

# A Virtual Reality Prototype for Evaluating Emotion Induced by Poetry and Ambient Electronic Music

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**Abstract:** Music and poetry evoke emotion. The neural correlates of emotion are not well known but constitute a growing research field in neuroscience. Using brain imaging techniques, emotion elicited by music has been addressed by several laboratories. However, most studies are focused on classical music. Surprisingly, ambient electronic music, which possesses the aesthetic characteristics prone to evoke auto-memories and emotion, has not been evaluated, and only a few studies are available regarding poetry. In the last years, virtual reality (VR) has become a powerful tool to elicit and enhance emotions, since this technology immerses the user in a three-dimensional environment, increasing the sense of presence. In this work we describe a VR prototype which combines ambient electronic music and poetry, as a preliminary step in our project to address the neural correlates of emotion and self-awareness evoked by these arts.

## 1 INTRODUCTION

Music, like poetry, is an exclusively human phenomenon, present in all cultures. The aesthetic experience of music and poetry, separate or in combination, evokes emotion.

Neural basis of human emotion is still poorly understood, despite constituting a relevant research field in neuroscience. Non-invasive functional imaging techniques such as electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) are applied to study complex brain processes, including memory, problem solving, planning, decision making, language, abstract reasoning, or emotion.


Using these techniques, several works have shown that listening to pleasant music involves the activation of the mesolimbic system (i.e., the reward brain system), the auditory cortex (related to auditory memory), and the default mode network (DMN), a network of brain regions active during mind-wandering (Troost et al., 2012; Wilkins et al., 2014).


Most of the data available on music-elicited emotion refers to classical music. Curiously, and despite the relevance of electronic music in the

musical panorama since the appearance of the first commercial synthesizers in the late 60s and early 70s, very few brain imaging studies have paid attention to this type of music (Aparicio-Terrés et al., 2024).

Electronic music encompasses a large and varied number of musical genres, including popular styles (breakbeat, EDM, techno, trance, house, dance, dubstep, among others) and more experimental forms, such as ambient music. In the context of emotion and self-awareness, ambient music is particularly interesting due to its timbral and “atmospheric” characteristics.

Regarding poetry, only a few neuroimaging studies have been carried out. They have been focused on some aspects of the poetic language, on the neural correlates of perceived literariness in poetry as compared to prose, or on the brain mechanisms involved in poetry composition (Gao & Guo, 2018; Liu et al., 2015; O’Sullivan et al., 2015). The emotional effect of poetic language and its associated aesthetic value has been studied (Wassiliwizky et al., 2017), and fMRI has shown the activation of brain areas belonging to the primary reward circuit. An important limitation in the study of emotions in general, and the emotions evoked by

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music in particular, is that in most published works the stimuli are presented to the subjects in a passive, non-immersive way. However, it is well known that emotions are elicited much more effectively when real experiences are simulated (Chirico et al., 2017; Riva et al., 2007). Virtual reality (VR) constitutes a new powerful tool for experiencing deep impact sensations and emotions in a multisensorial and interactive way. Thus, in recent years, VR has become a powerful tool for researching in the context of behavior and emotions both from the perspective of psychology and neuroscience.

**VR and Poetry.** VR environments, when used to enhance experiences related to poetry, allow artist to abandon the restrictive two-dimensional space of written words and enter in a new 3D environment where anything can exist. However, the limited number of existing experiences are not interactive and mainly consist of 360° videos (MDB, 2024). Another different use of VR in poetry is the virtual events hosted in social platforms (*Poetry & Virtual Reality: A Curious Combo. Does It Work? - YouTube*, n.d.) where the users can interact with their avatars. This use constitutes a new opportunity to gather people no matter their real location.

**VR and Electronic Music.** The integration of electronic music and VR has been addressed in different ways. For instance, Virtual Reality Musical Instruments are used to create and play music in virtual environments taking advantage of the interactions and 3D space (Serafin et al., 2016). Another case of use is virtual concerts that offer a high level of presence. And high level of engagement as the user becomes an active agent in the experience (Onderdijk et al., 2023), (*Sansar | Events*, n.d.; *Wave | The Show Must Go Beyond.*, n.d.). When talking about electronic music generation, several tools have been proposed in the past. *Virtuoso* (Serafin et al., 2016), is a 3D studio that offers six virtual instruments. Another VR tool is *GENESIS-RT* (Leonard et al., 2014), a platform that allows users to create instruments and interact with sound objects. However, the study of electronic music mechanisms of emotion induction is a recently opened and promising research field. For instance, it is known that VR combined with electronic music induces positive, negative and neutral emotions in a more effective way improving the quality of performance of several singers (Zhang et al., 2021). Moreover, several studies based on EEG have been developed in the past showing a promising way of understanding music-induced emotions (Su et al., 2024). State of the art literature suggests that VR combined with electronic music produces a complex effect that

involves sensory immersion, neural activation and emotion induction, that could be utilized in artistic applications, medicine, psychology, etc.

**VR, Poetry and Electronic Music.** Considering this, the combination of electronic music, poetry and VR is expected to produce a high impacting experience that will improve the sensations experienced by users with poetry or music by themselves. The uncounted opportunities that appear with this combination, overcome the difficulties of artistic expression, offering a multisensorial impressive experience.

We are interested in analyzing the neural correlates of emotion and consciousness (in particular self-awareness) elicited by ambient music and poetry, by using EEG to register changes in brain activity. As a preliminary step, here we present a VR prototype which combines both elements in a virtual scenario specially designed to enhance the emotional response to the particular music and poems used in this art experience.

## 2 MUSIC, POETRY, EMOTION AND CONSCIOUSNESS

### 2.1 Brain Regions Activated in Response to Music Listening

Based on the detection of changes in hemoglobin oxygenation or BOLD signal (blood-oxygen-level-dependent signal), fMRI makes it possible to identify the brain regions that are activated in a given task. When no specific task is performed, several resting state networks have been described (Greicius et al., 2003). Among them, the default mode network is particularly interesting. The DMN encompasses a set of functionally interconnected brain regions that are deactivated when attention is focused on external stimuli but are consistently activated when the mind is focused on introspective or creative thinking, when personal experiences are remembered, or when the individual is imagining the future. Therefore, in the last 20 years, numerous studies have evaluated the role of the DMN in self-awareness and the construction of a sense of self (for a recent review see Menon, 2023).

The DMN includes cortical regions such as the posterior cingulate cortex (PCC), retrosplenial cortex (RSC), medial prefrontal cortex (mPFC), anterior temporal cortex (ATC), middle temporal gyrus (MTG), medial temporal lobe (MTL), and angular gyrus (AG). Subcortical nodes include the anterior

and mediodorsal thalamic nuclei, medial septal nuclei, and nucleus accumbens.

Interestingly, preferred music enhances DMN connectivity, while the precuneus is relatively isolated from the rest of the DMN when listening to disliked music (Wilkins et al., 2014). Favorite songs influence auditory cortex-hippocampus connectivity, linked to memory, and activate the mesolimbic reward system, releasing dopamine in the caudate and nucleus accumbens (Salimpoor et al., 2011). Finally, sad music, compared to happy music, fosters stronger mind-wandering and greater DMN node centrality (Taruffi et al., 2017).

In summary, these works show that preferred and/or sad music, engages brain circuits involved in memory, pleasure, and self-awareness.

## 2.2 Evaluation of Music-Evoked Emotion: The Geneva Emotional Music Scale (GEMS)

From a psychophysiological point of view, emotions are usually classified and quantified using a two-dimensional valence-arousal space (Russell, 1980). This 2D model is extensively used in EEG and/or fMRI analyses of emotion recognition and classification. However, most of these neuroimaging studies use visual stimuli to induce emotions. Emotions elicited by music seems to be different from those produced by other types of stimuli, as they are not behavioural-oriented or adaptive (Scherer, 2004). Hence, a more appropriate psychological model has been proposed for their assessment (Strauss et al., 2024; Trost et al., 2012; Zentner et al., 2008), named GEMS (Geneva Emotional Music Scale), in which 9 dimensions of emotion are proposed (Table 1).

Table 1: Dimensions of the Geneva Emotional Music Scale (GEMS).

GEM Dimension	Description
Sadness	Sad, sorrowful
Tension	Agitated, nervous
Power	Strong, triumphant
Joy	Joyful, amused
Peacefulness	Calm, meditative
Tenderness	In love, tender
Nostalgia	Sentimental, dreamy
Transcendence	Fascinated, overwhelmed
Wonder	Dazzled, moved

Using fMRI, the regions that are activated for classical music excerpts belonging to each of the 9 dimensions of the GEMS model have been identified (Trost et al., 2012). Interestingly, it was observed that the dimensions considered as “low arousal”

(tenderness, peacefulness, transcendence, nostalgia and sadness) activated a brain network centered in regions of the hippocampus and the vmPFC, including the subgenual anterior cingulate cortex. This study corroborates the relevance of memory and the DMN in the processing of this type of music, which would be more related to introspection, autobiographical memories and emotion regulation (Trost et al., 2012).

EMMA is a database containing hundreds of music excerpts from different genres, representative of the nine GEMS emotion categories (Strauss et al., 2024), and it is available at <https://musemap-tools.uibk.ac.at/emma>. Although EMMA database contains some electronic music excerpts, no ambient electronic music is included, which is understandable, since electronic music encompasses a large number of different genres.

## 2.3 Ambient Electronic Music

Considering the GEMS model, ambient electronic music (which can be considered as “low arousal”) could be a particularly interesting candidate in the context of introspection and self-awareness, compared to other types of electronic music in which the rhythmic component is predominant, such as EDM, dance, techno, drum and bass or trance.

Ambient music is a type of minimalist instrumental electronic music, which is characterized by a predominance of drone-type sounds, and a special relevance of the sound textures and the atmosphere they generate, as opposed to pop, rock or classical music, where there is a focus on melody, harmony and rhythms. Sometimes ambient music also includes nature sounds, along with pad-type synthesis sounds. Frequently, there is a gradual exploration of timbre, and notes or chords are maintained over time, changing their harmonic content by using filters, and introducing additional sound layers. The harmonic progression is minimal, and sound effects such as reverb or delay are frequently used to collaborate in the generation of a soundscape.

## 2.4 Poetry and Neural Correlates

As mentioned in the Introduction section, data on the neural correlates of poetry listening are scarce. Using fMRI, it has been shown that the caudate nucleus, the putamen, the mediodorsal thalamus, the nucleus accumbens and the anterior insula are activated by listening to recorded poems (Wassiliwizky et al., 2017).

Another recent study compares not listening but reading Chinese poetry versus prose and highlights the importance of the left inferior orbitofrontal cortex (OFC) and the bilateral insula as aesthetic pleasure centers, relevant for the appreciation of the poetry beauty (Gao & Guo, 2018).

### 3 VR PROTOTYPE DESCRIPTION

VR is a powerful tool to elicit and enhance emotions, since this technology increases the sense of presence by immersing the user in a three-dimensional environment. As mentioned before, we are interested in the neural correlates of emotion and the sense of self evoked by ambient electronic music and poetry. Here we present a VR prototype, that can be used in combination of EEG, specifically designed to enhance the experience of listening to a particular set of poems and electronic music (see Appendix).

#### 3.1 Concept and Objectives

The proposed VR experience, combines VR, electronic music and poetry to elicit impressive emotions in the user. Taking advantage of the key aspects of these forms of expression (sense of presence, interactivity, immersion and neural responses to music and poetry), the experience aims to break the traditional limits of art. The primary objective is to study the brain response of users to a sequence of interactive visual and auditive stimuli specifically designed to induce emotions on them. The experience constitutes a journey that guides the users from their inner self to a fragile world of poetry, finishing with the immersion in a poem related to dead, from the book “Dressed in clay” (Appendix).

#### 3.2 the Narrative of the Experience

The experience unfolds through four interconnected scenes.

##### 3.2.1 Scene 1. Inner World

- Purpose. This scene purpose is to focus the users on the experience forgetting about the exterior, while getting used to the head set and hands tracking system.
- Design. It has a minimalistic design to not overwhelm the users and focus their attention on several specific objects as depicted in Figure 1 (a).

- Technical elements. We have added 3D audio (a low frequency heartbeat), a spatial audio sound area with high echo effect and simple but effective visuals.

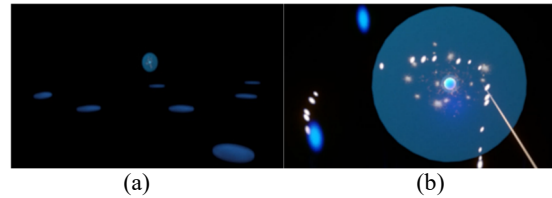


Figure 1: Inner world. Teleportation areas (a) let the users to reach the magic sphere (b).

The teleportation areas glow blue with a magic ring effect. The main object of the scene is a glowing sphere with particle effects within it, shown in Figure 1 (b). The teleporting and object interaction is driven by hand recognition, eliminating the need of controllers that could interfere with the artistic nature of the experience. The colour palette is black and blue to emphasize the intimate and magic feeling of the scene.

- Narrative intention. To prepare users to the upcoming revealing of the poetry clay world, with the subsequent deeper engagement.

##### 3.2.2 Scene 2. Fragility

- Transition. Triggered with the interaction with the glowing sphere. A clay landscape of mountains and craters gradually appears, Figure 2 (a), with synchronized lighting and sky adjustments.
- Purpose. To improve the engagement level to its highest peak before entering the main part of the experience.
- Design. A yellow, white and orange landscape of mountains and craters inspired in the book cover, Figure 2 (b).
- Technical elements. Several particle systems and visual graphs effects, spatial audio and shaders animation. The user can teleport and interact with objects made with clay such as masks, hands or faces, activating the corresponding animation. This environment has been specifically designed to follow the look of the book and, therefore, the colour palette is orange, yellow and white.
- Narrative intention. The role of this scene in this narrative is to express the book’s central theme, the fragility of the users, just like covered with a thin clay layer, while serving as a bridge between the abstract initial scene to the tangible manifestation of thoughts or dreams.

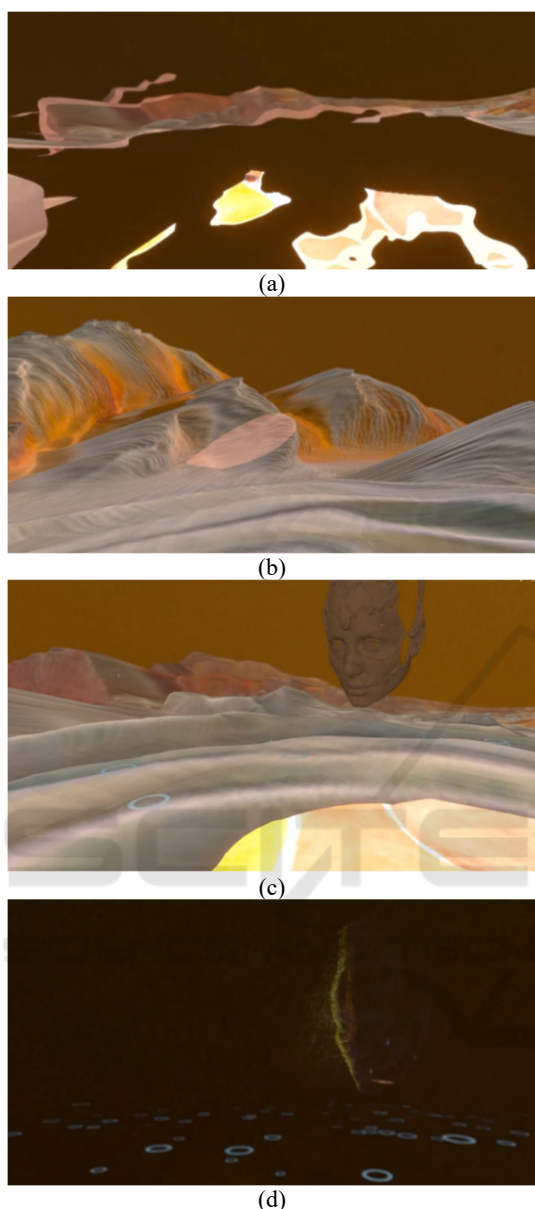


Figure 2: Fragility. The scenario’s shader allows the environment to appear smoothly (a) like a thin layer. The look of the scene is inspired in the book cover (b). There are several interactive objects, here “Soulless” by Ali Rahimi, (Sketchfab, n.d.), made of clay (c) that finally vanish with the rain (d).

### 3.2.3 Scene 3. Wooden Box

- Transition. Rain begins to fall with the subsequent dissolution of objects and environment. The fragile layer of clay disappears, making way to a new dark environment with a key centre object: a coffin. A voice recites a poem while electronic music, specifically composed to intensify the feeling of the poem, is played.

- Purpose. This scene is the main one where the emotion induction measures will take place.
- Design. A dark scene with a coffin as the key central object, Figure 3 (a).
- Technical elements. Synchronization of lights with music through the audio spectrum analysis with the Fast Fourier Transform. This rhythmic flickering allows for the study of potential psychedelic effects, Signed Distant Field effects, Figure 3 (a) and (b), sound area, hand-tracking.
- Narrative intention. The elicitation of intense emotions related to the poem’s theme.

### 3.2.4 Scene 4. end

- Transition. The coffin ends filled up with abstract “worms” as the poems ends. The book title appears and a fade in black transports the user into the mountain landscape again.
- Purpose. To give the option to the user of restarting, quitting the application or perform a survey.

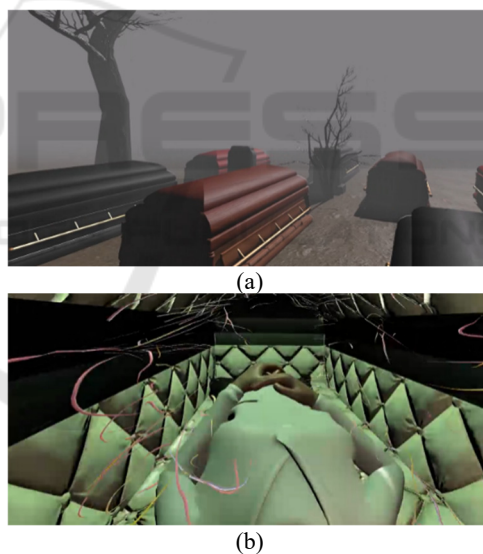


Figure 3: Wooden box. The central element is a coffin (a), that is gradually filled up with abstract lines while lights flicker synchronized with music (b).

- Design. The scenario is the same of Scene 2.
- Technical elements. UI canvas, Figure 4 (a), three questionnaires to assess the quality of the experience based on VR software toolkit (VRSTK), Figure 4 (b). Two of them are focused on the quality of the experience (QoE) itself and the third one evaluates specifically the emotions experienced. This one has been specifically designed for this application.

- Narrative intention. The conclusion of the emotional journey.

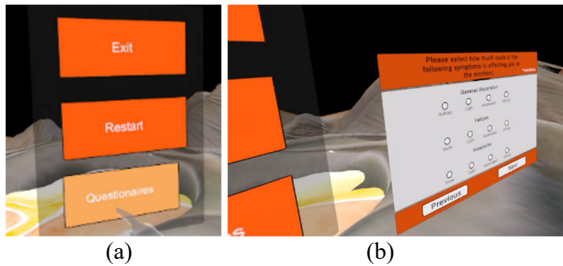


Figure 4: End. The users return to the landscape of scene 2 where the application can be exited or repeated (a). Moreover, VRSTK questionnaires could be presented to the user (b).

### 3.3 Technical Innovation

The presented VR environment enhances user experience through several technical innovations:

- Hand tracking. The experience eliminates the need for traditional controllers allowing users to interact with their own hands, Figure 5. This approach enhances sense of presence and immersion avoiding the use of a second layer between users and application.

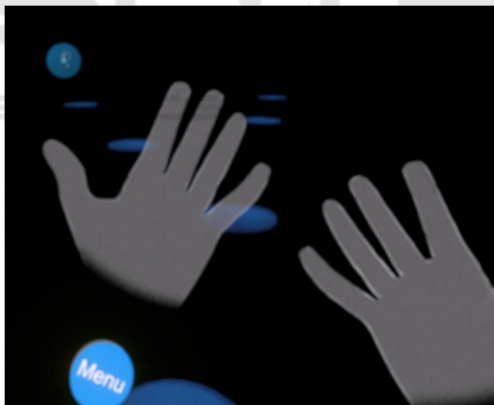


Figure 5: The experience uses a hand tracking system instead of traditional controllers.

- OpenXR. The experience is developed with OpenXR and therefore it is compatible with many available headsets. This choice eliminates hardware dependencies.
- AI-personalized environments. The use of generative AI has led to a completely personalized experience, due to use of customized environments that align perfectly well with the artistic theme of the experience while saving developing time.

- VRSTK integration. To assess the quality of the experience and the emotional responses elicited, VRSTK has been used, Figure 4 (b). VRSTK is an open-source software toolkit that provides prefabs for Unity to implement questionnaires within VR applications to obtain users evaluation seamlessly, without breaking users immersion. QoE questionnaires are “Simulation Sickness Questionary” and “Uncanny Valley Questionary”. Using VRSTK, all questionnaire responses are automatically stored and exported as structured CSV files. This capability allows for systematic post-experience data analysis, ensuring reproducibility and facilitating correlations between subjective user feedback and external measures such as EEG signals or physiological responses.
- Real-time synchronization of visual effects and audio. A dynamic synchronization system adjusts visual effects like particle systems or lighting in real-time, based on audio stimuli.

### 3.4 Used Tools

- Unity 6 0.25.f1 (*Unity Technologies*, n.d.). The main software tool for developing the experience VR systems, interactivity, synchronization, visual and audio effects, etc.
- 3ds Max 2025 (*Autodesk*, n.d.) for object modelling and refining.
- Blender 3.1.0 (*Blender*, n.d.) for scenario modelling and texture image mapping.
- Dall-E. AI (*DALL·E 3 | OpenAI*, n.d.). Tool used for the generation of base maps in the creation of materials realistic and customized
- Audacity (*Audacity*®). For audio edition to process sound effects and music to achieve a high level of emotion induction
- Gimp (*GIMP*, n.d.). For image editing tasks, including base map adjustments or creation of normal map.
- Zoe depth (Bhat et al., 2023). To generate the environment from images

Several objects, effects or sound have been obtained, as well, from:

- Unity asset store, (*Unity Asset Store*, n.d.): “3D Modern Menu UI” by SlimUI, “Coffin Royale” by @PaulosCreations, “Free Sound Effects Pack” by Olivier Girardot, “Magic Effects” by HOVL Studios, “Nature Sound FX” by Lumino, “PowerUp Particles” by MHLAB and “Stone Graves” by Sephtis Von Kain. All these

models are under the Standard Unity Asset Store EULA.

- Sketchfab, (*Sketchfab*, n.d.): "Hand animation test", by GabrielNeias, "Soulless" by Ali Rahimi. Both models are licensed under Creative Commons Attribution (<http://creativecommons.org/licenses/by/4.0/>).
- Pixabay (*Pixabay*, n.d.), Mixamo (*Mixamo*, n.d.), Freesound (*Freesound*, n.d.) and Polyhaven (*Textures • Poly Haven*, n.d.).

## 4 CONCLUSIONS

In this paper VR experience that combines poetry and electronic music has been presented. On one hand, this tool constitutes an innovative way to express poetry and intensify the emotions in the users. On the other hand, this tool is a technical element that will let experiments about, electronic music mechanisms of emotion induction or psychedelic effects caused by light flickering. The tool is not designed for any specific headset and do not need the use of controls, due to the hand tracking system. Shader graphs, visual effects, particles systems and light and audio synchronization work together to make the experience impressive and engaging, with a high level of immersion and sense of presence. The experience is interactive, letting the users to interact with objects, trigger transitions or changing visual and audio effects. The narrative and visual design has been carefully performed to add realism and details to the experience. Another advantage is the possibility of take questionnaires seamless inside the experience eliminating the effect of environment awareness inherent to traditional surveys. In addition, data from users is real time stored. Future work will focus on gather users' data, including EEG signals that will be further analysed and processed to find patterns that could help in the search of electronic music emotion induction mechanisms.

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## REFERENCES

- Aparicio-Terrés, R., López-Mochales, S., Díaz-Andreu, M., & Escera, C. (2024). *Assessing the relationship between neural entrainment and altered states of consciousness induced by electronic music*. bioRxiv. <https://doi.org/10.1101/2024.01.16.575849>
- Audacity® | *Free Audio editor, recorder, music making and more!* (n.d.). Retrieved December 15, 2024, from <https://www.audacityteam.org/>
- Autodesk. (n.d.). Retrieved January 12, 2025, from <https://www.autodesk.com/es>
- Bhat, S. F., Birkl, R., Wofk, D., Wonka, P., & Müller, M. (2023). *ZoeDepth: Zero-shot Transfer by Combining Relative and Metric Depth*. <https://arxiv.org/abs/2302.12288v1>
- Blender. (n.d.). Retrieved January 12, 2025, from <https://www.blender.org/>
- Chirico, A., Cipresso, P., Yaden, D. B., Biassoni, F., Riva, G., & Gaggioli, A. (2017). Effectiveness of Immersive Videos in Inducing Awe: An Experimental Study. *Scientific Reports*, 7(1), 1218. <https://doi.org/10.1038/s41598-017-01242-0>
- DALL-E 3 | *OpenAI*. (n.d.). Retrieved December 15, 2024, from <https://openai.com/index/dall-e-3/>
- Freesound. (n.d.). Retrieved January 12, 2025, from <https://freesound.org/>
- Gao, C., & Guo, C. (2018). The Experience of Beauty of Chinese Poetry and Its Neural Substrates. *Frontiers in Psychology*, 9, 1540. <https://doi.org/10.3389/fpsyg.2018.01540>
- GIMP. (n.d.). Retrieved December 20, 2024, from <https://www.gimp.org/>
- Greicius, M. D., Krasnow, B., Reiss, A. L., & Menon, V. (2003). Functional connectivity in the resting brain: a network analysis of the default mode hypothesis. *Proceedings of the National Academy of Sciences of the United States of America*, 100(1), 253–258. <https://doi.org/10.1073/pnas.0135058100>
- Leonard, J., Cadoz, C., Castagne, N., Florens, J. L., & Luciani, A. (2014). A virtual reality platform for musical creation: Genesis-RT. In: Aramaki, M., Derrien, O., Kronland-Martinet, R., Ystad, S. (eds) *Sound, Music, and Motion*. CMMR 2013. Lecture Notes in Computer Science, vol 8905. Springer, Cham. [https://doi.org/10.1007/978-3-319-12976-1\\_22](https://doi.org/10.1007/978-3-319-12976-1_22)
- Liu, S., Erkkinen, M. G., Healey, M. L., Xu, Y., Swett, K. E., Chow, H. M., & Braun, A. R. (2015). Brain activity and connectivity during poetry composition: Toward a multidimensional model of the creative process. *Human Brain Mapping*, 36(9), 3351–3372. <https://doi.org/10.1002/HBM.22849>
- MDB. (2024). *Empire Soldiers, a VR experience about WWI*. <https://www.mbd.limited/mbd-projects/empire-soldiers>
- Menon, V. (2023). 20 years of the default mode network: A review and synthesis. *Neuron*, 111(16), 2469–2487. <https://doi.org/10.1016/j.neuron.2023.04.023>
- Mixamo. (n.d.). Retrieved January 12, 2025, from <https://www.mixamo.com/#/>

- Onderdijk, K. E., Bouckaert, L., Van Dyck, E., & Maes, P. J. (2023). Concert experiences in virtual reality environments. *Virtual Reality*, 27(3), 2383–2396. <https://doi.org/10.1007/S10055-023-00814-Y>
- O’Sullivan, N., Davis, P., Billington, J., Gonzalez-Diaz, V., & Corcoran, R. (2015). “Shall I compare thee”: The neural basis of literary awareness, and its benefits to cognition. *Cortex; a Journal Devoted to the Study of the Nervous System and Behavior*, 73, 144–157. <https://doi.org/10.1016/j.cortex.2015.08.014>
- Pixabay. (n.d.). Retrieved December 20, 2024, from <https://pixabay.com/>
- Poetry & Virtual Reality: A Curious Combo. Does it Work? - YouTube. (n.d.). Retrieved December 14, 2024, from <https://www.youtube.com/watch?v=dcTArj0WAb8>
- Riva, G., Mantovani, F., Capideville, C. S., Preziosa, A., Morganti, F., Villani, D., Gaggioli, A., Botella, C., & Alcañiz, M. (2007). Affective interactions using virtual reality: the link between presence and emotions. *Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society*, 10(1), 45–56. <https://doi.org/10.1089/cpb.2006.9993>
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, 39(6), 1161–1178. <https://doi.org/10.1037/h0077714>
- Salimpoor, V. N., Benovoy, M., Larcher, K., Dagher, A., & Zatorre, R. J. (2011). Anatomically distinct dopamine release during anticipation and experience of peak emotion to music. *Nature Neuroscience*, 14(2), 257–262. <https://doi.org/10.1038/nn.2726>
- Sansar | Events. (n.d.). Retrieved December 14, 2024, from <https://events.sansar.com/>
- Scherer, K. R. (2004). Which Emotions Can be Induced by Music? What Are the Underlying Mechanisms? And How Can We Measure Them? *Journal of New Music Research*. <https://doi.org/10.1080/0929821042000317822>
- Serafin, S., Erkut, C., Kojs, J., Nilsson, N. C., & Nordahl, R. (2016). Virtual Reality Musical Instruments: State of the Art, Design Principles, and Future Directions. *Computer Music Journal*, 40(3), 22–40. [https://doi.org/10.1162/COMJ\\_A\\_00372](https://doi.org/10.1162/COMJ_A_00372)
- Sketchfab. (n.d.). Retrieved January 12, 2025, from <https://sketchfab.com/feed>
- Strauss, H., Vigl, J., Jacobsen, P.-O., Bayer, M., Talamini, F., Vigl, W., Zangerle, E., & Zentner, M. (2024). The Emotion-to-Music Mapping Atlas (EMMA): A systematically organized online database of emotionally evocative music excerpts. *Behavior Research Methods*. <https://doi.org/10.3758/s13428-024-02336-0>
- Su, Y., Liu, Y., Xiao, Y., Ma, J., & Li, D. (2024). A review of artificial intelligence methods enabled music-evoked EEG emotion recognition and their applications. *Frontiers in Neuroscience*, 18, 1400444. <https://doi.org/10.3389/fnins.2024.1400444>
- Taruffi, L., Pehrs, C., Skouras, S., & Koelsch, S. (2017). Effects of Sad and Happy Music on Mind-Wandering and the Default Mode Network. *Scientific Reports*, 7(1), 14396. <https://doi.org/10.1038/s41598-017-14849-0>
- Textures • Poly Haven. (n.d.). Retrieved January 12, 2025, from <https://polyhaven.com/textures>
- Unity Asset Store. (n.d.). Retrieved January 12, 2025, from <https://assetstore.unity.com/>
- Trost, W., Ethofer, T., Zentner, M., & Vuilleumier, P. (2012). Mapping aesthetic musical emotions in the brain. *Cerebral Cortex (New York, N.Y.: 1991)*, 22(12), 2769–2783. <https://doi.org/10.1093/cercor/bhr353>
- Unity Technologies. (n.d.). Retrieved January 12, 2025, from <https://unity.com/>
- Wassiliwizky, E., Koelsch, S., Wagner, V., Jacobsen, T., & Menninghaus, W. (2017). The emotional power of poetry: neural circuitry, psychophysiology and compositional principles. *Social Cognitive and Affective Neuroscience*, 12(8), 1229–1240. <https://doi.org/10.1093/scan/nsx069>
- Wave | The show must go beyond. (n.d.). Retrieved December 14, 2024, from <https://wavexr.com/>
- Wilkins, R. W., Hodges, D. A., Laurienti, P. J., Steen, M., & Burdette, J. H. (2014). Network Science and the Effects of Music Preference on Functional Brain Connectivity: From Beethoven to Eminem. *Scientific Reports 2014 4:1*, 4(1), 1–8. <https://doi.org/10.1038/srep06130>
- Zentner, M., Grandjean, D., & Scherer, K. R. (2008). Emotions evoked by the sound of music: characterization, classification, and measurement. *Emotion (Washington, D.C.)*, 8(4), 494–521. <https://doi.org/10.1037/1528-3542.8.4.494>
- Zhang, J., Xu, Z., Zhou, Y., Wang, P., Fu, P., Xu, X., & Zhang, D. (2021). An Empirical Comparative Study on the Two Methods of Eliciting Singers’ Emotions in Singing: Self-Imagination and VR Training. *Frontiers in Neuroscience*, 15, 693468. <https://doi.org/10.3389/fnins.2021.693468>

## APPENDIX

**Original Poems and Music:** Text from “Vestida con arcilla” (“Dressed in clay”), by María Luz Montesinos; Talón de Aquiles ed., 2024. ISBN: 978-84-10403-57-4. Translation (from the original in Spanish) by María Luz Montesinos; reviewed by Marina Martínez Barroso. Music from “Poemas de la caja de madera” (“Poems of the wooden box”), Slow Project (María Luz Montesinos), ml Records, 2024. UPC: 198665226245; ISRC: QZTB22449760.

Spotify link:  
<https://open.spotify.com/intl-es/album/5ehF6NEu8yxLn5vjbk1tVC>

YouTube link:  
<https://www.youtube.com/watch?v=EiuRTGnofVM>



## Crown of Flowers

Cut flower  
Moss  
The scent of jasmine  
Bitter  
Death carries  
Blind eyes  
Fluids abandoning the body  
The vomit  
Bitter  
Death carries  
The thinning hair  
Stained skin  
Poison  
Bitter  
Death carries  
The swollen belly  
The absent mind  
Breath  
Bitter  
Death carries

The wooden box  
The dead woman dressed in death's clothing  
Crown of flowers  
Bitter  
Death carries

## She is there, but she is not

She is there, but she is not  
In the wooden box  
Box for only one day  
So expensive  
So ugly  
She is there, but it is not her  
You cry and you laugh  
And you cry  
But you laugh too  
Because you cannot cry all the time  
And because if you laugh you forget she is not here  
Even if she is in her wooden box  
Have I told you that the box is expensive and ugly?  
A very polite man showed it to me  
In a catalogue  
Among a hundred of other boxes  
Very ugly all of them, very expensive also  
Just to use it for a while  
But the gentleman shows them to you  
And he tells you about the quality  
About the detail of the cross  
About the elegance of the model

(this one sold a lot last year)  
It does not matter what he says  
Because you are not paying attention  
And you do not care about the detail  
Or the quality  
Or the elegance of the model  
Because there she is  
But because she is not there  
And she is no longer her  
You do not want to look at her anymore  
You want to remember her as she was  
Not the one who is there  
Because she is no longer there  
Even if she is  
In the wooden box

## Catalogue

Adult wooden upholstered model  
Paskal model  
Madrid model  
Varnished adult model  
Sena eco model  
Pádova model  
Rainbow model without glass  
Lacquered children's model  
Luxury model  
Párvulo model  
Alejandría model, Rómulo, Alicante, 99, metallic children's, extra-large, round with glass  
(two for one)  
(they are flying)  
Classic and elegant design  
Wide range  
Ideal  
Customisable  
Eco-friendly  
Sustainable  
Adaptable

Fully opening lid  
To display the dead woman  
The dead woman in her wooden box  
(box for only one day, so expensive, so ugly)

## The Procession

The procession moves slowly  
Between the tombs  
Which are like little apartments  
Marked  
With name and date  
So, we know who lives in the little apartment  
That no longer lives, because they are dead

(so, we know who dies in the little apartment)  
All we hear is  
The creak  
Of the wooden box  
With each step  
And some wailing  
Feet dragging  
Through the gravel  
The procession moves slowly  
Because the eyes  
Are weeping  
And we cannot see where we step  
Some are torn apart  
For a few seconds  
Helpless  
As they reach the hole  
That must be filled  
With the wooden box

The hole is beyond description  
But the box enters the hole  
Pushed  
And on the base, the wood is scratched  
(the box, that was so ugly and so expensive)  
And the wails become silent screams  
When the hole is covered  
And the man on the ladder  
Puts the first scoop  
Of plaster  
And then another  
And another  
And another  
  
And another  
  
And then nothing

## A-92

I drive down the motorway  
For a long while  
*Down the motorway, you say?*  
Yes, yes, that seems to be it  
*And what are you thinking?*  
Nothing, just nonsense, things of mine:  
The astonishment of the astonished  
The wickedness of the wicked  
The mouse running in its wheel, anaesthetized...

I drive down the motorway and overtake a hearse  
*Could this be the one to carry your body later?*  
I do not think so, no one picks up a dead woman  
unless they have been paid first

I drive down the motorway and an ambulance, siren  
blaring, overtakes me  
*Could this, in the end, be the manoeuvre that kills  
you?*

The dead woman in her little wooden box  
But it is a music box  
*A music box, you say?*  
Yes, yes, that seems to be it  
*And what are you thinking?*  
Nothing, I am dead

But the lid of the box opens, and a  
waltz plays...