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Remote Musical Collaboration During the COVID-19 Pandemic

Gwen Manley-Muller

Ramapo College of New Jersey

Article Info.	Abstract

The quarantine and social distancing guidelines put forth during the COVID-19 pandemic have impacted the way in which musicians get together. The review for this study examined primary and secondary sources previously published online as well as academic journals published before June, 2020. Interviews with subjects were conducted in February of 2021. Unable to convene, musicians have taken to using technology developed for remote collaboration. Currently, these technologies can be divided into four distinct types: community websites, audio and file hosting websites that enable private or public interaction, digital audio workstations (DAWs) that allow for real-time remote collaborative editing sessions, and software that enables low-latency live performance. Established artists are passively collaborating with fanbases by offering excerpts (stems) from their music on newly-founded websites such as Isolate/Create, as well as experimenting with technologies that are not specifically designed for music use, including Instagram Live and Zoom, in order to find new methods of cooperation and communication. Pre-existing tools such as the mobile DAW Trackd are being promoted in an attempt to grow their user bases, as musicians explore new creative outlets. Lesser-known and amateur artists are also using these tools as a way of maintaining a sense of connection during periods of social isolation. The pandemic has had an influence on the themes of these musical pieces: a number of campaigns have utilized this technology including the #DONTGOVIRAL campaign in Africa, which aims to combat the 'infodemic.' These tools for remote collaboration have been in use for a number of years (e.g. Daisyphone has been available since 2003), however the pandemic has escalated their necessity. The development of these tools, particularly regarding the use of mobile DAWs and their user bases, can help to create and sustain a broader community for those with relatively limited recording equipment, in areas where mobile devices are more prevalent than computers, and for those with limited mobility including musicians with disabilities. As this thriving worldwide community grows, it is likely there will be a blurring of styles and the formation of a new genre entirely based around these remote collaborations.

1. Introduction

In the wake of COVID-19, music in any sort of live or in-person performance context has all but ceased in response to social distancing guidelines (defined by the UK's National Health Service as avoiding close contact with anyone with whom one does not live), which have been put forth in an effort to slow the spread of the pandemic. As a result, many musicians have turned to remote collaboration enabled by Internet communities and software, utilizing the various technologies available. Although these methods of creation are not new, they have become a newfound necessity within the music industry

on all levels as musicians struggle to maintain and grow their communities, secure their livelihoods, or simply fulfil their creative drives. As the importance of remote collaboration increases in response to the exigencies of the pandemic, it provides artists with a way to remain stimulated and connected, and able to explore the vast global network of musicians. From this, multiple implications present themselves, drawing from the increasing accessibility and cultural homogenization originating from the very nature of these distanced joint efforts.

Remote collaborations come with both certain limitations and freedoms not present in in-person interactions. These new nuances within the creative process force users to find the most effective uses of these technologies. With so many websites and tools accessible to users and the rise in their relevance during the COVID-19 pandemic as musicians utilize them for personal projects or campaign efforts, this shift in cooperative methods may be adopted more easily and welcomed as a viable alternative, possibly even extending its impact post-pandemic.

2.   Technologies

There appear to be four subcategories of collaboration spaces and technologies that have significant overlap but independent importance within remote musical collaboration, and which cater to musicians seeking a variety of outlets for 'do-it-with-others' (DIWO) projects. These can be simplified and categorized as community websites, audio hosting websites, online digital audio workstations (DAWs), and live collaborative performance software. Community websites have largely had a consistent user base, while many applications and websites in the other groups have had increased traffic since the beginning of the COVID-19 crisis.

Community websites, in this context, are those sites where musicians can make connections and find others with whom to collaborate. Popular social media websites such as Facebook, MySpace, Twitter, Soundcloud, and Bandcamp fall into this category. Although they do not include software to aid in the music-making itself, their importance comes in their provision of a space to find like-minded musicians. Users may post or place links to their music and gain a following, thereby facilitating communication with potential associates. Some of these social media companies are aware of their usefulness as cooperative tools: Soundcloud, which has a history of catering to hip hop artists - a genre that is known for collaboration - allows the private sharing of tracks by creators in order to facilitate individual input (Soundcloud, 2018). Other websites within this category are more expressly aimed at finding potential collaborators. On these sites, people may post clips or 'auditions' to seek out others who might want to work with them, and include the websites/apps Vocalizer and Vampr. These more community-based websites are important to the growth of remote partnerships as it has been suggested that songwriters 'who engage in social features and one-to-one collaborations perform their songwriting goals better than those who are non-social' (Calefato, Iaffaldano and Lanubile, 2017: 1)

Once musicians find potential collaborators, they may use audio hosting websites that allow users to post or to send tracks back and forth without affecting audio quality, which is necessary for a successful partnership. Some are solely file hosting websites such as Dropbox and Google Drive, while others offer more functionality for the creative process. Some of these websites open up projects to the public and allow the owners to determine the finished product while soliciting input from others in the community, for example, Kompoz, Soundstorming, and Blend. The website Splice offers a space to upload recording sessions where others can contribute to the project, as well as having free and on-sale plug-ins for musicians to help with their creations. These types of websites have become increasingly popular during the pandemic: according to data gathered by Similar Web, Splice saw growth from 3,400,000 total visits in February of 2020 (pre-pandemic and stay-at-home orders) to 4,600,000 visits in July 2020 (during the pandemic), with a peak in their monthly total visits in May 2020 (also during the pandemic). The aforementioned Kompoz also had more total visits, from 40,000 in February 2020 to 60,000 in July 2020 with a spike in April 2020.

With online digital audio workstations (DAWs), musicians can work in real-time with one another, rather than sending files back and forth or constantly uploading and updating files hosted on the Web. Many of these are free DAW applications for mobile devices, with notable examples being BandLab and Trackd. Others require acquisition of the software, as is the case with Soundtrap which, as of August of 2020, costs approximately $8 to $14 per month (approximately £6 to £10.50), depending on the user's plan. Pro Tools Avid Cloud Collaboration requires Pro Tools software, but also allows multiple people to edit one session at a time. If the paid services fall outside of a musician's budget, the aforementioned free software comes with features comparable to paid DAWs, allowing artists who are unable or unwilling to pay for services avoid compromising the quality of their finished pieces.

The fourth category, live performance collaboration software, has had a recent growth in popularity as it was largely unnecessary prior to the stay-at-home orders. While a variety of forms of remote collaboration could be appropriate in other contexts, playing live music together was largely regarded as an in-person social and creative interaction before the COVID-19 pandemic. However, with the start of the pandemic, this became no longer feasible. Use of live performance collaboration software is made more complicated by the issue of audio latency (time delays), an issue which is present in any software that makes use of the Internet for real-time collaboration. Musicians who want to play live with others virtually and participate in jam sessions must be mindful of this limitation. Software such as Soundjack and JamKazam offer low latency, although it is impossible to have absolutely none, and the latency is also dependent on the physical space between the performers. Long-distance collaborations may also have to contend with scheduling dilemmas if the collaborators are in different time zones (Wilson and McMillan, 2019: 4). Many performers are using Instagram Live and Zoom, but as these platforms were not made for music collaboration, they can have more problems than those applications specifically designed for virtual music interaction. There is software specifically designed for electronic musicians, who may try programs such as Endless or Ableton Link; however, Ableton Link is designed solely for people using the same Internet network and is not intended for remote music-making.

Live performance software operates as an 'inter-destination multimedia synchronization' of a 'distributed tele-orchestra' (Montagud et al., 2012: 4), displaying independent yet interrelated points of data in the form of a visual and audio presentation from each performer. These are particularly crucial in conjunction with collaborators who are simultaneously receiving and sharing information. Most music, especially that which has a strong beat, requires cues on both sides in order to be synchronized, lest the collaboration proves unsuccessful. According to Montagud, within telecommunications 150 milliseconds is the accepted maximum for delay when talking remotely, but in certain situations even a delay of 100 milliseconds could be disturbing (2012: 8). Therefore it is likely that within music, this threshold is considerably lower. Latency can be caused by a multitude of factors that can originate from the receiver, the sender, or network delays and latency concerns have been addressed as live performance technology has developed over time. As operating systems (OS) have shifted from sequential to parallel processing in recent years, latency has become less of an issue, but resource allocation is still a top priority in the prevention of audio latency. The issue of resource allocation and its link to latency was tackled by researchers at UC Berkeley with their development of the Tessellation OS, geared towards real-time audio applications. Through 'space-time partitioning' and 'two-level scheduling,' resource assignment and management could be optimized for the lowest latency. Specifically, within wide area networks, which are often unreliable, it is especially important to run an OS that internally minimizes latency as much as possible (Colmenares et al., 2013: 1-3). With this in mind, the COVID-19 pandemic may bring about more concern for audio latency within any OS as these programs become a necessity, and demand as much optimization as possible in order for musicians to have a workable solution while in-person live performances are indefinitely suspended. This live performance software will likely never be a substitute for in-person performances, but it may become a more respectable alternative.

3.   Pre-crisis developments

Although remote performances are becoming progressively more popular in the face of the pandemic, this type of technology had been tested and used previously. Many of these platforms were established before the COVID-19 pandemic, but live remote collaboration software has undergone a process of experimentation over the years. Examples developed specifically for live remote collaboration include the DIAMOUSES project, developed for the Linux OS, which has been an ongoing effort to establish a base for live networked music performances of all kinds. This platform was demonstrated online as early as 2007. DIAMOUSES does not limit network nodes and removes bandwidth demand by 'mixing the audio streams that arrive from different nodes into a single network stream on the server', proving yet another solution for audio delay issues (Alexandraki et al., 2008: 1-6). In a later development, the MusiNet research project sought to improve the limitations presented by DIAMOUSES (or other networked music performance software like Soundjack). MusiNet's objective was to provide an intuitive interface that was accessible to those with mid-range computers and network access in a way that would not jeopardize the integrity of the audio (Akoumianakis et al., 2014: 1-2).

Other projects include NOMADS (Network-Operational Mobile Applied Digital System), developed by the University of Virginia, which is another program for remote networked performances that has its own creation interface. This application is intended to provide 'limited control to a large number of participants rather than giving a small number of performers a great deal of sonic control.' The participants join through their own mobile devices and the interaction is broadcast as 'sound, projected images, text, animation and lighting.' NOMADS was used in the telematic opera Auksalaq where it utilized 'high-bandwidth audio streaming in JackTrip… and video through ConferenceXP.' It has also been used in concert with the MICE (Mobile Interactive Computer Ensemble) Orchestra. Although similar to DIAMOUSES in that the musicians do not have control over the final product, rather than merging the transmitted audio into a single network stream, it hands the reins to an in-house engineer for mixing the combined presentation (Burtner, Kemper and Topper 2012: 46-49).

Daisyphone provides a unique approach to an online music collaboration tool. It is available for Apple's iOS, (and the more recent, but very similar, Daisyfields), and has been in use since 2003, formatting its cooperative interface in an entirely different way to other software and largely basing interaction and music making on visuals (Bryan-Kinns, 2011: 4). This interface defines remote music making as 'somewhere between improvisation and composition'. Daisyphone is based upon loops that may be edited and rearranged by moving, removing, or adding notes for a 'live jam' with other users (Bryan-Kinns and Healey, 2006: 1).

Another remote collaboration practice, which was also in frequent use prior to the COVID-19 pandemic, is sampling, which has been used particularly in hip hop and rap music where musicians often incorporate portions of others' tracks in their own work, thereby creating a collaborative product. Sampling is a more straightforward technique and may be done using widely available technologies rather than specific technological developments aimed towards distanced cooperative efforts. Although these are just a few examples, all these technologies had established communities and/or active developers before the pandemic rendered remote collaboration a necessity.

A number of virtual performances were also hosted prior to the pandemic, using the remote collaboration technology available. For example, in May 2019 the Swedish Red Cross International Choir performed live from the Göteborg Opera, while the Greek National Opera Intercultural Choir simultaneously performed from Athens. They both live-streamed each other's performances from their respective locations and they used techniques such as call-and-response in order to perform with each other in real-time, even though they were in separate locations (Wilson and McMillan, 2019: 4). These earlier conceptual explorations paved the way for the newer technologies and performances now in widespread use.

4.   The creation process and 'active' versus 'passive' collaboration

It is unknown how the development and increasing popularity of these collaborative tools will affect the songwriting process in its entirety. In 2017, the sound producer Martin Koszolko carried out a case study where he created a song entitled 'The Giver' using remote collaboration methods. The piece was produced using Ohm Studio, a real-time collaborative DAW. Koszolko actively worked with users from the USA, Italy, and Poland in his production process. He concluded that these methods can be highly successful, especially if one can find a small, dedicated group with whom to work. Even outsiders joining the group temporarily were not found to disrupt the process. Instead, attracting more people in the earlier stages aided in locating the most interested and dedicated contributors. The synchronicity of the software used also helped with the composition, making for a democratic process and a progression that felt natural (Koszolko, 2017: 33-37). The DIWO sentiment helps to facilitate an environment in which every member involved is able to make a meaningful contribution, regardless of the overall distribution of the workload (Cayari, 2020: 11).

An analysis of data from Billboard and Spotify reveals that well-known artist collaboration profiles and correlated success appear to be dependent upon four factors: interaction, distance, similarity, and influence. The most successful artists tend to have highly collaborative profiles (Silva, Rocha, and Moro, 2019: 2071-2076). Lesser-known artists generally have far fewer connections and less access to resources than their highly successful peers. For those seeking the best outcomes and most engagement for these DIWO projects, recently posted projects have a higher likelihood of receiving more participation from other users within online music communities. Artists should therefore focus on maintaining their relevance through consistent involvement and output and try to form creative relationships with fellow musicians who in turn may help boost their status once multiple parties have become involved, resulting in an increasing cycle of interest and interaction (Calefato et al. 2018: 68).

Beyond these tools specifically designed for 'active' collaboration, that is to say, those tools designed for multi-member project interaction, back-and-forth file sharing, and general communication, there is also what can best be described as 'passive' collaboration. This is better known as sampling, and the similar, albeit earlier and less popular style development of musique concrète - a technique reusing a snippet of one sound recording within another separate, larger piece. While the final product of these sampling efforts is a collaborative effort on the most technical level, it is generally a one-sided process in that the creator of the original sampled piece is often not involved in the creation of the piece in which the sample is used. Even so, the accessibility and quality of recording excerpts (stems) has increased greatly due to the Internet, file-sharing websites, and (often free) file conversion software, with evidence from a study carried out in 2000 showing approximately 14 percent of Internet users downloading digital music files for free (Gopal, Bhattacharjee and Sanders, 2006: 1503). Although digital music files are widely available, there are ethical and legal debates surrounding the use of samples taken from artists unknowingly, who are financially dependent on sales of their work. Some artists have begun endorsing these creative pieces, releasing their stems online for fans and fellow musicians to obtain through legitimate means. One such space created in response to the need to quarantine and maintain social distancing during COVID-19 is the website Isolate/Create, whose founders state that their mission is to 'spark creativity and inspire digital collaboration, all while still practising responsible social distancing and helping to flatten the curve during the Covid-19 crisis.' The website currently offers stems bundled from over 20 moderately successful artists (including Chelsea Wolfe, Converge, and La Dispute) in free downloadable folders hosted on Reverb.com. This ease of access and intimate artist engagement via the offering of isolated audio files that would be otherwise acquired unethically or would be inaccessible to fans, opens up possibilities for more involved and interconnected creative processes (Isolate/Create, 2020).

5.   Established artists and promotion

In April 2020, the pop artist Charli XCX announced through a Zoom call (a video-conferencing platform) with fans that she would be recording and releasing a new album entitled "How I'm Feeling Now". With the world still in the midst of the COVID-19 pandemic, this would be a challenging task, relying on remote collaboration with others in the music industry. Using her connections, she was able to work remotely with well-known producers and artists such as Dylan Brady of 100 Gecs and A. G. Cook (Babcock, 2020). She made her process open to the public, live streaming workshopping sessions where she would play demos for fans on Instagram Live and Zoom in order to receive their input (Merchant, 2020). After six weeks of work, the album was unveiled on May 15 to wide acclaim. Having neither access to a studio nor the ability to meet with other musicians in person, she was able to make do with her existing tools and to engage in a creative process in a different way, while still achieving a desirable result. The virtual nature of these collaborations allowed for a more interactive process with her fanbase, similar to that of Isolate/Create, although rather than having fans creating their works based on an artist's contributions, she was basing her work on the fans' input.

Charli XCX's use of social media and remote live performances including interactions with fans, have granted her a novel way to maintain her relationship with her fans. She has used Zoom to communicate but also used the application to play music sets online. She has performed to approximately 1,000 fans in a Zoom call called Club Quarantine, a queer online nightclub where 'performers and artists and DJs and singers' come together to put on a nightly show intended to imitate a real club setting. The club strives to uplift and provide a platform and safe space for local underground artists as well as having celebrity interaction and participation which, along with Charli XCX, have included the likes of the singer/songwriter Robyn and actress Hunter Schafer (Colyar, 2020).

Although other artists have had similarly successful album releases using more conventional methods of remote collaboration (sending files back and forth), this might be attributed to having a previously established level of success. Ten-time Grammy Award winner Taylor Swift released her album *Folklore* on July 24, 2020, and only announced it 16 hours prior to its release. While self-isolating, she worked with other popular artists including Aaron Dessner, Bon Iver, and Jack Antonoff (Unterberger, 2020). Receiving wide critical acclaim and record-breaking streams on Spotify within the first day of release, the album further cemented the legitimacy of remote collaboration within the industry as a means of music-making.

Other artists have taken to directly endorsing certain programs to the public, rather than just using these collaborative methods for their own individual projects. Dave Stewart of Eurythmics held a contest for artists to submit songs based on an idea he shared to the mobile DAW Trackd for a chance to win $6000 and a recording deal. The Welsh artist Otto was declared the winner and has since worked with Stewart to create a finished product (Trackd, 2020). This contest provided an incentive to begin using these types of applications for those who otherwise may not have shown an interest in a DIWO experience, thereby growing the user base of Trackd and in turn, providing a richer and more diverse experience for the entire user base.

6.   Smaller-scale artists, big impact

While a number of established artists are using this period to create, promote, and release their materials and to create a larger presence on the available platforms, lesser-known artists are using the time to ensure that their community stays together, during a period when musicians are experiencing significant financial strains because of limited work options. One example of this comes from the United States in West Michigan. The Michigan Music Alliance created the Artist Relief Fund as a way to help ease the financial burden on musicians in the area who were unable to get gigs because of the indefinite closure of venues. The Music Alliance put together a four-day festival called Spread the Music featuring artists live-streaming performances from their homes or other remote locations in order to get donations

and raise money for the Artist Relief Fund. The festival included sets from 40 artists and raised more than $11,500 for the fund (Sinkevics, 2020).

While many are coping with their lack of income, others struggle with mental health while attempting to quarantine or socially distance themselves in attempts to slow the spread of the virus. In a period of social isolation, music can create a sense of community, while providing entertainment and stimulation for those involved. Some have expanded their communities outwards, for example the musician and composer Vinicius Leal who lives in France but was quarantined in Brazil while on vacation. He began working on music to help him cope with the stress of being separated from his family together with dealing with a water shortage. Leal described how the situation gave him extra time to work on unfinished projects. He recorded a demo and sent it to his father-in-law, Júlio Pimentel, another musician and composer. The demo was then sent on to a percussion teacher from the Federal University of Santa Maria, Sandro Cartier, and what started as a remote collaboration involving only three people has now expanded internationally, as musicians from Portugal and France also contribute to the project (The United Nations Department of Global Communications Rio, 2020).

Many musicians are using this time to collaborate with others and to spread messages to their local communities and also sometimes globally. In Africa, the #DontGoViral campaign was started by UNESCO and the Innovation for Policy Foundation. This campaign features artists from all over the continent sharing content and collaborating to make COVID-19-related material in order to combat what they call the 'infodemic' and to spread awareness of the pandemic. Some of the musicians involved in this campaign have collaborated remotely to create songs about the topic. For example, Seun Kuti, son of Fela Kuti, remotely paired up with the Parisian musical group Les Frères Smith to create a song and video called 'No Waiting' about being proactive and making a change in the name of justice (Girard, 2020). Musicians from other countries are also taking initiatives independently of any campaign. One such example is Sri Lankan musicians Gehan Blok and Dino Corera who made a song called 'Corona' in which they sing about ways to prevent the spread of the virus (Blok and Corera, 2020).

There are also musicians who have used the topic of the pandemic for inspiration, but rather than focusing on educational messages, they are trying to spread messages of positivity and hope. Pakistani musician Kashan Admani worked with 40 musicians from seven countries in a remote collaboration called 'We Are One/Ae Khuda.' Musicians featured in the composition included English Grammy nominee drummer Simon Phillips, Indian singer Palash Sen, and American Grammy award-winning violinist Charlie Bisharat. Admani's idea was to come together at a time where many are isolated (Yasir, 2020). In a similar vein (and on a smaller scale), 25 musicians from Gainesville, Florida, USA created a group called Band Together, where they created a song remotely called 'On the Other Side' as a tribute to healthcare workers (Montgomery, 2020).

7.   DIY artists speak about their experiences

In my interviews with four separate musicians (three situated in the U.S.A. and one in England), their experiences of collaboration and their outlook on music during the pandemic varied depending on the musicians' genre and their position within the industry. One of the musicians made rock music largely with organic instruments, one made experimental rock with electronic elements, one managed a label, and one created hip hop music. Hunter Wolfe of Nashville, Tennessee sings and plays guitar for the band Born Crooked who released the single 'Hearts Like Grenades' on January 24, 2021. While he felt that the music created was limited by the use of his personal home studio, he also described how recording from home provided an outlet for self-expression, especially as the stress of the pandemic caused a very serious challenge to his mental health. He described how working with bandmates from different states was not quite as efficient as in-person sessions, as it lacked the instantaneous back-and forth of in-person interaction. However, the musicians were able to easily send recordings to one another by accessing Apple's GarageBand and Logic DAWs. The pandemic allowed Wolfe time to refine his skills in using

these programs and in using his personal recording gear, and to expand his setup. As a result of his limited options, he found that the process was somewhat simplified:

> 'I don't think our style has changed much because of the distance and solidarity. I do think it has forced, at least myself, to get back to our roots… to our original sound in a way. It's easy to go down different paths when you're together in a studio with unlimited options,' he said.

Steven Moraghan of the band Grey Goes Black based in New Jersey has had some experience with remote recording as his band had created demos remotely, prior to the pandemic. In July of 2020, the band released an EP entitled 'The Slow Death of Everything' through the U.K. label Shore Dive Records. Although he found that using software from home was not difficult, and used Google Drive or Dropbox to share ideas with bandmates, he stated that most of the issues arose from laziness, which he attributed to staying home. He said, 'When you aren't paying for studio time or can do it in the convenience of your own home it can sometimes be hard to find the motivation. But that is also an advantage when you can really pick up a tablet and create whenever you want: at home, on your lunch hour at work, while you're waiting to pick up your kids from a school event... Really any time you can turn it on and work on things.'

Grey Goes Black's music contains electronic elements, which have increased due to Moraghan's use of electronic drums. With no studio to record live drums, he used the electronic drum kit presets pack Caustic which he believed made the music sound 'thinner.' He stated that the remoteness and the nature of the electronic programs themselves made the process of creation lose some of the spontaneity that could previously be found within it. Although all three band members used different recording software, the band ultimately utilized the DAW Reaper and the members sent their work online through Landr, an automated online mastering service.

Nicolas Pierre Wardell, who uses the moniker Nico Beatastic, runs the record label Shore Dive Records which released Moraghan's band's music. Shore Dive Records is based in Brighton, England and has a variety of artists, most of whom can be described as working within the rock genre. Wardell also creates his own music under a variety of names, notably Beatastic. He describes remote collaboration as allowing for a new palette of options with which to work, and explains that of course, one can choose with whom one wants to collaborate, however remote collaboration also allows access to an expansive list of tools available online. Wardell is not concerned by the limitations of recorded work but rather by the absence of live performance. His critique of live performance software is that it does not have the presence of a live setup. He relates his experience seeing the band Mogwai in live performance: 'I remember the sound pushing me in the chest… I had to take a step back from the sheer volume,' he stated. This experience of intensity, he believes, cannot be recreated by any means in a digital livestream of a performance.

Lastly, Charles Pfrommer of New Jersey, using the musical alias DeathIRL, has released music in the hip hop community since 2019. Due to hip hop's electronic nature and long history of remote collaborations and sampling, Pfrommer has had little difficulty in adapting to the new musical climate. Although in his experience, in-person collaboration with artists is generally easier for improvising and creating mutual understanding of shared goals, ultimately he has not found that the quality of the product has been impacted: 'Hip hop has always been at the forefront of the digital age in terms of music-making,' he said. 'We were already operating in terms of a pandemic… It was already [a] pandemic-proof genre. Someone lays down a track, it gets sent somewhere whether it's USB… It's already digital. Everything is already made in the DAW. You don't have to worry about the algorithmic compressions… unless you're mastering.'

Pfrommer attributes the success of hip hop as a genre, as well as its 'pandemic-proof' quality, to its 'home-brewed' nature in that it is one of the most accessible genres, requiring little more than a functional computer and access to a microphone. He says that one aspect of the COVID-19 pandemic that

may affect hip hop is that many people have more time for experimentation within their craft. He suggests that this period of time when there is little live music is good for exercising creativity and for utilizing the tools at one's disposal: 'limitations breed genius,' he noted. He also stated that regardless of the stay-at-home orders, if one is a musician, one has to be part of a scene, which means that any artist wanting to remain creative and relevant should use the Internet and make connections. Pfrommer believes that for the music industry as a whole, the experience of remoteness is going to 'cut the fat', with any part of the industry that was already on its last legs or only just starting off likely to end entirely: 'There's not going to be some revolutionary change or meteoric discovery. It's more a sad last breath in a hospice center,' he said of the state of the industry.

8.   The value of technology beyond the scope of the pandemic

To the extent that technology has developed out of necessity, the inflation of the value of remote collaboration may have an impact that reaches far beyond the scope of the pandemic. These types of technologies create and sustain a broader, worldwide community that is available to people of all skill levels. As not everyone has access to top-tier recording equipment, these applications and communities - available through mobile phones - could provide many with a way to create works using limited musical or technological appliances. In most developing countries where, according to the Pew Research Center, there is far more access to mobile phones than computers or tablets, this may come as a blessing for those seeking an online avenue for artistic expression. With added ease of access, this may create more opportunities for collaborations and sharing of music from these areas, which may create greater diversity in online circles (Silver, 2020).

It is important to note that not everybody in these communities has only been using this technology to replace in-person collaborations since the introduction of social distancing guidelines. Some people, for example disabled persons, had been using these types of technologies to assist with their creative process prior to the pandemic. Andrew McMillan, who lost much of his mobility in an accident in 2004, cites the programs Pure Data (which has its own community website) and Max/Multi-Pitch Detection as providing ways of interacting better with his associates, and allowing him to use less physical effort (Wilson and McMillan, 2019: 2-3). Although he used these programs in live settings with other musicians who were physically present, these technologies can also be used for virtual efforts. While it is too soon to accurately measure the expansion of these remote musical communities, it is likely that they have increased as they have become a necessity for a larger number of people. This growth will then provide existing users with more people with whom they can collaborate, thereby expanding the musical pool that was previously more limited.

There is an even broader need for online technologies in the field of music education, which in many places, at various times during the pandemic, will be restricted to using remote learning environments. Access to technology is a key factor to consider, and meaningful interactions between students and teachers are dependent on there being a stable and reliable form of internet connection between their respective devices. Mobile devices are oftentimes a more affordable and more accessible alternative to computers, and with the sizable roster of currently available mobile applications catering to various kinds of remote collaboration, constructive virtual interaction is now more attainable than ever. Within teacher education, mobile learning has been reported as beneficial, citing real-world applications across multiple disciplines that could fundamentally change the organization of the classroom, especially relevant in a time when the classroom is perceived by many as no longer a safe option (Baran, 2014: 23).

9.   Stylistic implications and conclusions

Another possibility afforded by this technology is the continued blurring of styles. As the world becomes more connected and culturally homogenized by means of the Internet, styles of music may become increasingly hard to label. Styles may now start to develop and thrive in online communities, rather than in physical ones. Applications and communities can connect musicians of all levels to anyone in the world, permitting them a larger pool of potential collaborators from which to choose. Certain

collaborations have been a global effort, with some even having forty or more musicians contributing, for example in the case of Kashan Admani's 'We Are One.' This collaboration is bound to have an influence on the sound as the musicians bring their local influences to the mix. As these joint efforts become more popular, more people will be exposed to other regional musics in both direct and indirect manners. This may also point towards a new genre in itself, as the practices and processes of remote music collaboration show a growing musical culture, albeit in the early stages.

As musicians are banding together on a global scale, they are realizing that they are less limited by their physical location and that they can find people anywhere and on any skill level with whom to work. Now that more musicians are utilizing tools for remote collaboration and becoming familiar with the process of virtual collaboration, one can expect the numbers of collaborative projects to continue to grow, and it is possible that will carry on once it is no longer a universal necessity. The long-term impact of the pandemic on the music industry is unknown, but many are making use of established platforms and working creatively using other decidedly non-musical platforms in order to compose, broadcast their music and perform with others. Mainstream artists have been put in the same position as amateurs as nobody is able to leave their house, and everyone is using the resources available to them to continue creating and stay connected. With many artists now turning to remote collaboration, this use of technology may become a new normal, and a more global music community may be formed as people flock to the applications and websites that foster these creative spaces, resulting in more diverse communities, and genre-blurring music.

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