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Trad'Europe - From Aquisition to Transmission of Traditional Dances

Josiane Mothe**

Josiane.Mothe@irit.fr

(1) IRIT, UMR5505 CNRS, INSPE, UT2J

Toulouse, France

(2) Lo Rondèu de Castelnau

Castelnau-Barbarèns, France

Oshri Even-Zohar

oshri@motekentertainment.com

Motek Entertainment

Houten, The Netherlands

ABSTRACT

Traditional dance music is one of the greatest treasures of Europe's intangible popular cultural heritage. It brings together musicians and dancers of all ages and dance levels into a communion that few other arts allow at that level, ensures social cohesion and reinforces the attractiveness of rural territories while contributing to their economic growth. The creation and circulation of traditional dance music face however a number of challenges. Traditional dance suffers from the backward-looking vision and a lack of transmission through education. These dances are rarely known outside rural areas, and their audience is limited. As part of the Trad'Europe project, we are developing and experimenting with ways of changing the vision of traditional culture as a modern means of social inclusion. This paper presents the virtual reality artefact we have chosen to experiment renewing the genre.

CCS CONCEPTS

• **Information systems** → **Multimedia content creation.**

KEYWORDS

Virtual reality, intangible cultural heritage, traditional dances

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1 INTRODUCTION

Traditional dance music is one of the greatest treasures of Europe's intangible popular cultural heritage. It brings together musicians and dancers of all ages and abilities in a communion that few other arts allow at this level. Pieces of music are continually rearranged and new ones created. It is a popular cultural heritage and an essential element in ensuring social cohesion and enhancing the

*Both authors contributed equally to this research.

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attractiveness of rural areas, while contributing to their economic growth.

Traditional dance music and traditional dance refer to a particular tradition, usually that of traditional rural society. It is a dance performed by the ordinary people of a country or region. Folk dances are an important part of our intangible cultural heritage. It is therefore essential to promote and protect them, so that they can be passed on to future generations. For example, the traditional dancing Fest-Noz, a "festive gathering based on the collective practice of traditional dances of Brittany" has been on the list of Intangible Cultural Heritage of Humanity since 2012. It underlines the importance of these local and traditional practices for citizens and the power they can have on people. The legacy to future generations covers two aspects: the recording of the existing practice, and the maintenance and dissemination of the practice. Recording is generally achieved using basic storage media such as audio and video recordings, which are good tools for documenting but probably not sufficient for maintaining the practice. More contemporary technologies have begun to be used to document intangible heritage [9, 10] and promote its attractiveness [3].

For many years, cultural policy-makers have focused their actions on cities and urban development, despite the fact that, according to EUROSTAT, more than half of the Europe's population does not live in cities¹. A recent report mentions that culture, in all its varied forms of expression and interpretation, plays an integral role in non-urban areas and this needs to be recognised and supported more actively across different levels of government [7]. It is well known that non-urban settings and landscapes have an inherent importance for certain cultural activities, and that artists, creators and cultural organisations have the opportunity to work and move in different types of environments. Traditional culture is mainly found in rural areas. But traditional culture could be an asset to society as a whole. However, the circulation of traditional dance music faces a number of challenges.

Firstly, traditional culture suffers from a backward-looking vision. "Traditional music and dance are to be imitated and reproduced as in the "good old days", ideally wearing old-fashioned clothes". This generally pejorative view of traditional culture is an obstacle to its transmission, particularly to young people. Traditional dance is associated with rural areas and the past, whereas contemporary dance, for example, is associated with urban areas and modernity.

Secondly, creation and dissemination also suffer from the usual mode of transmission, which is mainly by listening, observing and

¹https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Urban_rural_Europe_-_quality_of_life_in_cities

copying. Moreover, there is little room for traditional dance/music education in general vocational training establishments. Indeed, the transmission of traditional dance and music takes place mainly at festivals and dedicated public venues, mainly outside urban areas. This limits dissemination to a restricted audience, even creating bubbles of isolation, and further accentuates the perception of rurality, or even communitarianism, of traditional culture among non-practitioners.

Moreover, over the past two years, due to the COVID pandemic, festivals have all been cancelled, demonstrating the fragility of this unique means of transmission. Like local languages, some traditional dances are on the verge of extinction. There is an urgent need to diversify the means of dissemination and transmission.

Finally, dissemination is also limited because traditional events are rarely organized in urban areas, but rather in rural and hyper-rural areas where access to culture and promotion is limited. There is a need to build bridges between urban and rural areas. Traditional music, dances and artists are unknown out of the sphere of traditional culture and the audience is limited.

Our work aims to develop and experiment with ways of changing the way traditional culture is viewed, from "backward-looking for country folk" to its etymological meaning: "tradition" comes from the Latin *traditio* and means "to deliver, to transmit", which is also the perception of practitioners. An additional objective is to examine the gaps that exist between the social practice of traditional dance and music, knowledge, education and representations of traditional cultures, and ways of diversifying the audience for this genre to encourage learning and dissemination.

In order to increase the number and type of spectators and their participation in traditional culture, we aim to develop and experiment with a series of 3D videos based on the capture of dancers' movements and retargeted as avatars to match the younger technophile and animated film generation. Alongside other learning resources, these assets will be experimented with in a variety of contexts, most notably in the educational context (see section 4).

Augmented reality (AR) and virtual reality (VR) have been studied in various contexts related to cultural heritage; these studies are accompanied by analysis and comparison with other means of dissemination, and often analyze the user experience. Some studies have focused on storytelling. Dowling et al. describe a case study of the narration and production of a VR film about the legend of Faoladh in late 9th-century Ireland [1]. They analysed the YouTube analytics of that video. Elmezeny et al. studied several 360° videos through qualitative content analysis, comparing them to other video formats and considering four types of narrative immersion (spatial, temporal, spatio-temporal, and emotional immersion) [2]. Other studies focus on accessibility of cultural heritage considering that "3D virtual reconstruction context have high consumer appeal and edutainment value"; the case study in their work is bridge diving at Stari Most (Mostar Bosnia) [9]. We also hypothesise that traditional dances may be more attractive to young people if the teaching materials used advanced technologies. Selmanović et al. focus on the immersion part of the format, whereas we concentrate more on the appeal of the genre. In the survey by González Vargas et al. the authors studied learning motivation in cultural heritage and augmented and virtual reality as means of enhancing

it. They conclude that augmented reality for cultural heritage generates a positive impact on motivation for subjects related to art, history, the sciences [3]. Most of the work they analysed shows "that for museums, the underlying motivation to implement these technologies is to attract the public and encourage them to visit their galleries and presentations" [3]. Our motivations are similar to those of museums. Moreover, we focus on young people, including schoolchildren, teenagers and young Millennials. A recent study indicates that virtual reality is most popular among people aged 25 to 34² and that implementing augmented reality could lead to 40% higher conversion rates in online shopping³.

Augmented and virtual reality has also been investigated in the field of traditional life and culture. Ntagiantas et al. developed an augmented reality book to reintroduce the pastoral life of Psiloritis to children in Greece. In their book, the protagonist is a shepherd; users exchange knowledge and know-how [6]. To encourage the public to get involved and learn the traditional art of tightrope walking, which an acrobat performs with acrobatics, song and dance, Kim et al. suggest using digital technologies [4]. In their application, the user's set of movements and the holder's reaction, or feedback, is repeated several times until the user performs each movement properly. In their survey, Rallis et al. mention various areas that can benefit from the use of modern techniques on data acquired by visual sensors and motion capture devices, such as choreography summarisation, dance pose recognition, and analysis of style and emotion [8].

2 DATA ACQUISITION

The objective is to expand the reach of traditional dance to a wider audience by developing a series of videos that utilise dancers' motion capture data. This involves acquiring data on the movements of traditional dancers using specialised suits equipped with sensors. The acquired data is then processed and retargeted onto avatars to create visually appealing animations aimed at the younger generation, particularly those with an interest in technology and animated films. The resulting resources will be rigorously tested in a variety of contexts, not only with culture purveyors, but also with other influential people. These resources will be complemented by other learning resources to ensure a comprehensive understanding of traditional culture for educational purposes.

The motion capture process involves the use of a variety of equipment, including specialised sensors, customised algorithms and software that track dancers' movements in a three-dimensional space [11]. Sensors are placed on strategic parts of the dancers' bodies, such as their joints, to accurately capture their movements [8]. The system captures the motion data, which is then processed by specialised software to create a virtual representation of the dancers' movements. We will be using the Xsens inertial mocap system⁴. The inertial system was chosen for this project because two characters will be captured simultaneously and in close contact.

We considered several other motion capture technologies for the project. In addition to optical and inertial technologies, we looked at

²<https://dataprot.net/statistics/virtual-reality-statistics/>

³<https://dataprot.net/statistics/augmented-reality-stats/>

⁴<https://www.xsens.com>

video pattern recognition systems and various artificial intelligence-based techniques. We decided to opt for inertial technology for the following reasons: (1) passive optical marker technology would create line-of-sight problems when the dancers are in close contact, and would require complex and expensive installation when we wanted to film the dancers on location. (2) Recent advances in AI-based motion capture with systems such as openpose, move.ai, theia and capture would (in cases such as the wearing of traditional dancewear, (long flowing dresses)) would most likely create artifacts that would make the retargeting process problematic.

The inertial pipe line that was chosen because of the minimal risks and relatively low cost involved.

Retargeting motion capture data onto avatars involves mapping the captured movement data onto a virtual skeleton that matches the structure of the avatar. This ensures that the avatar's movements faithfully mimic those of the original dancer. The retargeting process also involves adjusting the motion data to fit the physical characteristics of the avatar, such as its height and weight. The resulting animations will then be rendered to videos used to create engaging and informative clips that showcase traditional dances to a wider audience. These videos can be used as a learning resource for those interested in traditional culture, or as a form of entertainment for those who enjoy animated films.

By experimenting with these motion-capture-based assets in different contexts, we can better understand their impact and effectiveness in promoting traditional culture to a wider audience. This will allow us to refine and improve the assets to better cater to the needs and preferences of different target audiences, ultimately leading to greater participation and engagement with traditional culture. Trad'Europe YouTube channel allows you to follow the project progress at <https://www.youtube.com/@tradeurope2524>.

For data caption, we chose in situ rather in a studio setting. There are several advantages to creating dance motion capture in situ compared to in a studio setting. Firstly, capturing the movements of traditional dancers in situ allows for a more authentic representation of the dance form. The location can play a significant role in the performance of traditional dances, and capturing the movement data in situ can ensure that these nuances are captured accurately. Capturing the motion data in situ allows for a more varied and dynamic background, which can add to the visual appeal of the final product. The natural lighting and scenery of the location can also be used to enhance the visual elements of the animation. Furthermore, capturing motion data in situ allows for a more cost-effective approach as there is no need to construct and rent studio space. This can significantly reduce production costs, making the creation of motion capture-based assets more accessible to a wider range of organisations and communities.

Overall, while studio-based motion capture has its advantages, capturing dance motion data in situ can result in a more authentic and visually appealing final product while also being a more cost-effective approach.

3 AVATAR

When creating motion capture-based videos, the choice of avatar type plays a crucial role in determining the success of the project. Avatars can be broadly categorised as follows (See Figure 1):

- Generic Avatars are pre-made and can be used for a variety of purposes; often designed to be customizable, allowing users to adjust their appearance to suit their needs.
- Realistic Avatars are designed to look as realistic as possible and are often used in applications such as virtual reality and gaming.
- Cartoon Avatars: These avatars are designed to be more cartoonish and less realistic. They are often used in applications such as animated films and video games.
- Animal Avatars are designed to represent various animals and can be used in a variety of applications, such as virtual pet simulations.
- Cultural Avatars: are designed to represent a particular culture or ethnic group. They are often used in applications that promote and preserve traditional cultures, such as educational videos.
- Humanoid Avatars are designed to represent human-like figures, but not necessarily realistic ones. They are often used in virtual assistants and chatbots.
- Robot Avatars are designed to represent robots and are used in applications such as robotics research and development.

Overall, the choice of avatar type depends on the specific application and desired outcome. Different types of avatars have their advantages and disadvantages, and the appropriate avatar type should be chosen based on the requirements of the project. Generic avatars are pre-made and can be used for a variety of purposes, while cultural avatars are specifically designed to represent a particular culture or ethnic group.

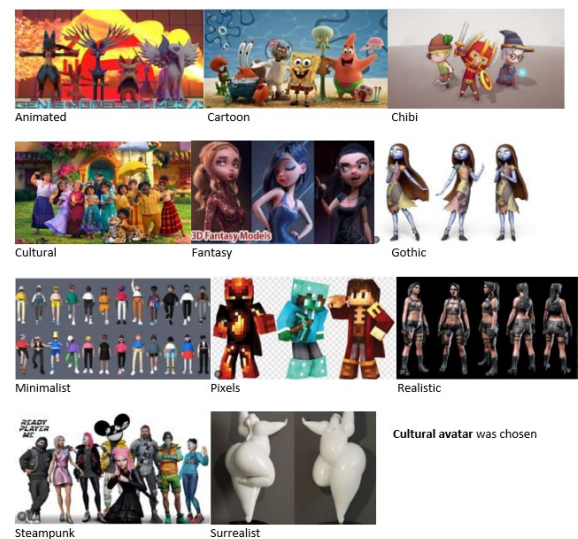


Figure 1: A series of avatar candidates.

To decide on the avatar to use, we selected a panel of participants to a poll. We first consider the target group of users, young Millennials, that is young in between 18 and 26 years old:

- 24 students in between 18 and 22 years old, 12 women and 12 men; our target audience;
- 120 children in between 11 and 14 years (younger than our target group);

- 5 teachers, 3 training school teachers and 2 from secondary schools in the domain of traditional language and culture;
- 3 adults in link with traditional dancing music.

The question we asked them was simply which type of avatar they think should better fit for a virtual reality on traditional dancing music. Each participant could choose one avatar; their favourite one only. The reason why younger students were the most numerous is because one of the teachers implied in the study could ask to a large audience. A single teacher thought that we should create an avatar with traditional clothes; none of the young mentioned this. Cultural avatar (See first sub-image on the second row in Figure 1) from a large majority of the target audience (16 over the 24 participants). Younger participants preferred the cartoon style (See second sub-image on the first row in Figure 1). Realistic and fantasy got more success on the adult audience.

We chose to use cultural avatars as they were preferred by the targeted audience and are more effective in representing traditional dances accurately. These avatars are designed to match the physical characteristics and movements of traditional dancers, making them a more suitable representation of the dance form.

Furthermore, cultural avatars can help preserve and promote traditional cultures and their associated dances. By using cultural avatars, we can accurately represent the cultural nuances and details of the traditional dances, and thus help raise awareness and appreciation for these art forms.

In addition to their cultural significance, cultural avatars are also visually appealing, making them an excellent choice for creating engaging and entertaining videos. By using these avatars, we can create animations that are not only informative but also visually stunning, which can help attract a wider audience.

4 EXPERIMENTS

The virtual reality video in itself could be seen as an asset; however, we would like to experiment with it at different levels and for different purposes, which are described below:

- **Question 1: do virtual reality-based videos on traditional dances attract more visitors and create user engagement?**

Experimental means: On social media, we would like to compare the popularity of a 2D video based on the virtual reality with real videos. To do this, we will compare the distribution of the virtual and real videos under the same conditions. We have published several videos and images on our social media accounts (facebook and Instagram) on different days of the week and at different times of day. We would like to publish the virtual-based video using the same pattern and compare the number of views as well as spreading. We will also analyse the comments for both types of videos.

- **Question 2: do traditional dance festival-goers like to experiment with 3D virtual reality? Are there different profiles of festival-goers? What are the main factors?**

Experimental means: We will make 3D virtual reality available to several festivals. We will consider the following factors: age, gender, dance level, urban or rural environment. We will use a 5-levels scale [5] regarding their experience when viewing the 3D virtual reality.

- **Question 3: what are the main differences audiences experiment when viewing 2D virtual reality-based and 2D real-based films on traditional dances.**

Experiment means: we will select a panel of 10 teachers, 40 students from the target audience (aged 18 to 26) and 40 younger children (aged 11 to 16). Each category of participants will be divided in two sub-groups, each exposed to one of the film types. They will then answer a series of questions about their experience. These questions will be designed to capture the participants' vision before and after viewing the videos, and willingness to learn these dances or participate in activities to learn or practice them.

5 CONCLUSIONS

In this paper, we discussed the importance of changing people's, and especially young people's, view of traditional dances in order to maintain the intangible cultural heritage they represent. We are developing virtual reality videos that will be declined into 2D and 3D videos which will then be used in several experiments and compared to real-based videos for this purpose.

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