VIRTUAL CHOIR AS A KIND OF DIGITAL MUSICAL ART

Fu Xinbin
Kharkiv State Academy of Culture, Kharkiv, Ukraine
820582341@qq.com

Фу Сіньбінь
Харківська державна академія культури, м. Харків, Україна
https://orcid.org/0009-0002-2335-658X

Fu Xinbin. **Virtual choir as a kind of digital musical art**

The relevance of the article. The so-called virtual choirs remain very common in modern musical creativity. Their activities are studied in modern science in many aspects: historical, technical, socio-psychological, musicological, etc. However, there is a debate about whether such a form of artistic activity can be considered a type of choral performance.

The purpose of the study is to clarify whether the phenomenon of "virtual choir" belongs to choral or digital art.

The methodology. Structural, functional and comparative analysis were used to analyze the specifics of the work of real and virtual choirs. The article also uses the results of statistical data obtained by other researchers on the psychophysiological impact of singing in real and virtual groups on the well-being of choristers. An analysis of surveys on other issues was also carried out.

The results. It was defined that a virtual choir fundamentally differs from a real one in its structure, which, in addition to performers and a conductor, also includes sound engineers and editors. Even in their actual absence, these functions are extremely important and, in fact, replace the conductor's activity, because the final result depends much more on the sound engineer and editor than on the conductor's personality.

It was found out that the specifics of the creative process in a virtual choir do not include a significant number of specifically choral elements, namely the ensemble component (except for coincidence with the phonogram), response to the real process and the possibility of influencing it during performance. In addition, singing in a virtual project slows down the development of empathy of singers, reduces their ability to recognize the conductor's gestures and facial expressions.

The scientific novelty. For the first time, a reasoned answer has been received to the question of the possibility of classifying the so-called virtual choir as a type of choral performance.

The practical significance. The results of the study can be used in courses on the history of choral art, the theory of choral performance, and in the practical activities of conductors and sound engineers.

Conclusions. The creative and methodological content of the work of a virtual choir has more differences than similarities with the work of a real collective. According to surveys, choristers evaluate the experience of co-creation in a virtual project more negatively than singing in a "live" choir.

A virtual choir does not require many purely choral skills to achieve a result (ensemble, tuning, responding to the conductor's gesture and singing by colleagues in the part), but requires significant technical knowledge and skills (video and audio recording, editing, correction, etc.).

Thus, virtual choir as a phenomenon of modern art is not so much a type of choral performance as its simulation, carried out using digital methods, and should be studied in accordance with its belonging to one of the types of digital art.

Keywords: *musical art, digital musical art, choral art, virtual choir, sound engineering.*

Фу Сіньбінь. **Віртуальний хор як різновид цифрового музичного мистецтва**

Розглянуто питання щодо атрибуції феномену віртуального хору як різновиду цифрового музичного мистецтва, усупереч його тлумаченню як специфічного виду хорового виконавства. За допомогою структурного, функціонального й компаративного аналізу творчих процесів, які відбуваються в реальному та віртуальному хорі, аргументовано доведено їхні принципові відмінності на рівні як процесів, що відбуваються, так і вражень, що формуються в музикантів. Зіставлення структури реального та віртуального колективів, завдань виконавців, диригента й технічної групи переконливо свідчать про неправомірність класифікації явища т. зв. віртуального хору як різновиду хорового виконавства. Статистичні дослідження, результати яких враховано в цій

72

праці, також відбивають відмінності впливу участі в реальному та віртуальному хоровому колективі на психофізіологічний стан виконавців та їхню само-рефлексію, що опосередковано свідчить на користь декларованого в статті підходу до досліджуваного феномену.

Ключові слова: *музичне мистецтво, цифрове музич-не мистецтво, хорове мистецтво, віртуальний хор, звукорежисура.*

The relevance of the study. In the last decade, the virtual choir as an artistic phenomenon has gained significant popularity in the global media space, however, working remotely using modern technical means calls into question the presence of choral specificity in such projects. Thus, the relevance of the study is due to the existence of a scientific discussion regarding the belonging of virtual choral projects to the field of choral art.

Problem statement. The concept of "virtual choir" has firmly entered modern vocabulary, but is a virtual choir actually a choir? This question has been raised for many years, and discussions have been going on around this phenomenon for many years. The answer is not entirely obvious, because several aspects must be taken into account, in particular, the structure of the collective, the features of the artistic process and the specificity of the artistic result.

The purpose of the study is to attribute the phenomenon of "virtual choir" from the standpoint of its belonging to choral art.

Analysis of recent research and publications. A detailed analysis of scientific works devoted to the virtual choir is contained in the article "Virtual Choir: Between Technical and Aesthetic" (Fu Xinbin, 2023b). Their content is mostly technological (Daffern et al., 2021; Statkus, 2022; Mróz et al., 2022), socio-psychological (Fancourt & Steptoe, 2019; Galván & Clauhs, 2020; Paparo, 2021; Grebosz-Haring et al., 2022; Wardani, 2022; Wardani & Suyajai, 2023), as well as didactic (Eren & Öztuğ, 2020; Kachurynets, 2020; Larissia et al., 2021; Mykhailova, 2022; Sukhetska, 2023; Vasylieva, 2024) and performance-interpretation (Savelieva, 2021; Shatova, 2021; Sukhetska, 2022) perspectives.

In the context of the aspect relevant to this article, it is worth noting that many authors of research on virtual choirs are interested in the socio-psychological specificity of the virtualization of the collective musical process. Research into the experience of "documentary" virtual choirs leads to optimistic conclusions that the perception of social presence is quite high for a virtual musical experience (Fancourt & Steptoe, 2019). However, in her article "Virtual choirs' and the simulation of live performance under lockdown" (Datta, 2020), the author directly points out the fallacy of the concept of "virtual choir", referring to the significant difference in the creative process of a "live" choir and its virtual simulation.

Some technical details of the process of creating a virtual choir, which allow us to compare them with the work of a real choral collective, are revealed in the article "Creating a Remote Choir Performance Recording Based on an Ambisonic Approach" (Mróz et al., 2022). An important source of factual information is the analysis of feedback from English choristers and facilitators who participated in the creation of virtual choirs during the pandemic lockdown in 2020 (Daffern et al., 2021).

Presentation of the main material of the study. Singing in a real choir as a process is a phenomenon with deep archetypal roots. From time immemorial, a person sang his emotional state in songs, finding sympathy in others who joined in singing, sharing anger, pain, and joy. Songs acquired semantic meaning, grew into ritual, and reflected significant life events. Their aesthetics were regulated by public demand, the degree of talent of the performers, and the singing technique that they learned from their family and teachers. The distinction of folk choral singing is the absence of a stage-hall, performer-listener barrier, because everyone present, even silent and untalented in singing, is a direct participant in the singing action.

Professional concert choral performance exists in the presence of such a barrier, in addition to which there is another one: the distance from the composer's idea and musical text to its embodiment in concert sound.

Despite the complexity of the choral music-making process and the increase in distance from the listener, a live performance retains the most important thing — the real common existence of people in joint singing and listening, a sense of unity in the performance, the opportunity for the listener

to thank with applause, and for the choir to feel an emotional response.

An audio or video recording of a live choral singing records the collective's presence in the process of creating music, therefore it carries a certain charge of people's singing coexistence. There is no direct creative meeting of the performers with the listeners, although the latter can testify to their attitude with reactions, comments, reposts on social networks. Listeners have the opportunity to delve deeper into musical creations through repeated listening and a certain "appropriation" of them.

But no matter how beautifully the choir sang during the recording, the aesthetic significance of the performance that will see the world directly depends on the creative group that makes the recording. Many corrective tools are in the power of these co-creators. The visual and audio canvas that will appear before the listener is composed by the group's director, filtering one, emphasizing and embellishing the other. In essence, virtual choir elevates the role of the sound and video director almost to the level of the choir conductor. The conductor's task remains only to create a video sample of the conducting and audio matrix, which should become the basis for the synchronicity of the recording of the performers. He can provide preliminary verbal advice on the technical and artistic side of the performance, embedding their visual embodiment in the conducting model. Individual singers must record their part of the future overall sound alone, at that moment only imagining the whole. After collecting the disparate recordings, the key stage of their technical processing and artistic combination comes. Only the successful completion of this stage, embodied in the corresponding video, is intended to enable the performers to feel connected to the entire choir, integral co-creators of the artistic image, and to present the listener and viewer with a multimedia choral performance that is as close to reality as possible.

With a high dependence of the aesthetic qualities of the final result on the technical means of implementation, the performance process ceases to be purely choral. This is evidenced, for example, by the fundamental change in the performance tasks of the choristers while working in a virtual project.

"Firstly, /…/ the work with recording software, choosing microphone and video camera settings, and editing and/or editing the recorded material in some cases are added.

Secondly, all tasks related to spontaneous response to the conductor's gesture are entirely removed. Ensemble tasks are also eliminated: during recording, there is no one to adjust to, or if other parts have already been recorded, the behavior of «colleagues» is completely predictable.

Thirdly, tasks of external expressiveness are actualized during video recording, /…/ up to the separate recording of video and audio tracks with subsequent editing" (Fu Xinbin, 2023a, p. 270).

Even such seemingly stable tasks of a singer, such as accurate intonation and mastery of the timbre of the voice, become less relevant, because they can be quite easily compensated for by digital correction.

Thus, "the total transformation of the functions and tasks of virtual choir singers indicates that this is a fundamentally different type of activity" (ibid.).

The results of a British study of the activities of virtual choirs discussed below contain the responses of English choristers and facilitators who participated in the creation of virtual choirs during the pandemic lockdown in 2020. They are based on three technical project creation models (Daffern et al., 2021):

1) multitrack — recording of individual solos, which are then combined into a common choral sound;
2) live broadcast — connecting people to the live broadcast via social networks;
3) live teleconference — singing and communicating in real time using appropriate programs.

From the point of view of the result of each of the models, a real choir sound can only occur in the multitrack version. Of course, you can find web software for online rehearsals in real time (for example, Jamulus)[1], but the technical requirements for their use are too high and are unlikely to be accessible to the entire team. For example, the main requirement of the specified application is a wired connection to the Internet, the use of a wired microphone and isolating headphones, which allows you to minimize sound latency. You can experiment and work with this, you can arrange rehearsals in

1. https://jamulus.io/

this way, but creating an artistically valuable result is not easy.

A fairly detailed technical instruction for creating a virtual choir is provided by the work "Creating a Remote Choir Performance Recording Based on an Ambisonic Approach" (Mróz et al., 2022). The authors of the article distinguish the following stages:

1) preparation for remote audiovisual recording;
2) determination of technical needs;
3) recording of musicians;
4) post-production of the soundtrack;
5) post-production of the visual imagery.

The first stage focuses on creating a sample recording from the group leader. The recording should be audiovisual, i.e. reflect the conducting and reproduce, for example, the piano sound of the score. A technical feature of this recording, which will help with future synchronization of the tracks, may be the sound of several claps in the palm of the hand, which mark the fate of one bar and prepare the performers for the tempo of the work. From an aesthetic point of view, it should be taken into account that the recorded conducting can find its place in the overall resulting video, and the artistically played score will help the choristers convey the subtleties of musical interpretation.

An important aspect of the preparatory stage is also conducting preliminary work with the choristers, which consists of helping them master the musical material (its phrasing, nuances, diction, etc.) and discussing technical needs regarding the recording, the aesthetics of the frame, and the expressiveness of the performance.

The ideal technical conditions for recording a virtual choir are recording each individual chorister in a studio using professional equipment. This approach makes it possible to achieve higher quality material. In addition, British experts are considering the option of recording with a spherical microphone to create a sound holographic image of the singer and then combining individual recordings into an ambisonic (spatial) sound. But it is clear that there are not always conditions for studio recording. In this case, recordings are made at home using the means available to the choristers, at least a smartphone. This complicates the work of the sound engineer, because the microphones differ in characteristics, extraneous noises, for example, from household appliances or passing traffic, can be added to the recorded voice. It is important for choristers to take care of minimizing acoustics, which will allow the director to simulate it virtually without obstacles.

Two devices may be needed during the recording process: one to play a sample video recording that the chorister listens to through headphones, and the second — for the actual parallel recording of singing. The arrangement of the devices should be such that the performer, looking into the camera, can see the recording of the conducting and, if necessary, the score. An important practical tip is to keep one ear of the performer free when using headphones, which allows for better control over their performance.

Post-production of soundtracks begins with noise suppression and frequency filtering of individual recordings. At the mixing stage, pitch and rhythmic accuracy may need to be adjusted. Further modeling of virtual acoustics is based on the spatial arrangement of the track material, the use of imaginary reflections and diffuse reverberation.

Combining disparate video material into a single picture should follow a well-thought-out scenario and have its own dynamics. This task can be solved by creating a spherical video, where a circle of video recordings of the choristers is added to a pre-programmed interior. Thus, the viewer can choose the angles themselves. But most virtual choir projects are built on a regular two-dimensional image. The simplest solution is the static arrangement of the performers in a rectangle of the overall frame, and we can see the most complex choir options in Eric Whitacre's projects.

In the multitrack version of recording a virtual choir, the quality of the result depends on the last two stages. Sound and video directors need to have both an internal representation of the desired sound and the technical skills to correct the shortcomings of personal recordings.

The existence of a choral group requires not only external perception, but also internal self-identification of the participants as a choir. Therefore, the attitude of the choristers to the process of virtual work and its result is of fundamental importance for the use of the word "choir" in the name.

Practical aspects, the logistics of technical solutions are of great importance in choosing a possible model of virtual existence for an established

choral group during a period when real meetings are not possible.

The results of a survey published in 2020 as part of the study "Virtual Choir as Collaboration" showed that virtual collaboration has little in common with "live" performance: "nothing can replace the physical feeling, act, and sonority of performing in a choir, though this experience still captured the beloved collaborative essence of doing so" (Galván & Clauhs, 2020, p. 15).

In contrast, a survey of participants in E. Whitacre's virtual choir showed that respondents enjoyed the process and felt a global connection with other performers. In particular, those who were limited in their opportunities to participate in the choir due to isolation or health problems remained satisfied. However, for many, the perception of their own sound and appearance was marked by a negative impression, in addition, "Respondents identified the lack of musical and social interaction between themselves, the conductor, and fellow singers as well as an absence of the embodied experience of being a part of the ensemble" (Paparo, 2021, p. 92).

In early 2022, a group of authors conducted a study of the impact of choral singing on children and adolescents in real and virtual formats by studying psychobiological effects (measuring cortisol levels, psychological testing to determine the level of stress, self-esteem, etc.). The authors found a positive effect of participating in choral singing, but while participation in a real choir contributed to a decrease in cortisol levels (a stress hormone), singing in a virtual one increased it (Grebosz-Haring et al., 2022).

In 2022, Indra Wardani conducted a study on the role of virtual choirs in the continuity of choir classes, the impact of technology on the reduction of the role of individuals, and the lack of social interaction and empathy of the members of the collective (Wardani, 2022). She later wrote that in a virtual choir, the setting of an artistic goal is reduced, high-quality contact between participants is impossible, and technology confidently displaces both the choristers and the conductor (Wardani & Suyajai, 2023, p. 69). She not only questions the concept of "choir" for the phenomenon under consideration, but also denies the correctness of using the word "virtual" for it, because virtual reality requires other technical means that simulate the effect of presence in another place and the corresponding sensory experiences. On the other hand, participation in a virtual choir, according to the researcher, hinders the development of empathy among singers, reduces their ability to recognize the conductor's gestures and facial expressions, and the hyper-developed technical component makes the so-called "virtual choir" a kind of digital media art (Wardani & Suyajai, 2023, p. 70).

According to the results of the survey (Mróz et al., 2022), many participants experienced discomfort and even alienation, which were associated with the lack of skills in using Internet technologies, poor communication, insufficient equipment, lack of space at home for recording and, even in the case of such a place, a feeling of loneliness in singing. The conference method of making music turned into a means for individual rehearsals and just ordinary communication, since insufficient synchronization did not allow avoiding sound chaos, and singing into turned-off microphones — the same feeling of musical loneliness.

The positive factors of virtual participation in choral work recognized by performers and conductors include the reduction of financial and time costs for the journey to the rehearsal base and the costs of renting premises, the opportunity to participate not only in "one's" choir, but also to join other large-scale projects.

Many new tasks arose for choirmasters. Post-production processing of individual video recordings required many hours of work and previously unfamiliar techniques.

The majority of participants considered the preservation of the collective through continuous activity in the "virtual world" a temporary solution, hoping to return to the normal functioning of the choirs over time. Understanding well that virtual solutions have a completely different "mechanics" and content, most choristers sought to join everyone in this option, feeling responsible for the collective and the common cause. The leaders of some choirs continued the remote activities of the choirs in order to maintain their personal income. But the choristers also often willingly supported their conductors. In such conditions, choirmasters often felt indebted to their collective, looked for more convenient technologies, and sought to return to the collective online rehearsals that had been missed

for some reason. The feeling of well-being in life for almost all survey participants was closely related to regular weekly live rehearsals. The realization of this came with the loss of such an opportunity. Joint choral singing was felt as a kind of therapy, to which was also added the feeling of being part of something bigger. For some, virtual meetings became a mitigation of loneliness, while others felt the difference from the previous mode of existence of the collective even more acutely, and came to anxiety and despair. And yet, for most participants, it was better to meet like this than not to meet at all.

The social aspects of choirs' existence are particularly challenged during virtualization, but there are also positive aspects to consider. The negative aspects of the lack of real choral singing as a significant social factor were formulated quite clearly by one of the respondents to the British survey: "There is every disadvantage. You can't hear voices on either side of you. You feel exposed if you are uncertain of the music you are not helped by being in the virtual choir. You have no real contact with other choir members and, speaking for myself, the experience certainly did not make me feel part of a group [Female; 75–84; Member MT; Qu 24]" (Daffern et al., 2021, p. 9).

The positive news of the new way of life was the opportunity to communicate and see each other's faces, which cannot be the case during regular rehearsals in a traditional choir setting. The motivation for further participation in multitrack-type projects for many was the sense of community that arose not during work, but already when watching the final video. That is, the singers, studying and performing their parts alone to a self-recorded recording, were patiently waiting for the delayed feeling of participation in general. The musical aspects of singing participation in a live broadcast, of course, with the microphone turned off, became a negative factor for many, especially if they were used to following the singing of more experienced singers, wanting to hear and respond to comments on their singing. A person hears only the musical material broadcast by the conductor and their own voice. Subconsciously, this process is accompanied by a comparison of what the singer hears with the usual sound in the choir. Often, after listening to their recording, a person draws bad conclusions

about their singing, which does not meet their usual expectations, and sometimes completely turns away from the choral work. An amateur singer's encounter with a reflection of themselves in a recording for a multi-track virtual choir can also be destructive for further singing in the choir. It is a well-known fact that some were ashamed to send their files to the director. But despite this, there were also those who were glad that there was an opportunity to repeat and choose the best option. Seeing the shortcomings of their own singing, these singers found opportunities for self-education and self-improvement.

Conclusions. The structure of a virtual choir, if not physically, then functionally cannot be realized without a sound engineer, who takes a place not even next to, but above the conductor. At the same time, the number of participants can be equal to one person (like, for example, Yevhen Maliarevskyi), which definitely contradicts the concept of "choir".

The methodological content of the work of a virtual choir has more differences than similarities with the work of a real collective, because it completely excludes the ensemble component (except for coincidence with the phonogram), response to the real process and the possibility of influencing it during performance.

The topic of co-creation in joint singing is mostly negatively covered by the respondents, despite the virtual choir model. Isolated positive assessments are associated only with listening to the finished result, which contradicts a number of other studies. This is a sign that the key criteria for evaluating their participation in such projects are not so much their belonging to the virtual format, but other factors (the personality of the conductor, the content, the impossibility of implementation in a real format). This explains the differences in the results of research on the work of Eric Whitacre and other scientific investigations.

Thus, virtual choir as a phenomenon of contemporary art is not so much a type of choral performance as its simulation, carried out using digital methods, and should be studied in accordance with its belonging to one of the types of digital art.

Список посилань

Васильєва, О. (2024, Лютий 22–23). *Підготовка студентського хору до event-art заходів у дистанційному форматі* [Тези конференції]. Методологія сучасних наукових досліджень: збірник наукових праць учасників Ювілейної XX Міжнародної науково-практичної конференції. Харків, 341–344. https://dspace.hnpu.edu.ua/server/api/core/bitstreams/c505a19f-b90a-493e-a383-d3e4b32260c2/content

Качуринець, Л. (2020). Віртуальний хор як необхідний педагогічний досвід в умовах дистанційного навчання. В М. П. Пантюк (Гол. ред.), *Актуальні питання гуманітарних наук: Міжвузівський збірник наукових праць молодих вчених Дрогобицького державного педагогічного університету імені Івана Франка* (Вип. 34, Т. 3, сс. 211–218). http://www.aphn-journal.in.ua/archive/34_2020/part_3/35.pdf

Михайлова, Н. (2022). *Педагогічна діяльність хормейстера в умовах дистанційного навчання: адаптація, проблеми, перспективи* [Тези конференції]. Диригентсько-хорова освіта: синтез теорії та практики: матеріали VI міжнародної науково-практичної конференції. ХНУМ ім. І. П. Котляревського. Харків, 132–135. https://repo.num.kharkiv.ua/handle/num/624

Савельєва, Г. (2021). "Lux aurumque" Еріка Уітакера в аспекті порівняльного аналізу виконавської інтерпретації. *Проблеми взаємодії мистецтва, педагогіки та теорії і практики освіти,* 58, 143–157. https://doi.org/10.34064/khnum1-58.09

Статкус, А. (2022, Листопад 11–13). *Створення віртуального хору* [Тези конференції]. Інформаційні проблеми теорії акустичних, радіоелектронних і телекомунікаційних систем (IPST-2022): тези доповідей 11-ї Міжнародної науково-технічної конференції, Харків, 32–36. https://repository.kpi.kharkov.ua/server/api/core/bitstreams/f94c1e98-9d84-4b9f-9d2a-00576d4107f8/content

Сухецька, О. (2022). Віртуальний хор: сутність явища та поняття. *Вісник КНУКіМ. Серія «Мистецтвознавство», (46),* 138–144. https://doi.org/10.31866/2410-1176.46.2022.258627

Сухецька, О. (2023, Березень 24). *Ефективні методи розвитку хорового колективу в контексті віртуального музикування* [Тези конференції]. Філософія культурно-мистецької освіти: матеріали II Всеукраїнської наукової конференції, Київ, 189–192. https://dspace.udpu.edu.ua/handle/123456789/15372

Фу Сіньбінь. (2023, Квітень 20–21). *Виконавські завдання співаків віртуального хору* [Тези конференції]. Культура та інформаційне суспільство XXI століття: матеріали міжнародної науково-теоретичної конференції молодих учених, Харків, Т. 1, 269–270.

Шатова, І. (2021). Віртуальний хор Еріка Вітакера: інноваційні тенденції розвитку сучасної музики. *Музичне мистецтво і культура, 1* (32), 17–30. https://doi.org/10.31723/2524-0447-2021-32-1-2

Daffern, H., Balmer, K., & Brereton, J. (2021). Singing Together, Yet Apart: The Experience of UK Choir Members and Facilitators During the Covid-19 Pandemic. *Frontiers in Psychology, 12* [624474]. https://doi.org/10.3389/fpsyg.2021.624474

Datta, A. (2020). 'Virtual Choirs' and the Simulation of Live Performance under Lockdown. *Social Anthropology*. https://doi.org/10.1111/1469-8676.12862

Eren, H., & Öztuğ, E. (2020). The implementation of virtual choir recordings during distance learning. *Cypriot Journal of Educational Science, 15* (5), 1117–1127. https://doi.org/10.18844/cjes.v15i5.5159

Fancourt, D., & Steptoe, A. (2019). Present in Body or Just in Mind: Differences in Social Presence and Emotion Regulation in Live vs. Virtual Singing Experiences. *Frontiers in Psychology, 10* [778]. https://doi.org/10.3389/fpsyg.2019.00778

Fu Xinbin (2023). Virtual choir: between technical and aesthetical. *Culture of Ukraine, 81,* 77–85. https://doi.org/10.31516/2410-5325.081.10

Galván, J., & Clauhs, M. (2020). The virtual choir as collaboration. *The Choral Journal, 61* (3), 8–19. https://www.jstor.org/stable/27034958

Grebosz-Haring, K., Schuchter-Wiegand, A. K., Nater, U., Feneberg, A., Schütz, S., & Thun-Hohenstein, L. (2022). The Psychological and Biological Impact of "In-Person" vs. "Virtual" Choir Singing in Children and Adolescents: A Pilot Study Before and After the Acute Phase of the COVID-19 Outbreak in Austria. *Frontiers Psychology, 12,* [773227]. https://doi.org/10.3389/fpsyg.2021.773227 [In English].

Lariccia, S., Lariccia, G., Gabrieli, M., Della Ventura, M., Toffoli, G., & Montanari, M. (2021, 8–9 March). *Museup: how virtual choirs may help students learning to learn* [Conference presentation abstract]. *INTED2021 Proceedings*, 6827–6834. https://doi.org/10.21125/inted.2021.1360

Mróz, B., Odya, P., & Kostek, B. (2022). Creating a Remote Choir Performance Recording Based on an Ambisonic Approach. *Applied Sciences, 12* (7), 3316. https://doi.org/10.3390/app12073316

Paparo, S. (2021). Real Voices, Virtual Ensemble 2.0: Perceptions of Participation in Eric Whitacre's Virtual Choirs. *The International Journal of Research in Choral Singing, 9*, 92–115. https://acda.org/wp-content/uploads/2021/09/IJRCSVol9Paparo.pdf

Wardani, I., & Suyajai, P. (2023, June). *Back to basic: What is missing in the virtual choir as a practice?* [Conference presentation] ICAPAS 2022 Proceeding, 62–72. https://www.researchgate.net/publication/371640784_Back_to_basic_What_is_missing_in_the_virtual_choir_as_a_practice_ICAPAS_2022_Proceeding

Wardani, I. (2022). Virtual Choir: To Sing Together, Individually. *International Journal of Creative and Arts Studies, 9* (2), 105–116. https://journal.isi.ac.id/index.php/IJCAS/article/view/8226/2897

References

Vasylieva, O. (2024, February 22–23). *Preparing a student choir for event-art events in a remote format* [Abstracts of the conference]. Methodology of modern scientific research: a collection of scientific papers of the participants of the Jubilee XX International Scientific and Practical Conference. Kharkiv, 341–344. https://dspace.hnpu.edu.ua/server/api/core/bitstreams/c505a19f-b90a-493e-a383-d3e4b32260c2/content. [In Ukrainian].

Kachurynets, L. (2020). Virtual choir as a necessary pedagogical experience in distance learning. In M. P. Pantiuk (Ed.), *Topical issues of the humanities: Interuniversity collection of scientific works of young scientists of Drohobych Ivan Franko State Pedagogical University* (Issue 34, Vol. 3, pp. 211–218). http://www.aphn-journal.in.ua/archive/34_2020/part_3/35.pdf. [In Ukrainian].

Mykhailova, N. (2022). *Pedagogical activity of a choirmaster in the conditions of distance learning: adaptation, problems, prospects* [Conference presentation]. Conducting and choral education: synthesis of theory and practice: materials of the VI International Scientific and Practical Conference. KhNUM named after I. P. Kotlyarevsky, Kharkiv, 132–135. https://repo.num.kharkiv.ua/handle/num/624. [In Ukrainian].

Savelieva, H. (2021). "Lux aurumque" by Eric Whitacre in the aspect of comparative analysis of performance interpretation. *Problemy vzaiemodii mystetstva, pedahohiky ta teorii i praktyky osvity, 58,* 143–157. https://doi.org/10.34064/khnum1-58.09. [In Ukrainian].

Statkus, A. (2022, November 11–13). *Creating a virtual choir* [Conference presentation]. Information problems of the theory of acoustic, radioelectronic and telecommunication systems (IPST-2022): abstracts of the 11th International Scientific and Technical Conference, Kharkiv, 32–36. https://repository.kpi.kharkov.ua/server/api/core/bitstreams/f94c1e98-9d84-4b9f-9d2a-00576d4107f8/content. [In Ukrainian].

Sukhetska, O. (2022). Virtual choir: the essence of the phenomenon and concept. *Visnyk KNUKiM. Seriia "Mystetstvoznavstvo", (46),* 138–144. https://doi.org/10.31866/2410-1176.46.2022.258627. [In Ukrainian].

Sukhetska, O. (2023, March 24). *Effective methods of developing a choral group in the context of virtual music making* [Conference presentation]. Philosophy of cultural and artistic education: materials of the II All-Ukrainian scientific conference, Kyiv, 189-192. https://dspace.udpu.edu.ua/handle/123456789/15372. [In Ukrainian].

Fu Xinbin (2023, April 20–21). *Performance tasks of virtual choir singers* [Conference presentation]. Culture and information society of the XXI century: materials of the international scientific and theoretical conference of young scientists, Kharkiv, Vol. 1, 269–270. [In Ukrainian].

Shatova, I. (2021). Eric Whitacre's virtual choir: innovative trends in the development of contemporary music. *Muzychne mystetstvo i kultura, 1* (32), 17–30. https://doi.org/10.31723/2524-0447-2021-32-1-2. [In Ukrainian].

Daffern, H., Balmer, K., & Brereton, J. (2021). Singing Together, Yet Apart: The Experience of UK Choir Members and Facilitators During the Covid-19 Pandemic. *Frontiers in Psychology*, 12 [624474]. https://doi.org/10.3389/fpsyg.2021.624474. [In English].

Datta, A. (2020). 'Virtual Choirs' and the Simulation of Live Performance under Lockdown. *Social Anthropology*. https://doi.org/10.1111/1469-8676.12862. [In English].

Eren, H., & Öztuğ, E. (2020). The implementation of virtual choir recordings during distance learning. *Cypriot Journal of Educational Science, 15* (5), 1117–1127. https://doi.org/10.18844/cjes.v15i5.5159. [In English].

Fancourt, D., & Steptoe, A. (2019). Present in Body or Just in Mind: Differences in Social Presence and Emotion Regulation in Live vs. Virtual Singing Experiences. *Frontiers in Psychology, 10* [778]. https://doi.org/10.3389/fpsyg.2019.00778. [In English].

Fu Xinbin (2023). Virtual choir: between technical and aesthetical. *Culture of Ukraine, 81,* 77–85. https://doi.org/10.31516/2410-5325.081.10. [In English].

Galván, J., & Clauhs, M. (2020). The virtual choir as collaboration. *The Choral Journal, 61* (3), 8–19. https://www.jstor.org/stable/27034958. [In English].

Grebosz-Haring, K., Schuchter-Wiegand, A. K., Nater, U., Feneberg, A., Schütz, S., & Thun-Hohenstein, L. (2022). The Psychological and Biological Impact of "In-Person" vs. "Virtual" Choir Singing in Children and Adolescents: A Pilot Study Before and After the Acute Phase of the COVID-19 Outbreak in Austria. *Frontiers*

Psychology, 12, [773227]. https://doi.org/10.3389/fpsyg.2021.773227 [In English].

Lariccia, S., Lariccia, G., Gabrieli, M., Della Ventura, M., Toffoli, G., & Montanari, M. (2021, 8–9 March). *Museup: how virtual choirs may help students learning to learn* [Conference presentation abstract]. *INTED2021 Proceedings*, 6827–6834. https://doi.org/10.21125/inted.2021.1360. [In English].

Mróz, B., Odya, P., & Kostek, B. (2022). Creating a Remote Choir Performance Recording Based on an Ambisonic Approach. *Applied Sciences, 12* (7), 3316. https://doi.org/10.3390/app12073316. [In English].

Paparo, S. (2021). Real Voices, Virtual Ensemble 2.0: Perceptions of Participation in Eric Whitacre's Virtual Choirs. *The International Journal of Research in Choral Singing, 9,* 92–115. https://acda.org/wp-content/uploads/2021/09/IJRCSVol9Paparo.pdf. [In English].

Wardani, I., & Suyajai, P. (2023, June). *Back to basic: What is missing in the virtual choir as a practice?* [Conference presentation] ICAPAS 2022 Proceeding, 62–72. https://www.researchgate.net/publication/371640784_Back_to_basic_What_is_missing_in_the_virtual_choir_as_a_practice_ICAPAS_2022_Proceeding. [In English].

Wardani, I. (2022). Virtual Choir: to Sing Together, Individually. *International Journal of Creative and Arts Studies, 9* (2), 105–116. https://journal.isi.ac.id/index.php/IJCAS/article/view/8226/2897. [In English].

Фу Сіньбінь
аспірант, Харківська державна академія культури, м. Харків, Україна

Fu Xinbin
postgraduate student, Kharkiv State Academy of Culture, Kharkiv, Ukraine