Choir@Home
How to carry out virtual choir rehearsals with the help of digital tools

R2.3: Literature-based insights into online group singing

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Introduction

- During the COVID-19 crisis **in-person rehearsals** were **prohibited**

- Choirs used **digital tools** in an attempt to continue singing and performing together **online**
  - Video-conferencing solutions (e.g. Zoom, Webex)
  - Low-latency solutions (e.g. Soundjack, Jamulus)
  - Multitrack videos

- During the pandemic, choirs sought to **replicate** in-person singing using technology and online formats had to **replace** in-person singing
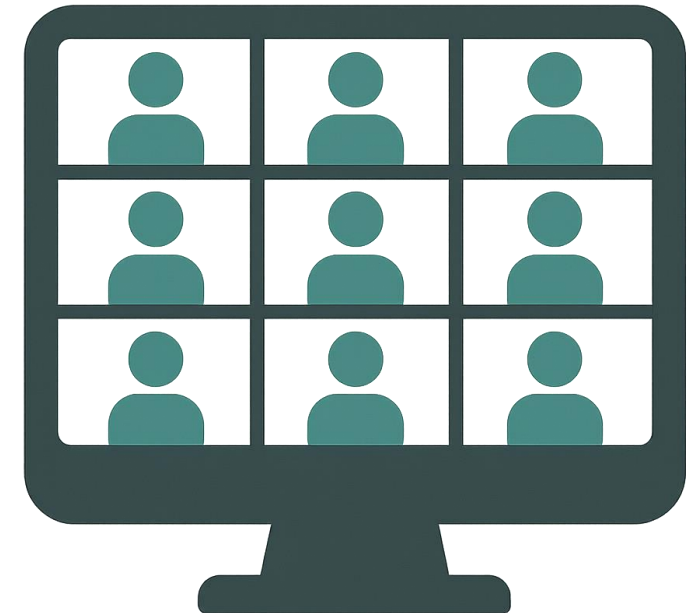
Sources: Morgan-Ellis, 2021; Martinec, 2020; Morgan-Ellis, 2022; Daffern, Balmer, & Brereton, 2021

1. Which **approaches** for online group singing exist?

2. What are **drivers** and **barriers** of online group singing?

3. What are **benefits** of existing approaches for online group singing?

4. What are **challenges** of existing approaches for online group singing?

5. What are **opportunities** and **future potentials** of online group singing?

Method

Overview of the literature review process

Process	1. Search strategy	2. Selection	3. Analysis & Evaluation	4. Synthesis & Transfer
Method	Identify relevant outlets, keywords, selection criteria	Literature analysis in relevant libraries	Read and extract relevant information from precollected papers	Develop a logical structure for grouping and presenting the results
Outcome	▪ Selected databases: Google Scholar (academic literature), Google (non-academic literature) ▪ Search terms: "online choir", „online singing", „(choir OR choral) AND (zoom OR Jamulus OR Soundjack)" ▪ Time frame: unlimited / 2020-current date	▪ Scanning of paper titles on the first 10-15 pages of results on Google Scholar ▪ Reading of abstracts of potentially relevant papers ▪ Final sample of academic papers: 39 ▪ Final sample of non-academic papers: 11	▪ Extraction and of metadata and other information (e.g. tools mentioned, research question) and key findings regarding technological, socio-technical, and choral pedagogical aspects ▪ Documentation in an XLS Sheet	▪ Identification and presentation of drivers and barriers, employed tools, opportunities and challenges of rehearsing online

Sources: Bandara et al., 2011; Okoli & Schabram, 2010; Webster & Watson, 2002

Foundations

How do in-person choir rehearsals work?
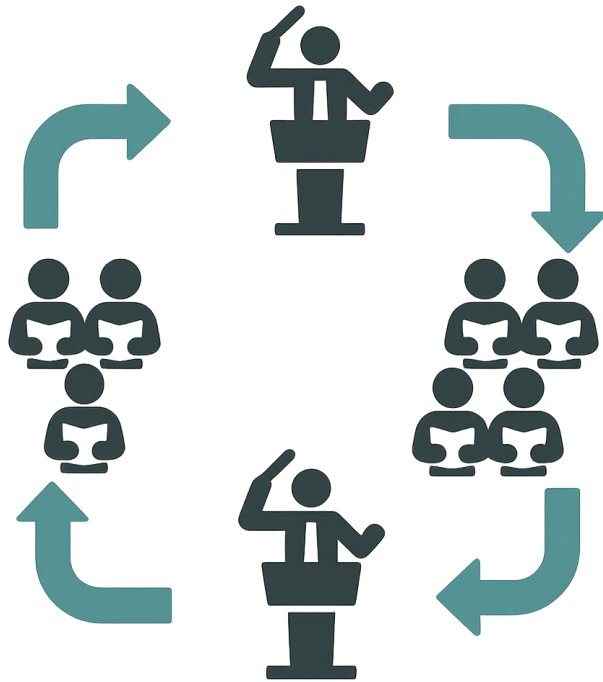
- Traditional **in-person rehearsal** approaches usually rely on an **iterative** process

  - The conductor **demonstrates** music through his/her voice and/or instruments and asks singers to **sing along** or **imitate** him/her

  - Then the conductor will **evaluate** the results and give **feedback** to the singers or **demonstrate** something again

  - This process is **repeated** until the end result is **satisfactory** for the conductor as well as the singers

- Depending on which approach for **online singing** is used the traditional rehearsal approach needs to be **adapted** due to certain **technical** and **musical challenges** that occur with a certain choice of a technical solution

Sources: Colson, 2012

Online group singing approaches:
Video-conferencing solutions

Requirements:

- Software: e.g. Zoom, Webex, Microsoft Teams

- Hardware: Laptop, mobile phone, tablet

Description:

- Conductor holds rehearsal (e.g. playing the piano or singing); conductor can be heard by rehearsal participants

- Singers are muted because of latency / noise suppression

- Conductor cannot hear singers and singers cannot hear each other

- Singers sing in isolation; singing together in real-time is not possible

- The regular „feedback-loop" between conductor and singers is interrupted

Sources: Morgan-Ellis, 2021b

Online group singing approaches:
Low-latency solutions

Requirements:

- Software: e.g. Soundjack, Jamulus, JamKazam

- Hardware: Laptop, wired headphones and microphone

- Other: Stable high-speed internet connection, wired ethernet connection

Description:

- Conductor holds rehearsal (e.g. playing the piano or singing); conductor can be heard by rehearsal participants

- Singers are not muted, they can hear each other and sing together in real-time

- Conductor can hear singers and give feedback on their performance

- Low-latency solutions are often used in combination with a video-conferencing solution (like Zoom) to have a high-quality video stream; in that case the video stream lags behind the audio stream

- Soundcheck before rehearsal recommended

Sources: Daffern et al., 2021; Morgan-Ellis, 2021b

Online group singing approaches:
Facebook Live Singing

Requirements:

- Software: Facebook Live

- Hardware: One device for playing the stream and one device for broadcasting one's own stream, high quality loudspeaker and microphone

Description:

- Singer 1 broadcasts themselves via Facebook Live

- Singer 2 hears broadcast and streams themselves singing along

- ….

- People watching the stream will only see the Facebook Live broadcast by one singer but hear all parts

- Synchronous participant experience

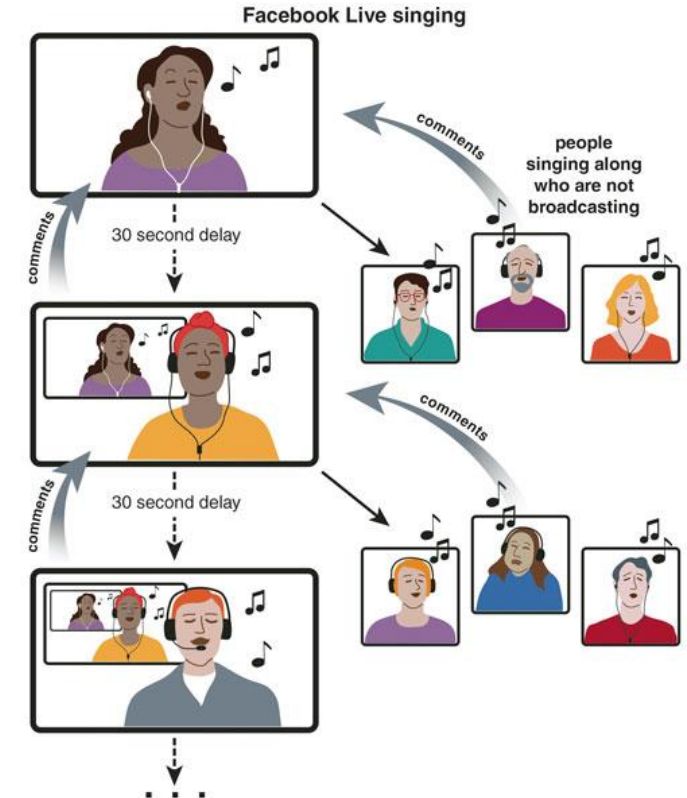- Possibility to sing along muted, interaction via comments

Image source: Link

Sources: e.g., Morgan-Ellis (2021b, 2022)

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Online group singing approaches:
Multitrack videos

Requirements:

- Software: Audio recording software, video/audio editing software
- Hardware: Recording device (e.g. microphone, laptop, headphones), computer for editing

Description:

- Conductor provides singers with guide track
- Singers rehearse and record their parts
- Individuals audio / video files are layered together
- Multitrack videos are often shared on a video-sharing website like YouTube
- Multitrack videos are a form of online performance

Sources: e.g., Daffern et al., 2021

Findings of the literature review

Factors influencing the adoption and experience of online group singing

Drivers

- **Pandemic situation** as catalyst

- Availability of **equipment** and **skills** to use it

- Availability of **infrastructure**

- Positive **attitude** towards online singing

Barriers

- Lack of a **private space** to sing

- Lack of **fast/reliable internet** access

- Lack of **equipment**

- Lack of „**digital readiness**"

- Technology **aversion**

➢ Singing via a videoconferencing solution is easier to set up and requires less demanding equipment than low-latency solutions

➢ Participation in virtual choirs requires additional skills, e.g. ability to read music and learn from a recording

➢ Perception of online group singing seems to vary significantly, e.g. because of different underlying motivations for singing, different musical and technical skills

Sources: Daffern et al., 2021; Morgan-Ellis, 2021c

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Online group singing using videoconferencing systems: Benefits and challenges

Benefits 👍

- Possibility to connect and socialise with fellow singers during the pandemic
- Accessibility
- Features (e.g. video, screen-sharing)
- Less distraction and improved concentration compared to F2F rehearsal
- Possibility to study new material, develop musical skills and grow in independence (focus on own voice)
- Room for musical experimentation (e.g. singing other parts)

Challenges ❗

- Social interaction of F2F cannot be replicated
- Singing together is not possible, no „real" musical interaction (ie. no feedback from fellow singers)
- No surround sound
- Conductor becomes „solo-entertainer" and singers become „solo-ists"
- Need to manage technology

LOW-LATENCY

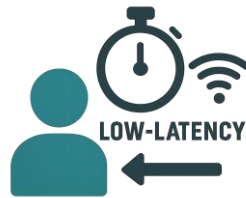Sources: Daffern et al., 2021; Martinec, 2020; Morgan-Ellis, 2021a; Youngblood et al., 2021

Online group singing using videoconferencing systems: Best practices

✓ Conductors can go through a piece, **demonstrate** parts by singing or playing an instrument, conduct for the singers while the singers can **sing along** at home and make notes in their scores.

✓ **Vocal warm-ups and exercises** can be demonstrated by the conductor. The conductor can listen to **one singer at a time**, if it is needed to give feedback to specific singers.

✓ **Conversational interaction** is possible. Singers can ask **questions** about the music and conductors can also ask individual singers to sing to give feedback.

✓ Conductors can ask singers to **record themselves** singing a particular part or an entire choral piece outside of rehearsal time. The conductor and/or other singers can give **feedback** on these recordings.

Sources: Boyd, 2022; Carlson & Hanna-Weir, 2021; Martinec, 2020

Benefits 👍

- Affords multidirectional singing experience, improved musical interaction (as compared to rehearsals via video-conferencing solutions)
- More natural interaction
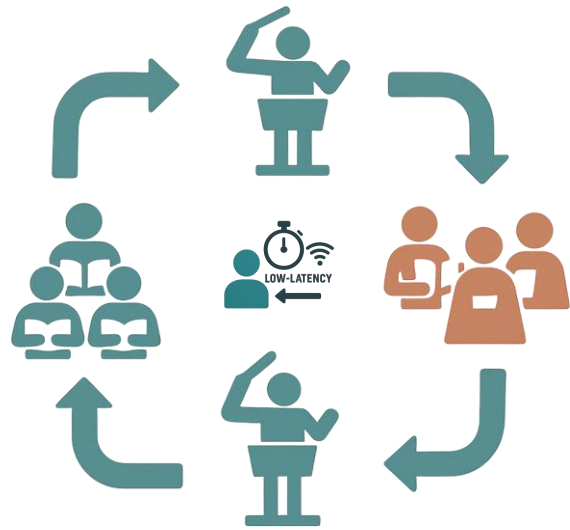- Second-best alternative to F2F singing

Challenges ❗

- Higher technical requirements, e.g. in terms of equipment and set-up
- Increased effort in organising and hosting rehearsals, e.g. need for soundcheck
- Technology-related problems during rehearsals

Sources: Carlson & Hanna-Weir, 2021; Morgan-Ellis, 2021b

- Most traditional rehearsals approaches can be used with low-latency software as the feedback-loop is **not interrupted**.

- There are still some challenges when using low-latency tools, because the latency is depending on many technical factors such as speed and stability of the internet connection.
  The higher the latency is the more difficult it gets to **keep in time while singing together**.

This leads to further problems regarding

→ rhythmical precision.

→ enunciation of words and lyrics.

→ overall choir sound.

Sources: Carlson & Hanna-Weir, 2021

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Online group singing using low-latency software: Best practices

✓ **Do not let yourself get distracted by initial timing problems**. At first, it takes some time to get used to the online environment, but singers adapt quickly to the new situation.

✓ **Provide rhythmical stability**. Because of the lack of visual guidance the singers need an acoustic signal that provides a clear and steady beat in order to avoid slowing down while singing. This acoustic signal can be a metronome or a playback recording of an instrumental accompaniment as an example.

✓ **Remind singers to listen to the acoustic signal** for rhythmic orientation instead of listening to fellow singers or looking for visual cues from the conductor.

✓ **Practice rhythm-related musical skills**. It is important that the singers are able to keep in time autonomously and that they do not loose track while counting rests.

✓ **Boost the confidence of the singers**. Singing „alone" from home instead of singing in the usual group environment can feel a lot different and challenging. Encourage singers to trust their own musical abilities and sing with confidence.

Sources: Boyd, 2022; Carlson & Hanna-Weir, 2021; Galván & Clauhs, 2020; Martinec, 2020

Multitrack videos: Benefits and challenges

Benefits 👍

- Multitrack videos as a common goal
- Can inspire „sense of communion"
- „Cool factor" of technology-mediated performance
- Fostering of musical learning and development (e.g. active and critical listening)
- Fostering of independence (e.g. improved possibilities for self-assessment)
- Asynchronous and location-inpendent format opens up opportunities for new collaborations

Challenges ❗

- No musical interaction during time of production
- Lack of spontaneity and creativity
- No social interaction between singers unless combined with other tools (e.g. online rehearsals)
- Singing in isolation, listening to own voice and seeing one's video may lead to feelings of exposure and cause stress
- Outcome may be perceived as synthetic

LOW-LATENCY

Sources: Boyd, 2022; Galván & Clauhs, 2020; Martinec, 2020; Morgan-Ellis, 2022; Paparo, 2021

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Recommendations for online rehearsals

General recommendations:

- Encourage **social interaction** and provide space for informal conversations, e.g. by doing games or using break-out rooms
- Encourage **social presence** by welcoming individual choristers and inviting them to perform or share something with the group

Music-pedagogical recommendations:

- Concentrate on aspects and tasks in group singing that are **more suitable** for online rehearsals than others, e.g. learn new repertoire rather than finetune known pieces, do sectional rehearsals or concentrate on smaller sections of pieces, etc.
- Try out pieces of **different genres and levels of difficulty** to find out what works well and what does not work well in an online environment
- Compensate for lack of **feedback** by asking choristers what went well / where problems are.
- Substitute or complement real-time feedback with **asynchronous options**, e.g. by inviting singers to prepare recordings
- Integrate **online performances** (e.g. multitrack video) to have a goal to work towards

Sources: Carlson & Hanna-Weir, 2021; Galván & Clauhs, 2020; Rourke et al., 1999

Outlook

Enhancing online choir rehearsals
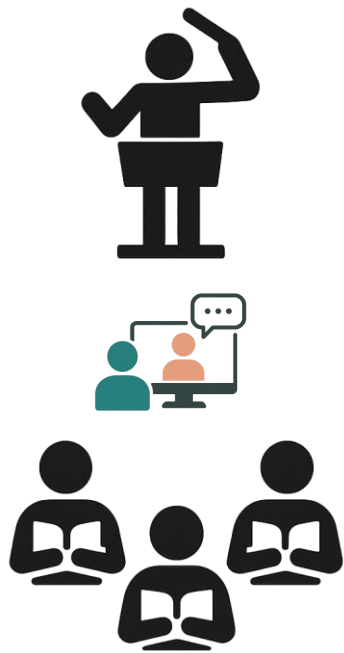
There are many ways of **enriching online rehearsals**. By using the technical tools that are needed for online singing, it is relatively easy to offer **musical and theoretical training** on different musical skills that are important for choir singing in general.

➔ **General musicianship training:** Online training sessions can be offered to improve sight singing or rhythm reading skills. These skills are very helpful for singers when they have to learn new repertoire. Moreover, general musicianship training can also include sessions on music history, interpretation, performance practices and everything else that is relevant for the performance of a choir music.

➔ **Voice training and vocal exercises:** Especially one-on-one or voice training in small groups can be done in an online setting quite well. It is possible to invite voice coaches from all over the world to work with the choir singers.

➔ **Inviting guest speakers/conductors:** Rehearsing online opens a lot of possibilities to invite guest speakers/conductors from all over the world. When rehearsing a contemporary choir piece, it might be very interesting to have a discussion with the composer about their thoughts and ideas of their piece.

Sources: Carlson & Hanna-Weir, 2021; Swanson et al., 2021

Future potentials of online group singing (1/2)

✓ **Enhanced musical learning**: Fostering **independence** in learning and active listening, online rehearsals may be a powerful tool to **complement** in-person singing. **Asynchronous** learning may allow for a more **individualized** learning experience and improved **skill development**. While this might be challenging initially for some singers, it can also give an opportunity to develop one's singing skills further. Moreover, it means that singers can develop their relationship to their own voice as they are able to hear themselves well while singing. This might also have a positive effect when singers return to singing live with others, since they might have gained more **awareness** and **better control** of their own voice.

✓ **Traditional hierarchies within in choirs can be redefined**: In many choirs during live rehearsal the conductor is the only one to give **feedback** to singers. When singers have to sing by themselves or when they record themselves, there is the option that they evaluate their singing themselves or that other choir members give feedback during this process as well. This can lead to **musical empowerment** on the side of the singers.

Sources: Boyd, 2022

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Future potentials of online group singing (2/2)

✓ **Improved accessibility:** Online rehearsals promote inclusion and flexibility, e.g. by allowing individuals in remote areas or with other restrictions participate.

✓ **(New) collaborations**: Location-independent online rehearsals make easier to do collaborative projects with partner choirs, e.g. in other countries, or invite guest artists.

✓ **New forms of aesthetic expression:** Musicians can come up with ideas for leveraging technology in creative ways to rethink choral art.

✓ **Increased reach:** Online performances allow choirs to reach new audiences and more people beyond local communities.

✓ **Improved sustainability:** Online rehearsals may help save greenhouse gas emissions by reducing trips to rehearsals.

Sources: Boyd, 2022; Daffern et al., 2021; Morgan-Ellis, 2021a, 2021b; Morrison, 2021

Required technological innovations to further improve online group singing

➔ **Low-Latency video:** While some software already offers the ability to work with low-latency audio, there is still no proper way to combine it with low-latency video. This would be a major step forward, as the art of choral singing is usually closely linked to the visual gestures of the conductor. Conductors can not only indicate tempo and dynamics with their conducting, but also give a lot of micro-information about the character and style of the music. This is done, for example, through facial expressions or body language.

➔ **Choir sound:** When singing online, people usually use a microphone to send the acoustic signal of their voice to a server that combines all these individual acoustic signals. Therefore, the acoustic experience of an online choir rehearsal is often very different from an in-person rehearsal. When people are singing together in a room, the acoustics of the room play a big role in creating a mixed choral sound from all these individual voices. Technical improvements should look for a way to create a similar experience of a mixed, homogeneous choir sound for online rehearsals.

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