what is new in the behaviour of its consumers is, among other things, how they use it for identity itself, although not in an individual, exclusive way, but one negotiated with the rest of the virtual community through social networking (Aguilera, Adell & Borges, 2010: 43). As many voices predict, the experience will be the new reality. Then we will venture to dream.

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