VIRTUAL CHOIR: BETWEEN TECHNICAL AND AESTHETICAL

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Fu Xinbin. **Virtual choir: between technical and aesthetical**

The relevance of the article. The relevance of the research topic is determined by the extraordinary popularity of the remote form of joint choral performance in contemporary musical culture. The virtual choir is a fairly new, but already very widespread form of music-making, which is gradually acquiring new characteristics and functions compared to those that were inherent in its early days.

The main factors of the development of the virtual choir phenomenon can be divided into "evolutionary" (the digitalization of art; the interest of performers in new forms of music making; active development of art therapy and inclusive art practices) and "revolutionary" (the COVID-19 pandemic and the Russian-Ukrainian war, which, although more localized than the pandemic, involves a very large number of choirs that have been unable to work as usual).

The latter two factors have led to a quantitative explosion of virtual projects, as well as significant changes in their focus, structure, functions, and composition of performers, etc. that require appropriate scientific understanding.

The purpose of the research is to analyze and systematize existing studies of the virtual choir and to make up a strategy for its comprehensive research.

The methodology. The study of the available scientific literature on the phenomenon of the virtual choir was carried out using the tools of systematic, textual comparative and comprehensive analysis.

The results. The main scientific works on the virtual choir are systematized in four main areas: socio-psychological, technical, didactic and historical. It was found that musicology, choral studies and interpretation aspects have been studied very briefly. Most of the works reveal certain inaccuracies in the presentation of the history of virtual choral performance (except for Cayari), as well as some contradictions in the results of previous studies. In addition, the article raises the question of the conformity of the studied phenomenon with the concept of "virtual choir".

The scientific novelty. For the first time, the research provides a systematic review of scientific papers about the virtual choir, revealing the current trend towards the study of non-musical aspects.

The practical significance. The materials of the article can be used in practical activities of conductors and choristers, as well as in the educational process of training conductors, choirmasters and vocalists in conditions of remote work.

Conclusions. Scientific comprehension of the phenomenon of the virtual choir is active, but rather limited. Most often, it acts as a certain aesthetic phenomenon that should replace (mostly temporarily) the work of "live" choirs during social cataclysms that limit the possibility of creative communication between people. That is why the most relevant areas of research are socio-psychological and technical. At the same time, many works raise the question of the legality of using the term "virtual choir" for this multimedia activity, which, according to experts, has little in common with both the choir and virtuality. As a matter of fact, the lack of musicological, choral, interpretological investigations, typical for traditional choral activity, revealed within the scope of this study indirectly confirms this idea. The first step on the way to further scientific development of this topic should be a multi-faceted analysis of the current activity of virtual choirs.

Keywords: *choral art, digitization of art, virtual choir, choral performance, remote rehearsals, audio-video recording, editing.*

Фу Сіньбінь. **Віртуальний хор: між технічним та естетичним**

Дослідження містить аналіз наукових праць, присвячених феномену віртуального хору, який сформувався у 2009 р. та під час пандемії COVID-19 набув вибухового розвитку. Здійснено класифікацію основних аспектів вивчення віртуального хору;

78

означено, що найбільшого поширення набули соціально-психологічні, технічні та дидактичні. Водночас акцентовано, що музикознавчі, хорознавчі та інтерпретаційні проблеми у сфері віртуального хорового виконавства розглядалися досить обмежено, а історичні здебільшого містять неповну або неточну інформацію. Виявлено деякі суперечності в результатах попередніх досліджень впливу участі у віртуальному хорі на психофізіологію співаків, окреслено певні проблеми відповідності явища, яке досліджується, його поширеній дефініції «віртуальний хор».

Ключові слова: *хорове мистецтво, діджиталізація мистецтва, віртуальний хор, хорове виконавство, дистанційні репетиції, аудіовідеозапис, монтаж.*

The relevance of the article. The relevance of the research topic is determined by the extraordinary popularity of the remote form of joint choral performance in contemporary musical culture. The virtual choir is a fairly new, but already very widespread form of music-making, which is gradually acquiring new characteristics and functions compared to those that were inherent in its early days.

The main factors in the development of the virtual choir phenomenon (as well as virtual performance in general) can be divided into "evolutionary factors" and "revolutionary factors". "Evolutionary" ones existed for a long time and gradually formed the prerequisites for the emergence of virtual forms of performance. Including:

1) Digitization of art.
2) Performers' interest in new forms of music making.
3) Active development of art therapy, as well as inclusive art practices.

"Revolutionary" factors arose only starting from 2020 and are associated with "external" expansion for art:

1) the COVID-19 pandemic;
2) the Russian-Ukrainian war, which, although it has a more local character compared to the pandemic, nevertheless covers a very large number of choirs that were left without the opportunity to work in the usual mode.

The last two factors led to a quantitative burst of virtual projects, as well as significant changes in their direction, structure, functions, composition of performers, etc., which requires appropriate scientific understanding.

Problem statement. Virtual choir as a cultural phenomenon was initially considered purely narratively, but with the actualization of the use of this method of performance, technological issues came to the fore. However, in reality, the virtual choir phenomenon has a much wider range of issues. Questions of philosophical, cultural, aesthetic, sociological, psychological, and even therapeutic aspects of its being are already arising. From an uncommon digital oddity, virtual choir has grown into a bright phenomenon of musical art, the scientific understanding of which, despite the large number of various publications, is insufficient. Therefore, the purpose of the article is to analyze and systematize existing research on the virtual choir, to form a strategy for its comprehensive research.

Analysis of recent research and publications. In the international practice of art studies, there are several major approaches to the study of the virtual choir (by prevalence): historical, socio-psychological, technological, didactic.

Although the historical approach is present in almost every work devoted to the virtual choir, it is mostly implemented through the description of the facts of the existence of E. Whitacre's projects (in almost every article). However, in only one work, the prerequisites for the emergence of the phenomenon of the virtual choir in the conditional "pre-Whitacre" period (Dr. Cayari, 2020) have been determined, and there are no systematic further studies of this phenomenon.

The socio-psychological aspects of the activities of the participants of virtual choirs involve the study of the nature of creative collaboration (Galván & Clauhs, 2020), the psychophysiological features of the creative process (Grebosz-Haring et al., 2022) and its impact on the mental health of the participants (Fancourt & Steptoe, 2019; Wardani, 2022; Wardani & Suyajai, 2023) changes in the social well-being and behavior of virtual choir singers (Paparo, 2021).

The technological approach is represented by works that directly consider the process of creating a virtual choir, analyze technical means, software, etc. (Statkus, 2022). Among such studies, the article by a group of Polish authors (Mróz et al., 2022) and a collective study by British scientists, which includes not only the specified aspects, but also a typology of

different methods of creating a virtual choir, taking into account their characteristics and impact on the participants (Daffern et al., 2021).

The didactic approach was formed in the context of the 2020 lockdown and has a dual orientation. One direction of research is devoted to the transition of educational choirs to a remote form (Kachurynets, 2020; Mykhailova, 2022; Sukhetska, 2023), the second is the use of virtual choir technologies to create synthesized musical samples for learning (Eren & Öztuğ, 2020; Lariccia et al., 2021).

Apart from the main approaches to the study of the phenomenon of the virtual choir, it is also possible to note some interdisciplinary works dedicated to the visualization of such performance, in particular, the study of the multimodal space formed in the final virtual work (Kerry, 2022).

It is surprising that the actual musicological, choral and interpretative aspects are almost not developed. The musicological analysis of E. Whitacre's compositions was carried out by I. Shatova (2021), certain features of the choral approach to the activity of the virtual choir are outlined in the work of O. Sukhetska (2022), the comparative analysis of virtual and concert performances of E. Whitacre's Lux Aurumque is presented in the article H. Savelieva (2021).

Presentation of the main research material. Most researchers believe that the virtual choir was invented and first implemented by Eric Whitacre. But that is not so. Similar projects were created long before his "Lux Aurumque", as the musicologist Christopher Cayari (2020) competently describes in his documentary "The History of Virtual Choirs". He believes that the first significant act of combining the singing of people who are not only at a distance in space, but also in time, was the Grammy Award-winning song "Unforgettable", which the singer Natalie Cole performed in 1991 accompanied with a recording of her father Nat King Cole, who had died more than 30 years before this performance.

C. Cayari also emphasizes that the creative activity of the Irish singer Enya already in 1992 includes the use of numerous own vocal tracks imitating a choir. Nick Pitera, a famous American singer and YouTuber who liked to perform various parts of duets, in 2007 received a software opportunity to combine the simultaneous performance of two parts

in a duet with himself. Visually, he used the method of split-screen (which is very similar to the modern practice of "windows" with performers of a virtual choir). Producer Kurt Hugo Schneider, on the contrary, when recording vocal "clones" preferred the effect of a common space. He avoided splitting the screen by combining frames shot on a green background (chroma key technology), due to which the effect of the simultaneous presence of all "clones" in one frame was created. For example, this is how the singer Sam Tsui (Samuel "Sam" Tsui) is recorded. Soon, joint projects of various artists appeared, who sang while synchronizing their separately made recordings. The "Disney" corporation even held contests to attract fans to create virtual covers of popular Disney tunes.

In his film, Christopher Cayari emphasizes that the genre-style palette of such virtual projects included both pop music and classical music, which could be performed both by an a cappella choir and accompanied by an orchestra.

In 2008, the artistic multimedia movement "Playing for Change" was born, which combined musicians from different countries in one composition, and Julien Neel recorded a track with his collaborators, who sang in 8 different countries.

In 2009, large virtual projects began to appear, one of which was the performance of E. Whitacre's work "Sleep", initiated by Scott Haines. It was he who became the editor of Eric's first project Virtual Choir 1.0 "Lux Aurumque".

Thus, Eric Whitacre's virtual choir was actually not the source and beginning of the existence of a new musical phenomenon, but a natural peak of its development, prepared by many processes of "evolutionary" nature. All attempts at virtualization directly depended on the emergence of technical possibilities to record and combine sound tracks without too much trouble, and the very principle of such a combination of sounds was already familiar to the field of cinematography for more than a decade, in which sound editing developed almost from the very beginning of its existence.

The value of Christopher Cayari's documentary also lies in the fact that it does not stop at the significant success of E. Whitacre, paying attention to the further spread and development of virtual choral practice. In particular, he outlines the later

hybrid projects, where remote performers or their recordings were used in the "live" concert of the choirs.

The main achievement of the virtualization of choral performance was the opportunity to unite talents from different countries, religions, cultures and traditions. In 2020, this need became relevant due to quarantine measures around the world. Since, with the appropriate equipment, performers could now participate in the project without leaving their homes, it allowed overcoming geographical, social, cultural barriers, as well as physiological limitations. Due to this, the issues of its socio-psychological impact also came to the fore in scientific studies of the virtual choir phenomenon.

In the spring of 2019, the results of a study by Daisy Fancourt and Andrew Steptoe on the impact of participation in a virtual and "live" choir on a person's psychological state were published (Fancourt & Steptoe, 2019). The authors were interested in whether the experience of social presence in a virtual choir is identical compared to live musical experience? The experience of 1158 virtual choir singers (in collaboration with Eric Whitacre and his team) was compared to that of 1158 live choir singers using propensity score matching based on a range of demographic, social and musical factors. It was found that participants in the virtual choir experienced more social presence than participants in live choirs, and they also used less general emotion regulation, avoidance strategies, and approach strategies. They used self-development strategies significantly more. This generally positive result for supporters of the virtual choir was not confirmed in other studies in the future.

In October 2020, the American Choral Conductors Association released the work by D. Galván and M. Clauhs, "Virtual Choir as Collaboration" (Galván & Clauhs, 2020). By surveying the participants and observing their social behavior, the researchers analyzed the experience of two virtual student groups created by them. The results showed that with a fairly high level of satisfaction with the process, virtual collaboration is very different from "live" communication. Many choristers noted that it was very difficult for them to sing alone, because they did not feel the presence of others, nor could they hear their singing. Some of the participants emphasized the importance of the ability to rely on one's own self-esteem, when the singer is forced to be both a teacher and a student. However, opinions were also expressed that "nothing can replace the physical feeling, action and sonority of a performance in a choir, although this experience still conveyed the beloved essence of joint work" (Galván & Clauhs, 2020, p. 15).

The American researcher Steven A. Paparo (2021) was looking for answers to 4 main questions for the participants of E. Whitacre's virtual choir. With the help of an anonymous online survey, he tried to find out from 312 singers (mostly amateurs) the following:

1) What did the participants get from their participation?
2) What did they learn about their voices and themselves as performers?
3) How did they perceive the similarities and differences between face-to-face and virtual choirs?
4) How has participating in a virtual choir affected their current and future participation in choral music?

He noted: "The results show that respondents experienced a sense of personal satisfaction and global connection. A virtual choir has opened up opportunities for those unable to participate in in-person choirs due to geographic isolation, scheduling conflicts, personal disabilities, and listening barriers. For many, watching their performance on video was a new experience and led to mostly negative criticism of their own voices" (Paparo, 2021, p. 9). It is very important that "respondents identified a lack of musical and social interaction between themselves, the conductor and fellow singers, as well as a lack of embodied experience of participation in an ensemble" (Paparo, 2021, p. 9). In general, from the answers of the respondents, it seemed to the researcher that participation in the virtual choir seemed to "encourage participation in future choral singing" (Paparo, 2021, p. 9).

At the beginning of 2022, a group of authors led by Katarzyna Grebosz-Haring presented a pilot study, the purpose of which was to study "the psychological and biological effects of choral singing on children and adolescents, as well as to compare the psychobiological effects of in-person and virtual

choral activities of children and adolescents before and after the acute phase of outbreak of COVID-19 and due to the quarantine in Austria" (Grebosz-Haring et al., 2022, p. 11).

The analysis was carried out with the help of various tools for assessing the condition of the test subjects: saliva and hair samples for cortisol content, psychological tests and surveys that helped determine the level of stress, changes in self-esteem, satisfaction, etc. "Subjective indicators (momentary mood, stress) were taken before and after singing once a week. In addition, salivary biomarkers (cortisol and alpha-amylase) and the amount of social contact before and after singing were assessed every two weeks. Psychological resilience, self-esteem, emotional abilities, and levels of chronic stress were measured at the beginning of in-person singing, as well as at the beginning and end of virtual singing" (Grebosz-Haring et al., 2022, p. 1).

The authors noted a positive effect on mood after any form of participation in choral singing. However, over time, in-person singing showed a decrease in the "stress hormone" cortisol, while virtual singing showed a modest increase.

The Indonesian scientist Indra Wardani raises the question quite acutely in her latest research. In 2022, she held interviews with two conductors "to understand the state and dynamics of online rehearsals and virtual human performance" (Wardani, 2022, p. 105). In the process of research, she identified three important topics regarding the work of virtual choirs:

1) the role of the virtual choir in the continuity of choral classes;
2) the impact of virtual choir technology on reducing the role of individuals;
3) lack of personal social interaction to increase empathy.

In 2023, in another work, she wrote: "... as practice shows, in a virtual choir, musical elements are reduced in many ways: the reduction of the musical goal, the impossibility of achieving a certain choral standard, moreover, the noticeable role of technologies that push away singers and conductors" (Wardani & Suyajai, 2023, p. 69). She recognizes virtual rehearsals as a tool for preserving the continuity of the team's activities in the pandemic and as a flexible tool for attracting singers who are unable to attend rehearsals, but emphasizes the lack of experience of personal social interaction. In addition, she notes that the concept of "virtuality" in the definition of the phenomenon under consideration is quite conditional. Virtual reality requires other prerequisites, a sense of presence in another place, simulated sensory experiences.

The researcher is particularly concerned about the observation of a decrease in the development of empathic abilities of singers during online rehearsals. In her opinion, they leave very little scope for advanced recognition of gestures and facial expressions between participants and conductors of a virtual choir, although they are necessary for work in a "live" choir.

I. Wardani also focuses on certain limitations of remote choral activity, which is extremely critical to the quality of the Internet connection, the performance of the device used during recording, the acoustic context in the room where the recording takes place, etc. The researcher quite rightly points out that an important aspect of choral singing is the singer's feeling of his own voice as a part of a whole, achieving timbre balance, etc. If in a "live" choir singers harmonize their sound with the general performance, then in a virtual choir all the mentioned aspects lose their meaning, because they can be software-adjusted by audio and video editors.

"Virtual choir provides full access to editing, from pitch correction and time delay, volume control and vocal effects to voice panning to create a 3D feeling as if the singers were in a certain stage position [...] Now when audio-video editing has become so sophisticated that the singers can perform only the minimal musical aspect and still produce a quality virtual choir video, can we say that a virtual choir is more of a digital media art than a choir as such?" (Wardani & Suyajai, 2023, p. 70).

The issue of the technical implementation of virtual choral projects has been briefly considered in many works, but they acquired the most powerful systematic consideration in the study of a group of scientists from Gdańsk (Mróz et al., 2022), who not only offer a fairly detailed technical instruction on creating ambisonic (three-dimensional) sound, but also carry out a certain systemological reflection, distinguishing the stages of work on the piece of art (preparation for remote audiovisual recording; formation of technical requirements; direct

recording of musicians; post-production of the soundtrack; post-production of the visual backing).

Feedback from English choristers and facilitators who participated in the creation of virtual choirs during the pandemic lockdown in 2020 is systematized in the work of British authors (Daffern et al., 2021). They determine that there are three main technical models of virtual choir functioning:

1) multitrack — recording of individual solos, which are then combined into a general choral sound;

2) live broadcasting — connecting people to the live broadcast through social networks;

3) live teleconference — singing and communicating in real time using appropriate programs.

The virtual choir is a phenomenon that can be called "omnivorous" as to the repertoire. Perhaps that is why so far, we are aware of so few scientific works devoted to the musicological analysis of performed works. In this sense, Iryna Shatova's article (Shatova, 2021) attracts attention, in which she defines the main features of Eric Whitacre's musical language in his virtual projects. The researcher notes that defining the composer's style is somewhat difficult. His harmonic thinking can be classified as neotonal (pantonal, posttonal), but "Eric Whitacre's works are in line with the American tradition, sometimes reminiscent of Samuel Barber's works, and sometimes of Charles Ives' ones, but his approach is always original. In his spectacular choral works, the composer is not afraid of unusual harmonies, stylistic eclecticism, or experiments with electronics" (Shatova, 2021, p. 21).

A number of scientific publications by Oksana Sukhetska (2022, 2023) demonstrate a fairly deep choir study approach. She has the idea to compare how the elements of choral sonority function in real and virtual choirs, but the presented conclusions about the existence of a significant identity raise certain doubts. Also, the researcher believes that remote activity can be effective in the process of development of a really existing choral collective, with which, taking into account the above arguments of foreign authors, one can only partially agree.

Since virtual choirs usually perform compositions that are not repeated, it is rather difficult for scientists to look at the performing aspect in this musical field. However, Hanna Savelieva managed to do this, who conducted a detailed and thorough comparative analysis of the performances of E. Whitacre's work "Lux Aurumque" under his own conducting in virtual and real performance, as well as the performance of this piece by the student choir of Kharkiv National University of Culture and Arts (Savelieva, 2021).

The didactic aspect mentioned at the beginning of this article is of quite large-scale, and mostly of Ukrainian authorship, because due to the circumstances, the virtualization of musical performance became the only way of collective music making in the conditions of the lockdown, and then the Russian-Ukrainian war. On the one hand, the creation of virtual projects is currently the only form of existence of many collectives, on the other hand, the technical achievements worked out in the practice of virtual choirs are effectively used to ensure the methodical component in the work of choral collectives (for example, sound samples of musical scores being studied).

Conclusions. The analysis of studies devoted to the virtual choir has shown that the history of this phenomenon does not begin with Eric Whitacre's work, but the great merit of the composer is in demonstrating the hitherto unattainable level of aesthetic design of a media work of this type. It was the high example that encouraged people to join E. Whitacre's projects, imitate his practice and study it.

Scientific comprehension of the phenomenon of the virtual choir is active, but rather limited. Most often, it acts as a certain aesthetic phenomenon that should replace (mostly temporarily) the work of "live" choirs during social cataclysms that limit the possibility of creative communication between people. That is why the most relevant areas of research are socio-psychological and technical. At the same time, many works raise the question of the legality of using the term "virtual choir" for this multimedia activity, which, according to experts, has little in common with both the choir and virtuality. As a matter of fact, the lack of musicological, choral, interpretological investigations, typical for traditional choral activity, revealed within the scope of this study indirectly confirms this idea. The first step on the way to further scientific development of this topic should be a multi-faceted analysis of the current activity of virtual choirs.

Список посилань

Качуринець, Л. (2020). Віртуальний хор як необхідний педагогічний досвід в умовах дистанційного навчання. *Актуальні питання гуманітарних наук: Міжвузівський збірник наукових праць молодих вчених Дрогобицького державного педагогічного університету імені Івана Франка, Вип. 34, Т. 3,* 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. *Диригентсько-хорова освіта,* 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. *Інформаційні проблеми теорії акустичних, радіоелектронних і телекомунікаційних систем (IPST-2022)*: тези доповідей 11-ї Міжнародної науково-технічної конференції (11.11–13.11, 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. *Філософія культурно-мистецької освіти: матеріали ІІ Всеукраїнської наукової конференції*, *Київ*, 189–192. https://dspace.udpu.edu.ua/handle/123456789/15372

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

Dr. Cayari. (2020). *A History of Virtual Choirs: A documentary about online singing.* [Video]. Youtube. https://www.youtube.com/watch?v=BOEIBdoPxz8

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

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

Kerry, V. J. (2022). 'The Birth of the Virtual Choir': Exploring the multimodal realization of the Covid-19 liminal space in a YouTube virtual choir performance. *Multimodality & Society, 2*(2), 141–164. https://doi.org/10.1177/26349795221086882

Lariccia, S., & Lariccia, G., & Gabrieli, M., & Della Ventura, M., & Toffoli, G., & Montanari, M. (2021). Museup: how virtual choirs may help students learning to learn. *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). Back to basic: What is missing in the virtual choir as a practice? *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

Kachurynets, L. (2020). Virtual choir as a necessary pedagogical experience in distance learning. *Topical issues of the humanities: Interuniversity collection of scientific papers by young scientists of Ivan Franko Drohobych State Pedagogical University, 34, Vol. 3,* 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. *Dyryhentsko-khorova osvita,* 132–135. [In Ukrainian].

Savelieva, H. (2021). "Lux aurumque" by Eric Whitacre in terms 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. (November 11–13, 2022). Creation of a virtual choir. *Information problems of the theory of acoustic, radio-electronic and telecommunication systems (IPST-2022): abstracts of the 11th International Scientific and Technical Conference, (11.11–13.11, 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. (March 24, 2023). Effective methods of choir development in the context of virtual music-making. *Philosophy of cultural and artistic education: materials of the II All-Ukrainian scientific conference,* 189–192. https://dspace.udpu.edu.ua/handle/123456789/15372 [In Ukrainian].

Shatova, I. (2021). Eric Whitacre's virtual choir: innovative trends of development of modern 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].

Dr. Cayari. (2020). *A History of Virtual Choirs: A documentary about online singing.* [Video]. Youtube. https://www.youtube.com/watch?v=BOEIBdoPxz8 [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].

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].

Kerry, V. J. (2022). 'The Birth of the Virtual Choir': Exploring the multimodal realization of the Covid-19 liminal space in a YouTube virtual choir performance. *Multimodality & Society, 2*(2), 141–164. https://doi.org/10.1177/26349795221086882 [In English].

Lariccia, S., & Lariccia, G., & Gabrieli, M., & Della Ventura, M., & Toffoli, G., & Montanari, M. (2021). Museup: how virtual choirs may help students learning to learn. *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). Back to basic: What is missing in the virtual choir as a practice? *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].

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