





Resonant Webs: An International Online Collaborative Arts Performance for Individuals with and without a Disability

Jonathan Duckworth¹(✉) , Shigenori Mochizuki² , Ross Eldridge¹,
and James Hullick³

¹ School of Design, RMIT University, Melbourne, Australia

{jonathan.duckworth, ross.eldridge}@rmit.edu.au

² College of Image Arts and Sciences, Ritsumeikan University, Kyoto, Japan
mochiz@im.ritsumei.ac.jp

³ Jolt Sonic and Visual Arts Inc., Melbourne, Australia
james.hullick@joltarts.org

Abstract. In this paper we discuss the creation of an international online sound arts performance developed in collaboration between artists in Australia and Japan. The COVID-19 global pandemic has made community activities related to the arts more challenging due to restrictions on personal mobility and international travel. We report on a hybrid workshop approach that combines online and face-to-face interaction, which has enabled sound artists with intellectual disability to participate in activities with international outreach. Specifically, we describe the design and technological implementation of a live performance and an interactive audio-visual artwork that translates audio data to visual effect from an Australian ensemble of sound art musicians with intellectual disability, and a professional Japanese Noh singer and performer. Based on the artists initial reflections in developing the performance we discuss opportunities and advantages of online digital spaces for international collaboration and co-creation in community arts contexts that may be utilised in the future.

Keywords: Interactive art · Disability · Sonic arts · Participation · Interaction design

1 Introduction

The significant impact of COVID-19 on the arts, cultural and creative industries are among the most adversely affected industry sectors due to measures to control the spread of the virus such as local government social distancing requirements and closure of physical venues, prohibiting not only public indoor performances but also rehearsals [1]. For many in the skilled, resource-intensive, and highly collaborative performing arts and music sector has seen most activities postponed or cancelled. According to Deloitte Access Economics, in Australia the pandemic resulted in an estimated AU\$6

billion forecast loss in revenue between April and June 2020 for the arts sector [2]. The Australia Council for the Arts found that only 47% of businesses in the arts and recreational services sector were trading in the week commencing March 30, 2020, with 94% of arts and recreational industry adversely affected by government restrictions arising from COVID-19, as compared to 90% of businesses as a whole [3]. The situation was similarly dire in Japan, with the Government Agency for Cultural Affairs reporting that 80% of cultural events were postponed with 60% cancelled indefinitely [4].

In response to the crises, individuals, and arts organisations with resources to do so have adapted existing materials to the newfound restrictions, luring wider audiences via digitized archives, tours of virtual exhibition spaces, and streaming performances for what would otherwise be localised public events [5]. However, the rapid shift toward digital service delivery has been unevenly distributed across cultural institutions, artist collectives and individuals. The provision of digital services assumes the availability of digital connectivity, access to devices, data, necessary software, and hardware platforms along with the ability, staffing, skills, and resources to access those platforms [6]. A lack of funding for Artists and those working in the community arts industry has made access to appropriate digital resources challenging and the long-term outlook for the sector remains precarious. Furthermore, those with a disability have been identified as being at greater health risk of COVID-19 in Australia [7], which requires organisations to provide additional levels of support and care to ensure their safety in public settings.

The rights of access to the creative arts and the opportunity to live ‘an ordinary life’ is a statutory requirement of many agencies that serve to protect and foster participation of marginalized groups [8]. And yet, those who need specialised support and who wish to participate in such activities are often excluded by a lack of availability, accessibility and/or the capacity of creative arts organisations to accommodate their needs [9].

We have been working toward creating opportunities for individuals with and without disability to jointly collaborate in the arts using interactive digital technologies through various workshops, performances, and exhibitions [10]. Our prior research discussed how social aspects of group interaction combined with the affordances of digital technology may be exploited to enhance the participation of people with a disability in co-creative, artistic activity [10]. We define participation as an approach that may lead to improved person-related constructs such as heightened sense of self-efficacy, preferences, belonging to a group, and the development of specific competencies that can be carried forward [11]. Indeed, several other examples of inclusive technology design in the arts has been shown to further enhance the opportunities and developmental needs for people with a disability and act as a catalyst that extends the invitation to participate in cultural activities and expand individuals’ preferences [12–14].

Our community arts partners provide excellent examples of successful implementations of online technology that facilitate collaboration and creativity during COVID-19. Slow Label is a non-profit organisation in Japan that generates opportunities for forms of co-creation that transcend national and disciplinary boundaries through the arts with a specific focus on disadvantaged and diverse communities in developing stage performances since 2014. Slow Label has produced and developed several successful initiatives and performances for diverse audiences including Slow Circus project, a circus school and workshop program that utilizes the circus arts to support disadvantaged and

disenfranchised youth [15]. In 2019, Slow Label developed a social circus program which assists people with a disability to participate in society through practicing and learning circus skills. Their social circus program has conducted numerous workshops and circus schools which resulted in the first Social Circus performance held in Japan [16]. Due to the impact of COVID-19, Slow Label's circus program has hosted online workshops using online video streaming services, where participants can practice moving their bodies and performing while watching videos of the instructors and other participants [17].

Similarly, Jolt Sonic and Visual Arts (JOLT), a non-profit arts organization based in Melbourne, Australia provides specialist training in the arts for people with intellectual disability and disadvantaged communities since 2008. JOLT is an inclusive sonic arts organisation that creates in-house sonic works, whilst also supporting and presenting the works of other auditory creators. Sonic arts access has become central to JOLT's identity having supported and mentored The Amplified Elephants – a sound art ensemble with intellectual disabilities [18]. JOLT has developed an online workshop program since the beginning of the pandemic to facilitate collaborative learning and rehearsals for sound art performances with sound engineers and other auditory creators.

These examples embrace the idea of inclusivity and foster participation that provide an environment for everyone to contribute when they are afforded opportunities for their involvement whether online in virtual space or face-to-face. However, the feasibility of digital technology and hybrid online activities for individuals with a disability during the disruptions caused by COVID-19 are little understood. We report on the development and technical implementation of a sound art performance developed through a hybrid workshop program that combines online interactions between Australia and Japan. We reflect upon the experiences of the artists participating in the workshop program and performance which offers some preliminary insights on how individuals with disability were able to collaborate with international artists and to connect with others in the development and presentation of a performance mediated through digital live streaming technology during the pandemic.

2 The Resonant Webs Live Performance

The Resonant Webs project is an arts and cultural collaboration between RMIT University and Ritsumeikan University to develop a proof-of-concept live online public sound and visual performance aimed at enhancing the participation of artists and individuals with a disability in the arts industry in Australia and Japan. This project builds upon common interests between the researchers who explore inclusive design and rehabilitation technologies for populations with motor and cognitive impairment [19]. This relationship was further augmented to include two community arts organisations, JOLT and Slow Label, with whom the researchers had forged long term collaborations to develop audio-visual technology for several live performances.

2.1 Project Design and Scope

A twelve-week program was designed to facilitate the online collaboration between the partner organisations and the artists between January-March 2021 in preparation for the live performance. With the disruption of COVID-19 remote learning in tertiary institutions and online collaboration became the new normal. In line with government restrictions and health and safety advice in Japan and Australia, Slow Label and JOLT had suspended all face-to-face activities and transitioned to online delivery of their respective workshop programs and events for professional artists and musicians with disability. The Resonant Webs project provided an opportunity to leverage our existing experience and skills working with online video platforms to develop the performance and rehearse remotely. During COVID-19 lockdowns earlier in 2020 The Amplified Elephants had already successfully transitioned to working online using the Zoom™ video conferencing platform prior to the commencement of this project.

The workshop structure was delivered via a blended mode of online sessions with the artists in Japan and face-to-face in Melbourne when restrictions permitted. The workshops were divided into three consecutive four-week activities. The first stage focused on the development and ideation of the performance; the second stage consisted of experimentation and co-creation with sound making technologies; and the final stage on the composition and performance rehearsals.

The scope of the project was to develop a proof-of-concept performance using online technologies to facilitate participation across international borders. Our role was to facilitate and implement the use of technology for the artists and to reflect upon the development of the performance. Our goal was to gain some initial insights into how the technologies supported the creative and collaborative process. We didn't wish to intervene in the existing creative processes of the artists or attempt to establish formal scientific evidence through empirical observations and qualitative analysis. Rather we focused on the artists existing relationships with technology to develop the performance motivated by our desire to facilitate increased participation outcomes for the artists. Our enquiry is framed by introducing the technical aspects of the performance as well as sharing the initial responses of the JOLT artists through the lens of our conceptual model known as the family of Participation Related Constructs (fPRC) which blends current theory on participation, interaction design and community art [10, 11]. After the workshops and performance JOLT provided written reflections based on their observations of the overall experience which we elaborate upon in the outcome section.

Throughout the twelve-week program JOLT mentored and managed The Amplified Elephant musicians who participated in the development of the performance. Their participation is supported through an arts program funded by the Australian National Disability Insurance Scheme (NDIS). The NDIS also made it possible for The Amplified Elephants to purchase a variety of computers and electronic instruments which they used for the performance. Participation into the program is voluntary and recruitment, training and individual consent is coordinated by JOLT management in communication with the participating individual and parent or legal guardian. The Amplified Elephants are supported through the rehearsal process by support workers and JOLT's Health Officer – a dedicated fully registered nurse qualified for mental health triage. Both support workers and the Health Officer are trained by JOLT for the specific care requirements of each

participant. Ethics approval was received from RMIT to obtain consent from the artists to use the publicly available outputs (e.g., performance and symposium) for publication and public dissemination.

2.2 Performance Ideation and Conceptualisation

The online workshops provided a space to facilitate the ideation, design and development of the performance and experimentation with sound making instruments and technologies. Common interests expressed among the group related to digital media art making practices, inclusive design approaches, building and sharing knowledge in sound art making skills, and interest in finding new ways and strategies for reaching audiences via online media.

In the initial conceptualization stages of the project, we gravitated toward developing a contemporary interpretation of *Hagoromo*, a traditional Japanese story told through Noh theatre performance. Noh theatre is a form of musical dance drama that crystallised in the 14th century in Japan. In traditional Noh theatre, the stage is a symbolic and minimal space whereby the stage set is usually adorned with hand drawn or painted pine or bamboo trees on the background wall. The main actor called *Shite* plays in the center of the stage, and the Noh orchestra called *Hayashi* and the chorus called *Jiutai* are placed at the side of the main stage [20]. The plot of Hagoromo is as follows: a fisherman finds the Hagoromo, the magical feather-mantel of *Tennin*, an aerial spirit or celestial dancer, hanging upon a tree bough. The celestial dancer demands its return. The fisherman argues with her, and finally promises to return it, if she will teach him her dance or part of it. She accepts the offer, performs the dance to the fisherman and then ascends into the celestial realm with the feathered mantel [21].

We expressed the collaboration as an elision of cultures between Japan and Australia via Noh theatre, contemporary sonic art, and technology as workshop themes to explore in developing the performance. To initiate the cultural exchange, Slow Label invited vocalist and singer Ryoko Aoki to perform Hagoromo as a form of traditional Japanese prayer for the well-being of all people during COVID-19. JOLT invited The Amplified Elephants to create an audio-visual performance as an interpretation of the Noh orchestra to accompany the Noh chanting. With the easing of some COVID-19 restrictions intermittent face-to-face assembly to workshop and rehearse was possible in each country. The rehearsals between the countries were combined online using video conferencing technology between Spiral Hall, Minato-ku, Tokyo, and Kindred Studios in Melbourne, Australia. The basic concept for the event was to hold simultaneous broadcast of the performance in each venue via live streaming and distributed online to the public. The online distribution was made available via YouTube Live as an event in the SLOW MOVEMENT Showcase and Forum on March 28, 2021 [22].

2.3 Technical Implementation

Representing the collaboration between the Japanese and Australian performers who were connected online but physically separated was an important issue. For the performance we adapted an existing digital media artwork developed by the authors called *Disruptive Critters*, to visualize and connect the musical performances of the

Japanese and Australian performers during the online streamed performance. Disruptive Critters is an audiovisual interface originally designed to augment live vocalized sound art performances [23]. The interface consists of a 42-inch multi-touch tabletop display; a graphical menu of six sound generating entities, or *Critters*, at either end of the display that users can select. The six Critter types (or strains) were conceived as an ecology of evolving sonic entities. The six strains are called (i) Pixel, (ii) Line, (iii) Spin, (iv) Flip, (v) Shape, and (vi) Cubic (see Fig. 1).



Fig. 1. A user interacts with the Disruptive Critters interface. The six critter types can be selected from the graphical menu at the edge of the screen near the user.

Each strain of the Critter has its own sound world and gestural repertoire that increases in complexity as it evolves from one form to the other in a linear fashion. The critters evolve in graphic and sonic complexity as it transitions from the first strain (e.g., Pixel) through to the final manifestation (e.g., Cubic) over a period of time. For example, the pixel, which is visually represented by a dot, will transition and stretch into a line triggering more complex sounds over time. The rate of transition may occur forwards or backwards at different speed depending on the Critters behaviour within the virtual environment, other Critters, and the performer. The movement of the Critters uses a ballistic physics collision model, which propels them around the virtual environment. Users can drag and place multiple critters into the scene using finger touch gestures. Each computer-generated critter outputs unique vocalized sound sample produced from a database of 456 pre-recorded abstract utterances that resemble human-like emotions. Once selected and placed, the critters become autonomous co-performers moving around the screen seemingly striving to communicate in unpredictable ways with the performers and each other alike. The Disruptive Critters interface was used by The Amplified Elephants during the performance.

In developing a hybrid version of Disruptive Critters for the performance we selected the 'Flip' critter as a central motif and virtual avatar to represent the Japanese and

Australian performers. Avatars are used to visually represent the performers in virtual space rendered and composited as an overlay onto the live video stream (see Fig. 2).

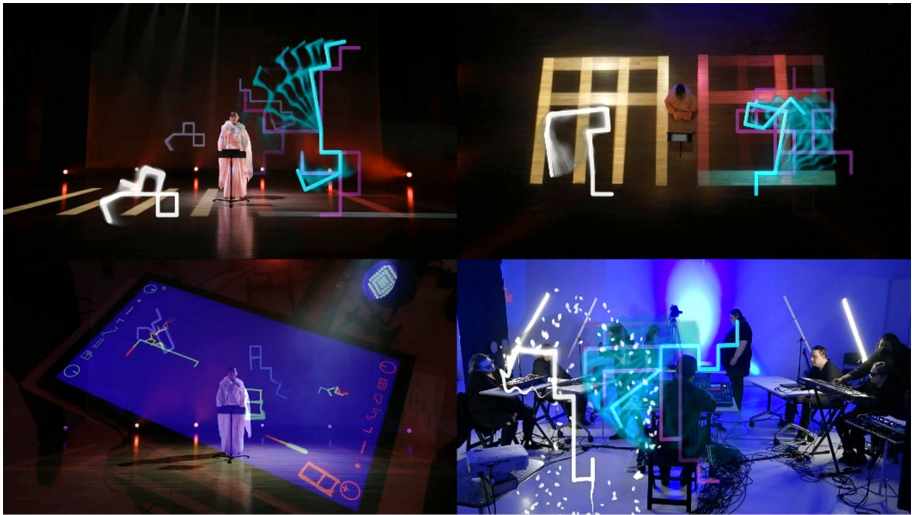


Fig. 2. Examples of the composited overlay of the virtual avatars on the live video stream.

The ‘Flip’ critter avatar is visually represented by a vertical graphical line divided into twelve equal segments. Segments can rotate by pivoting at the connecting joints. Joints rotate in increments of 90 degrees but are forbidden from flipping back upon the previous segment (180-degree angle). When the audio input signal amplitude exceeds a given threshold a random segment will be rotated 90 degrees either clockwise or counterclockwise. While the audio input remains above the threshold, a random segment will be flipped at a rapid interval. In this way a continuous loud amplitude will cause the critter to rapidly change shape, whilst a momentary sound will create small movements (see Fig. 3).

The heavenly maiden and the fisherman in the Hagoromo story are each represented by a Critter. The movement of each Critter is linked to the audio input of the singing voice of Japanese performer, Ryoko Aoki and the sounds generated by The Amplified Elephant performers in Australia. The ‘Flip’ Critter representing the Japanese performers was configured to rotate its segments more slowly and with a larger interval between each segment rotation. This Critter had additional visual effects applied throughout the performance: motion blur, ribbon trail and feather particles. Both Critters had a smoke-like fluid simulation effect and a waving cloth simulation applied at various points during the performance. In addition, the audio values of the overall performance were used to trigger and activate stage lighting patterns at Spiral Hall (see Fig. 4).

For the performance we used YAMAHA SyncRoom™ to monitor the audio from each performance venue. Several broadcast 1080p resolution video cameras were setup at Spiral Hall and Kindred Studios to capture the performance from multiple viewpoints. The video from Australia was transmitted to Japan using LiveU™ suite of broadcasting

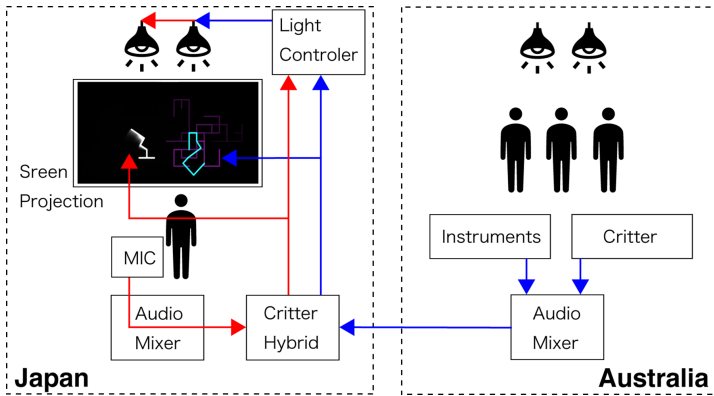


Fig. 3. Audio input and output diagram of the Disruptive Critter hybrid version.

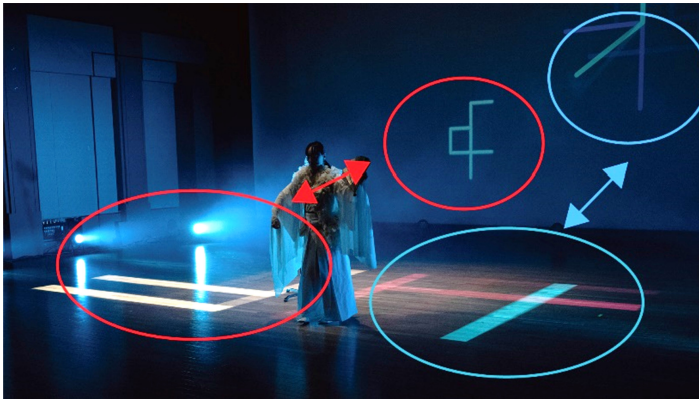


Fig. 4. The stage lighting effects, and movement of the rear wall projected critter avatars are triggered by the corresponding audio input.

technology which can transmit video with low latency and high quality (see Fig. 5). The live video stream from Australia was mixed in Japan with live video footage from Spiral Hall before being transmitted for broadcasting (see Fig. 6).

3 Outcomes and Reflections of the Artists

The online performance of Hagoromo was successfully broadcast on YouTube Live on March 28, 2021, as part of the event SLOW MOVEMENT Showcase and Forum vol.5 and was positively received by the audience as evidenced by their responses in the live chat [22]. The number of pre-registrations was 141 (93 in Japan and 48 in Australia), and the number of viewings during the performance was 204 (186 in Japan and 48 in Australia). However, the exact number is likely higher as many single registrants included the participants extended family members watching the event. The archive of the performance reached 554 views as of July 28, 2021 (354 in Japan, 200 in Australia).

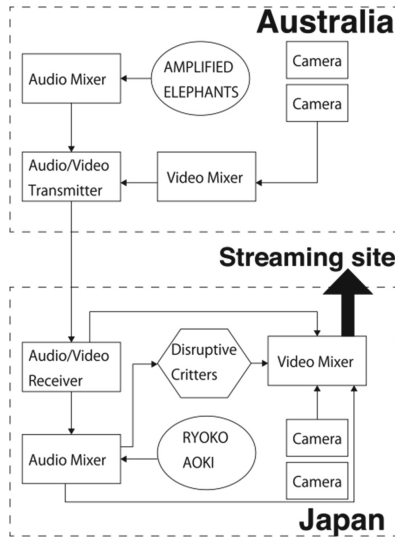


Fig. 5. Wiring diagram of the audio video inputs and live streaming output.

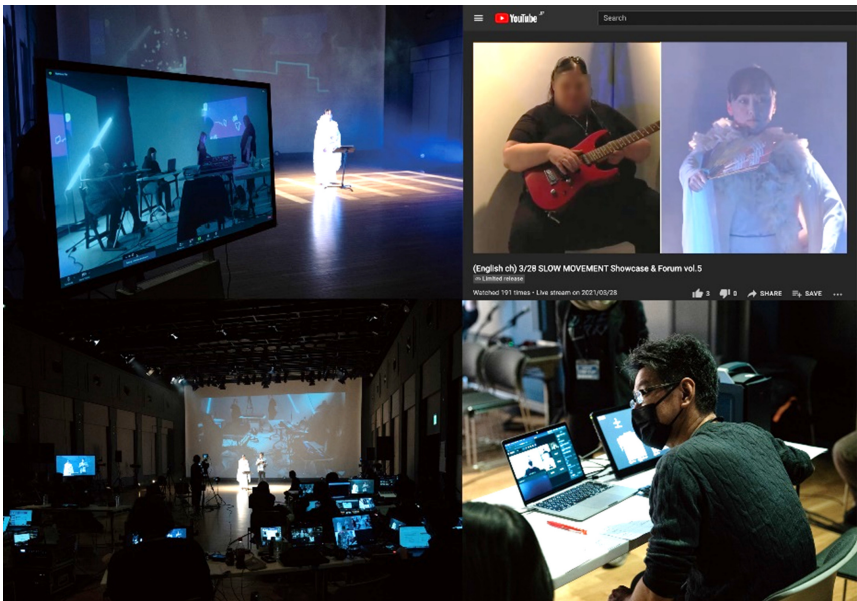


Fig. 6. Photographs of the Hageromo stage and online streaming video (top right) of the SLOW MOVEMENT Showcase & Forum vol.5. (Image courtesy of Slow Label)

After the performance the JOLT organisation provided written informal reflections based on their observations of the workshops and rehearsals, as well as the perspectives of the artists who discussed their experience during the public symposium that was held

after the live performance. The written reflections were prompted by four themes derived from our conceptual model (fPRC) which takes an integrated approach to understanding the role of interactive technology in disability we first presented at the International Conference of Arts and Technology, Interactivity and Game Creation (ArtsIT) hosted in Aalborg, Denmark 2019 [10]. The four themes provide an initial appreciation of (a) the individual's perspectives on interactive digital media; (b) the flexibility of the online technology to enable participation; (c) how the online and face-to-face workshops were designed to afford opportunities for people with a disability to feel included during COVID-19, and (d) the ways in which social-cultural forms of participation can promote a sense of agency for the individual.

3.1 Perspectives on Interactive Digital Media

The Amplified Elephants are an ensemble who regularly use technology in their performances. Standard equipment includes synthesizers, microphones, mixing desks, guitars, computers, and tablets. Since 2007 the ensemble has engaged with new technology including amplified orchestras, robotic sound machines [24], and interactive tabletop audio visual technology originally design for movement rehabilitation [25]. The ensembles engagement with the process of developing and performing with custom designed technology began in 2014 through JOLT's ongoing partnership with RMIT University. In every custom technology project, including the development of Hagoromo, The Amplified Elephants are active drivers of the design and creation of that technology, and user testing is undertaken in arriving at the electronic instrumentation that they can use effectively and creatively. In this context, technology design that accounts for user experience alongside co-creation ensures smart, effective, feasible, and meaningful solutions that incorporate the individual perspectives. JOLT observed that given the opportunity to express their preferences and perspectives on technology use provides a sense of self-efficacy and the development of their skills that can be carried forward by the individual. JOLT reported that the level of engagement along with the ensembles long history of exploring new technologies as part of their arts practice also enabled them to rapidly transition to online modes of collaboration.

3.2 Participation Through Online Technology

In Melbourne, State Government COVID-19 strict lockdown orders were delivered swiftly and hard over a three-month period in 2020 with only five reasons to leave home (food shopping, essential work, medical treatment, getting tested, and exercise). The ensemble had to transition rapidly to working online with very little time given to adapt. The Amplified Elephants were faced with significant challenges of having to learn new software tools that many had not used previously. Through the families of the ensemble members JOLT was able to organise support staff to visit the houses of the artists to assist them set up a computer or tablet at home and provide software training so they could join the workshop video conference calls. By the time The Amplified Elephants joined the Resonant Webs project in 2021, online activity had become a ubiquitous part of their everyday life. Indeed, JOLT reported that through the individual's level of resilience, persistence, and hard work, using online technology eventually became second nature.

The Amplified Elephants were able to access the workshops from wherever they were and those that were unable to regularly attend the previous face-to-face rehearsals due to mobility and health issues were able to access the sessions from home. This suggests that with the appropriate level of support, patience and perseverance, online activities do offer new contexts and flexibility for participation for those with a disability outside of traditional settings such as physical workshop and rehearsal spaces.

3.3 Inclusion Through Online and Face-To-Face Collaboration

Whilst JOLT found that The Amplified Elephants could adapt to online workshops, they were having to think harder to maintain their level of engagement. A full program day (6h) of 'in person' participation was truncated to two 2-h sessions when online to reduce fatigue. Ensemble members' families became the support workers for the online sessions which meant that the whole community was attending the workshops. Much effort goes into administrating and organizing the ensemble, who due to their disability, require very long lead times for rehearsals and fixed schedules and dates. The Japanese Slow Label team arranged a fixed date and the Spiral Hall venue for the performance early in the collaboration and issued schedules and timetables in discussion with the artists and provided the technical specifications for the broadcast. JOLT reported that having a fixed and highly organised schedule assisted with reducing the level of anxiety for The Amplified Elephants.

In the last four weeks of the program, the Victorian Government had successfully suppressed the virus and eased restrictions. This enabled the ensemble to work together face-to-face on Hagoromo. In Melbourne, JOLT booked the Kindred Film Studio, a space the artists were familiar with from previous rehearsals and workshop activities, and large enough to accommodate capacity limitations on people as mandated by the Government. For live streaming purposes film or photographic studios can be more suitable and flexible than theatre and concert halls offering affordable options that are resourced with studio lighting and neutral film backdrops. Extra face-to-face rehearsals were scheduled in the studio when restrictions permitted and Zoom™ was used as a rehearsal tool between Japan and Australia in the weeks leading up to live stream performance. As reported by JOLT, the environment and context were an important factor in regulating the participation and sense of inclusion for The Amplified Elephants. Their familiarity of working in the studio space environment within the context of a highly organised schedule assisted in reducing anxiety and focusing their engagement on the creative process.

3.4 Social and Cultural Participation

Culturally, a feature of common ground was that both the Japanese and Australian teams liked to talk and were highly communicative during their online interactions. The online conference calls provided a space to conduct conversations both casual and work related around the project. This was crucial for many reasons – boosting morale, fostering friendship through laughter and sorrow, and facilitating creative ideation. This dialogue and exchange provided the artists with opportunities to share resources, recordings, and videos to understand Noh theatre and Japanese culture more broadly. Through

Ryoko Aoki's personal insights, The Amplified Elephants were able to understand Noh theatre and develop their own sound world that would complement her vocals. During a workshop the artists might offer suggestions to the group by playing an instrument or making a drawing of a stage layout as well as sharing YouTube videos as a way of pollinating ideas and creativity. Through this process the ensemble chose clearly to be influenced by Noh culture whilst maintaining their own identity through creating, sharing, and accepting sounds to use, and incorporating sounds of other members in the group into their sonic repertoire. Through Hagoromo the cross-cultural collaboration was expressed as a balance between sounds that were Noh and sounds that were The Amplified Elephants' auditory electronica. The workshop program was designed to support individual experiences that enable the participants to exercise control and choice through social interaction. Over time, similar approaches have been shown to lead to an enhanced awareness of one's strength, self-identity, and future opportunities for development [26].

4 Conclusion

In reflecting upon the experience of participants in the development of a proof-of-concept performance of Hagoromo we have begun to understand viable processes that can sustain the artists in using technology to create virtual performances. These processes consider the individuals' perspectives on interactive technology, and the flexibility of online media that enables the artists to participate and feel included in community activities. Providing virtual online space for intercultural dialogue and performance to occur can promote a sense of agency for the individual and the development of competencies that can be carried forward. It is clear through our preliminary reflections and the success of the Hagoromo performance that online solutions and interactive arts technology can enable participation specific to individual needs which may improve inclusion and sense of belonging via community arts practice.

We consider our contribution a work in progress toward a longer-term research investigation to understand participation in the context of interaction design and community art to foster inclusion and contribute to positive change in personal (and collective) well-being. However, we see several challenges ahead such as the economic viability of the technology for underfunded community arts organizations, the accessibility and skillsets required to operate the technology, along with the persistent latency issues of online media and virtual technology connected across distance. To realize collaborative performances in remote locations, technologies that reduce the latency of video data sharing are necessary.

In the future, we will develop technologies and performance designs that allow the audience to participate in the performance. To bring about a new audience experience that is different from viewing a performance on-site, for example, changes in the images and sounds generated can be brought about by the operation of the viewer's mobile device to expand the participation of the audience.

Mental health issues caused by self-isolation and COVID-19 restrictions has had a significant impact on the lives of people with disability and those involved in the arts sector that support them. As shown in this project, hybrid online collaborations are

opening new possibilities for international artistic expression for artists with a disability. In the event the pandemic continues to restrict peoples travel and mobility, hybrid face-to-face and online performances will continue to be an important option for community art activities.

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