A Telepresence Stage: or how to create theatre in a pandemic – project report

Paul Sermon a, Steve Dixon b, Sita Popat Taylor c, Randall Packer d and Satinder Gill e

aSchool of Art and Media, University of Brighton, Brighton, UK; bLASALLE College of the Arts, Singapore, Singapore; cIndependent Academic Scholar, UK; dThird Space Network, Washington, DC, USA; eCentre for Music and Science, University of Cambridge, Cambridge, UK

ABSTRACT
This report describes the authors’ research project ‘Telepresence Stage’, funded by the Arts and Humanities Research Council’s (AHRC) ‘COVID-19 Rapid Response’ scheme. The project aims to develop effective and affordable new approaches to connect performers from their separate homes and place them within virtual sets online where they can rehearse and perform together. The report discusses the history of telematic performance and explains how this research is using some of those established approaches to open up alternative possibilities for theatre and dance companies working in and beyond the current pandemic. To date, the project has shown how a range of telematic chromakey systems can be employed to bring a whole new level of creativity to videoconference-based performance work, freeing the performers’ bodies from the entrapment of Zoom boxes and co-locating them in specially designed 3D environments. Drawing on case studies from some of the project’s eight residencies with professional performance groups, the authors discuss how existing techniques have been adapted for different levels of experience, and how the project has offered new ways of working. Whilst the pandemic is expected to be a time-limited issue, these techniques hold value for performers and creators of theatre and dance well beyond ‘lockdown’.

KEYWORDS
Telepresence; telematic; dramaturgy; scenography; phenomenology; chromakey

Introduction: pandemic theatre

Theatre is first and foremost a live and collaborative artform where performers and audiences come together in a physical space. From early 2020, the effects of the COVID-19 pandemic hurriedly dissolved its fundamental fabric, with lockdowns and social distancing acting as a stage trapdoor to literally take the ground from under the actor’s feet. New solutions needed to be found and for many performance groups a move online was obvious, essential and immediate. Companies seized the opportunity to stream both live and pre-recorded productions, while teleconferencing platforms were quickly

CONTACT
Paul Sermon p.sermon@brighton.ac.uk

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group
This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
harnessed to bring performers together for rehearsals and live events. *Live Aid* style celebrity marathons saluted frontline workers, serried rows of actors stared out intensely from their bedrooms performing serious plays, while musicians and singers conjoined on screen to perform operas and belt out Broadway anthems. The general public also hungrily embraced seemingly ‘new’ platforms such as Zoom (first launched in 2013) with a proliferation of creative video chat encounters, from living room performances and streamed DJ sets to family quizzes, karaoke parties and even Skype dinner dates. The pandemic had, it seemed, further accelerated the Internet’s progress as ‘a site of therapeutic catharsis-overload, and … the largest theatre in the world, offering everyone fifteen megabytes of fame’ (Dixon 2007, 4).

Zoom theatre became a whole new genre unto itself, spawning hundreds of productions, some with actors beaming in from all around the globe. Television also adopted the format with celebrated shows such as *Staged* starring Michael Sheen and David Tenant (BBC 2020). But while there was an excitement at the initial novelty, and theatre troupes showed inventiveness and ingenuity, for example, by seemingly breaking the fourth wall of the Zoom frames to pass props to one another, for many, the paradigm remained less than ideal. Ultimately, the format resembles live television far more than theatre, and the framed boxes are artificial distancers, acting like battery chicken coops to cage and restrain the performers rather than liberate them.

So while both performance groups and the public had been quick to turn to Internet video communications to creatively experiment their way out of isolation, there were and still are fundamental drawbacks, and an urgent need for novel approaches with which to explore this networked world of coexistence. There are also many phenomenological and ontological issues to be considered before theatre can emerge stronger (if indeed at all) in the midst of a pandemic. Finally, even in its early stages, this project has indicated that telepresence stage techniques can be valuable to performers in a number of ways independent of the pandemic, and are likely to become part of the regular toolkit for some in the future.

**Be creative with your videoconferencing, make it memorable, it makes a difference**

On the 21st March 2020 a simple message appeared on media artist Paul Sermon’s Facebook profile in response to the increasing uptake of online video communications just as the UK was going into lockdown: ‘be creative with your videoconferencing, make it memorable, it makes a difference’. Having spent almost thirty years working with videoconferencing in his arts practice, he was compelled to respond to the current situation with some words of creative encouragement. In May 2020, quite separately and thousands of miles away, Steve Dixon published an opinion editorial in Singapore’s *The Business Times* noting that the new proliferation of online performance events was not actually as revolutionary as many were suggesting, but rather ‘a stopgap measure … more of a medium unto themselves than any kind of substitute for live theatre’ (Dixon 2020). When the government’s UK Research and Innovation (UKRI) published an ‘Ideas to Address COVID-19’ call for research projects to assist different industries to navigate, mitigate and tackle the effects of the pandemic, the two authors came together with a proposal. In collaboration with two other telematics and digital performance experts, Sita Popat Taylor and Randall Packer, and an interaction and communications psychologist,
Satinder Gill, they applied to conduct an eighteen-month project exploring alternative methods and telepresence techniques to increase participants’ sense of connection and coexistence in videoconference encounters.

The application, entitled ‘Collaborative Solutions for the Performing Arts: A Telepresence Stage’ was successful and, at the time of writing, the project is in its early stages and working with a number of UK performance groups. They range from those with little or no previous experience of telematic performance work, such as Phoenix Dance Theatre to those who are already well-established using such technologies, such as Creation Theatre (Figure 1). The research sets out to find a range of different and affordable ways to break the actors out of their online boxes and co-locate them live within virtual spaces that adequately replicate/simulate theatre sets.

At the heart of the project is telematics – the process of joining up two or more remote locations together using telecommunications or videoconferencing systems, which the authors have been exploring artistically and theoretically for decades. Zoom is a telematic format, but its rigidly boxed structure limits its theatrical aspirations, and the research project instead looks to adopt a range of accessible and user-friendly online platforms and software systems. It is hoped that these will offer new ideas, approaches and advances for theatre and dance groups to rehearse and perform together using video chromakeying and compositing techniques.

A brief history of telematic performance

The first known example of a telematic performance event was Kit Galloway and Sherrie Rabinowitz’s Satellite Arts Project: A Space with No Geographical Boundaries (1977). It employed video keying techniques to bring together live dancers in different locations (Menlo Park, California and the NASA Goddard Flight Center, Maryland) into a composite image. As Rabinowitz observed:

![Figure 1. Seemingly flouting safe distancing rules but actually joining one another from their separate homes, Creation Theatre actors (left to right) Graeme Rose and Giles Stoakley take on a nineteenth century opponent in a drunken card game, situated within Paul Cézanne’s classic painting The Card Players (1895).](image-url)
The video image becomes the real architecture for the performance because the image is a place. It’s a real place and your image is your ambassador, and your two images meet in the image … So it incorporates all the video effects that are used in traditional video art, but it’s a live place. It becomes visual architecture. (quoted in Lovejoy 2004, 233)

Three years later, Galloway and Rabinowitz’s highly celebrated Hole-in-Space (1980) used satellites to link a department store window in Los Angeles with New York’s Lincoln Center for the Performing Arts. Crowds gathered to watch and communicate live with their counterparts in the other city, romantic relationships were reportedly sparked, and distant relatives arranged to meet up using the art installation as their ‘Telepresence Stage’. In 1984, Nam June Paik’s manifesto ‘Art and Satellite’ celebrated the potentials of bringing together remote artists to create revolutionary new types of relationships and to discover ‘not new things but new thinks’ (Paik 2001, 41–42). By the mid-1990s, pioneering telematic theatre group The Gertrude Stein Repertory Theater was declaring that with Internet videoconferencing: ‘It becomes ridiculous to think of theatre as what can happen in one room, with one audience … we start to conceive of the Web as an eventspace, a place where things can happen’ (Reaves 1995).

Paul Sermon has explored the medium for three decades, and his influential Telematic Dreaming (1992) gallery installation linked beds in two separate rooms using video cameras, monitors and projectors and a videoconference ISDN line (Figure 2). Visitors sit or lie on the blue beds and their image is separated from its background using chromakey techniques, and is projected onto the other bed, with the composite image shown on monitors. The mutual meeting of the two distant bodies sparks a very intimate encounter, but a purely physical one, since Sermon strategically avoids any audio link, with the human interaction ‘reduced to its simplest essence: touch, trust, vulnerability’. (Kozel 1994). The subtitle to Oliver Grau’s book Virtual Art: From Illusion to Immersion

Figure 2. A projected gallery visitor lying on a bed awaits the interactions of another gallery participant in Paul Sermon’s Telematic Dreaming at Fabrica Gallery, Brighton in 1999. (Note the screen suspended to the right, in which all participants can see the composite image of the third space.)
(2003) echoes the dual elements of illusion and immersion so central to Sermon’s piece, and in analysing it Grau reflects that:

a feeling of astounding nearness arises … many visitors seize the opportunity for uninhibited mischief and make virtual seductive advances, indulge in intimacies or even come to blows … the restraints that reality imposes on us are lifted and the actual consequences of our actions removed. (Grau 2003, 275)

From the early days of fibreoptic telephone lines through to contemporary Internet videoconferencing, Sermon has combined and relocated distant audience members within a range of familiar social settings (e.g. on sofas, in bathrooms) and fictional contexts (e.g. seated around a United Nations negotiation table on the eve of the Iraq war in 2003). His recent collaboration with Randall Packer, Gregory Kuhn and the Third Space Network, Pandemic Encounters (2020) telematically connected artists and scientists around the world, seeking a collective response to the pandemic that has turned our reality and social behaviour on its head. In Packer’s words, it explored ‘the deep third space and the realm of telematic togetherness, navigating the precarious landscape of network connections, latencies, errors, malfunctions and glitches, while along the way discovering a few magical moments’ (Packer 2020). Sermon’s works invariably involve personal and socio-political interactions using customised video and computing technologies to bring remote participants together with a heightened sense of presence and empathy between them (Figure 3).

Key to this sensation is relayed eye-to-eye contact, switching between the views of ‘me looking at you’ and ‘you looking at me’ through the convergence of remote spaces into a third space – space 1 is yours, space 2 is the other person’s, and the third space is the screen where both of you appear together and can dynamically interact in real time. Telematic art and performance exploits this mirrored combination of views within the same specular image, allowing the self and the other simultaneous reflection. The third space is always visible to all participants on screens in each location, so that each participant can orient themself in relation to the others sharing that space. The proprioceptive choreography of body movements, facial expressions and hand gestures are key components to any conversation, often used unconsciously, but by simply combining these

Figure 3. Against a hellish Hieronymus Bosch backdrop, Paul Sermon wears protective clothing and a Medieval plague mask in his interaction with Roberta Buiani in Pandemic Encounters (2020).
views within the same image we become kinaesthetically conscious and in control of our combined coexistence, escaping our individual isolation.

Telematic artworks emphasise facial and body language, and in certain ways can offer more than physical encounters permit. The presence and observation of their own body in the third space as well as ‘the other(s)’ provides the participant with an opportunity to make coinciding subjective and objective observations. Since on screen their self is also the other, they are able to reflect on the interactions and performances occurring in front of them while seeing themselves as being directly responsible for it.

**Introducing theatre and dance groups to ‘The Telepresence Stage’**

Although relatively complex, such telematic systems are possible to set up at home and to great effect with only modest equipment, some rearrangement of the furniture, a large green cloth and a little video experimentation. The research project involves the investigators working with eight theatre and dance companies to do precisely this, supporting and enabling individual performers and directors/choreographers to work from home and collaborate within a dynamic and interactive ‘Telepresence Stage’ space where they are co-present for live devising, rehearsals and performances. The companies typically work for around three months experimenting and creating, with the research team supporting and assisting in different ways including creating the virtual theatre sets, and each project culminates in a live public performance.

The project reframes and customises conventional web-conferencing technologies to create innovative and original virtual performance settings that live performers cohabit. These spaces enable collaboration in a shared online environment with multiple layers, allowing for action to take place within different areas, in front of and behind different planes and objects, and within a range of ‘vanishing perspectives’. The spaces and background settings (which can be 2D or 3D) are also instantly interchangeable at the touch of a button, allowing filmic-style cuts to relocate and reveal the live performers in entirely new locations and circumstances. Real-time video images of the remote performers are thus merged within virtual stage sets, where participants have dialogues and interactions, and appear to co-exist. Ideally, two or three screens displaying the composite third space are placed around each location, so that each participant can see the shared space when facing in different directions. This allows them to maintain the sense of being together in the third space whilst moving around their individual physical room. Sometimes it is necessary to ‘cheat’ the eyeline a little to give the impression of eye contact between performers, but often careful placement of cameras and screens can make eye contact feel real to everyone involved, even when facing in different directions.

The ability for actors and dancers to simulate presence together from their homes, studios, theatres, or other remote locations is found to significantly enhance their experiences in creating, rehearsing and performing in comparison to most other online modes of communication. Their creativity is stimulated by their superimposed co-presence within imaginative virtual set designs, and most significantly because the boxed-in head-and-shoulders paradigm of platforms such as Zoom/Skype/Teams/FaceTime is replaced by full-body interactions with no spatial boundaries or visual separations between the performers. ‘Togetherness’ has become a pointedly relative term since the onset of COVID-19, and a majority of our experiences with family, friends and colleagues
have been mediated via conventional web-conference applications. But for performance practitioners, while they have offered one way out of the isolation and an opportunity for experimentation and playfulness, the limitations of most formats of conferencing software and their peculiar (lack of) social dynamic has made it a struggle for them. Even beyond the performing arts, web-conferencing platforms have started to lose their initial shine and appeal to many, and are perceived increasingly as a far less than ideal substitute for family gatherings, business meetings, social events, happy hours, and those just attempting to sing happy birthday in unison.

The research project therefore attempts to respond to the urgent needs of the creative performing arts sector which has become largely marooned, through an alternative, deeper and more fully-embodied approach to interactive web-conferencing. Through conflation of disconnected images with background sets and environments, it seeks to create telepresence solutions for widespread immediate use across the performing arts, from youth and student theatre groups to professional dance ensembles and regional theatre companies. It takes a dramatic leap away from the web-conference grid paradigm, to one in which our experience of online connection and creative collaboration is heightened and re-envisioned through the superimposition of our full bodies within dynamic and changeable virtual spaces.

**Aiming to make a difference to performing arts**

The aims of the project sit alongside a number of existing COVID-19 projects seeking to 'make a difference' to the theatre and dance communities, such as 'Digital Theatre for Performers in Isolation' by Spirit Lighting and the 'Dynamic Teaming Platform for Live Entertainment' by Curtain Call. Others use the latest mixed-reality technologies and online delivery for theatre productions, including 'The Round’ from Reality Check Productions, ‘Digital Midsummer Interactive Theatre App’ from OnMyMobile and ‘IoLive’ from Wowsome XR. Whilst these projects provide virtual reality and CGI simulations of staged productions, one unique feature of our 'Telepresence Stage' project is its accessibility and scalability. It provides opportunities for low cost creation and production techniques for remote performers using standard home computing equipment to deliver online live theatre productions to global audiences. The virtual reality approach of existing projects and the live co-existent video approach of our project adds reciprocal value; and combined they could provide fully immersive online theatre experiences.

The project is therefore designed to be highly scalable and impactful across a wide range of users, from individual performers and members of the public with little or no resources beyond a laptop, to well-funded and commercial performing arts companies adopting more high-tech solutions. Our explorations with the eight performing arts companies are testing and developing approaches using a range of proprietary systems as well as bespoke online video encoder/decoder laboratory platforms, undertaking technical and creative experiments towards proof-of-concept testing, prototyping and the development of new forms of online performance. However, the project's open-access online dissemination of findings enables anyone using standard hardware and software/freeware to implement these scalable solutions: from techniques for individual performers and community groups, to full-scale networked performance productions for
large national companies. The solutions are also adaptable to different applications outside the performing arts, for example, in education to facilitate more immersive collaborative learning; for online broadcast news and entertainment forms; business conferencing applications; training courses; interactive games; and remote family members wanting to feel closer together.

Project outputs and publications are drawn from observations, reflections and analyses of each residency group’s work and the activities explored, including concepts, techniques, prototypes and technical solutions. In collaboration with a professional graphic designer, these findings are disseminated as easy-to-follow ‘How-To’ PDF user guides, unique to each resident group. These are open access and illustrate the processes undertaken and equipment employed, and the necessary room preparations: from the simplest of setups involving standard web-conferencing adaptations and virtual backgrounds to full green-screen installation spaces and compositing effects. Step-by-step video tutorials, as well as video case-studies of the performance projects are also disseminated online, together with open-source software templates for use with VDMX and other real-time audio/visual applications for live video compositing setups. The project will culminate with a collation of background descriptions and reports from each residency, along with video documentation, photographs, interviews, essays, and technical schematics to be published online as the ‘Telepresence Stage Handbook’, a complete multimedia toolkit for online performance in the wake of COVID-19. The research team are also preparing a number of online video lectures demonstrating and reflecting on their own artistic practices in telematics, and have commissioned a number of pioneering artists in the field to do the same. Academic outputs will include journal publications, book contributions, conference papers and exhibitions.

**Telematic quarantine – telepresent stories of self [isolation]**

The first project undertaken by the research team was a collaboration with a number of remote performers from many corners of the globe, staged for the International Limestone Coast Video Art Festival (ILCVAF) in South Australia. Led by Paul Sermon in collaboration with Steve Dixon, *Telematic Quarantine* (2020) was streamed live on YouTube. It utilised a customised Skype connection to bring the international performers into Sermon’s home in Brighton, UK, for an uncanny COVID-themed encounter. Together, in a heavily layered video environment where participants moved through painterly-rendered 3D simulations of the rooms in Sermon’s actual house, they played, improvised, and shared their stories of self-isolation. Over the two and a half hour live performance, the ideas and interchanges varied widely as did the theatrical/filmmic genres explored: from kitchen sink drama to political satire, and from hospital drama to magic realism and the theatre of the absurd.

Each individual performer, or in some cases group of performers, had received technical instructions in advance to either set up a green-screen backdrop or to use a virtual green-screen background, to allow for the compositing (chroma-keying) of their incoming video image with that of Sermon’s. They were provided with no further instruction, other than a specific time to call and the length of call (either 10 or 20 minutes) and the following email invitation to visit him at his home in quarantine:
All you really need to do is turn up at my front door … I will most likely be in my dressing-gown still (it will be early for me) but I would like to show you around my house. I haven’t had visitors in a long while so it will test our mental health, we might need to help each other, we might need a lie down, the neighbours are driving me crazy, complaining and partying outside, the constant sound of ambulances driving by and BBC News updates is giving me an intense headache. So, I really could do with a visit. You are very welcome to dress for the occasion, bring a ‘gift’ if you wish.

The encounters that followed were entirely improvised, with a combination of software and chroma key compositing the incoming Skype callers with Sermon’s image in his living room with greenscreen backdrop. By enabling NDI (Network Device Interface) in Skype it was possible to feed the incoming video to Resolume Avenue 6, a live video mixing software package, which incorporated further recorded background scenes and foreground objects into the final composited output. Sermon and the remote visitors were layered on background scenes, upon which foreground props and clips were placed. Each background was drawn directly from video recordings from Sermon’s home, with painterly video filters offsetting the photo-realist narrative and allowing for more playful agency, particularly with the foreground props and overlays. Many of these emphasised the sombre undertones of COVID-19, such as delivering a Downing Street briefing in the bathroom at a lectern in the form of a fruit machine which rotated strident safety messages, a moving graphic showing a ‘flattening’ infection curve, and through Sermon instantly relocating two participants from his living room into its television set, whereupon he put them on the spot to answer questions on coronavirus within a BBC Newsroom set. Throughout each episode, he controlled different effects live through an iPad, changing the room environments and activating a series of foreground layers via OSC (Open Sound Control).

Many performers came bearing gifts for their unrehearsed encounter. Cynthia Schwertsik arrived with a face-print self-portrait which she attempted to smother Sermon’s face with to produce a dual face-print (Figure 4); Tania Fraga brought a Brazilian potted plant which was placed in his garden; while collaborator/performer Steve Dixon arrived with Felipe Cervera, dressed in regulatory suits and ties wishing to search the premises. Announcing themselves at the front door as Peter and Peter, they formed a Pinter-esque double act, offering absurdist humour and underlying menace in equal measure (Figure 5). They revealed their suspicions that the house was in fact ground-zero of the pandemic outbreak, and Sermon played along. He activated some of the pre-recorded video overlays (props), with smoke effects gradually filling the room, placard-wielding anti-lockdown protesters suddenly appearing through the window in the garden, and the dramatic appearance of an oversized coronavirus cell which swept into the room and attacked them. Some performers, including Dixon and Cervera, were pre-scheduled for a second episode later in the day, and on their return picked up on some of the intervening events. It resulted in Peter and Peter’s final revelation that they were actually members of a religious sect: ‘The Congregation’. This followed on from a scenario played out earlier by visitors Indumathi Tamilselvan, Nurulhuda Hassan and Alex Kong, who danced and sang gospel-style arias to try to bring Sermon out of his dark mood and lure him into joining ‘The Congregation’.
Telematic dancing

The project’s first main residency group was Phoenix Dance Theatre, based in Leeds and the longest-standing UK contemporary dance company outside London. Founded in 1981 by three black British men and celebrating its 40th anniversary, its mission is ‘to inspire and entertain … and to develop new audiences for dance, whilst enriching and embodying the spirit of a multi-cultural Britain’. It is one of just a handful of mid-scale dance companies to employ professional dancers on permanent contracts, and in a typical year its productions are seen by around 20,000 people while its community and education outreach activities engage over 6,000 participants. The COVID-19 pandemic and consequent...
lockdowns quickly put pay to such statistics, and like many groups they began exploring ways of increasing their engagement with digital platforms and performances, including making a number of short dance films.

However, the performers who worked on the residency had never been involved in equivalent telematic work, and this complemented and extended their other online activities, enabling them to explore more digital options for their creative process as well as a new type of product. For them, the emphasis was therefore on investigating the possibilities of working with telepresence as a creative space. The decision was made to work with improvisation as an exploratory tool, rather than to focus on choreographing a final performance, in order to provide the maximum opportunity to try different approaches. Background images and environments were used to inspire simple narrative situations, in which the dancers could interact if they chose.

The Telepresence Stage project delivers a number of basic equipment kits to all its collaborating companies, and the four dancers received green-screen materials, stands, LED video lights and webcams, along with installation set-up diagrams for their home location. To ensure they all had near-identical setups, it was also suggested that they link up an extra TV screen (in addition to their computer screen) to enhance their viewing and monitoring of the composited screen interactions, and to expand their angles and points of view.

The researchers led an introductory briefing session followed by a technical practical workshop where the Phoenix team worked together in a studio space, learning how to use the equipment and interact with the digital scenography via their computer and TV monitor screens. Subsequent sessions took place with the dancers and choreographers/directors working remotely. Two of the four dancers were in the same household so were together physically, while all of the other team members were in separate spaces, each setting up their own equipment. By the end of the residency, a collection of vignettes had been created through improvisations which opened up many possibilities for expansion into more formal choreographic works in the future.

Holey spaces and impossible viewpoints

The Phoenix Dance Theatre members were particularly fascinated by the opportunity the system offered them to experiment with alternative viewpoints that are not usually possible to achieve in live stage settings. A primary theme they developed was of images of holes in the ground, and four different scenographic designs were created to represent different types of ‘holey’ spaces. Each had a layer feature so that the dancers could be located either inside the hole and looking out, or on the ground outside of it looking down and in. The dancers positioned cameras above their heads pointing down at green screens spread on the floor, providing an unusual and arresting vertical perspective. Improvisations saw dancers lying down and bridging over a large hole in the ground with their body while others walked over them, and pulling one another out of the hole (Figure 6). The Holes provided rich narratives related to hiding and revealing, absence and presence, jeopardy and safety, freedom and entrapment, and being here and there – all of which seemed to hold particular meaning in relation to the nature of working across physical and digital spaces. Regardless of the various scenographies, most of the dance improvisations returned to these themes.
In later sessions, the cameras were positioned more conventionally, at eye level in front of the dancers with the green screens behind them, sometimes with furniture positioned under the green cloths so that the dancer could appear to be sitting on chairs or climbing on items within the digital scenography. Changes in perspective and scale were introduced, as dancers worked closer to and further away from their cameras to change their relative sizes in the digital space. Backgrounds created for this camera position included a horizontal hole in the ground, with one or more dancers working in front of the hole image (or scenographic layer) and others behind it, in the hole. For the latter, this positioning and the ability to quickly adjust the visual size and scale of each performer (physically or digitally) meant that oversize parts of their bodies such as a giant foot, arm or head could appear in the hole (Figure 7). Meanwhile, by perching on a sofa under the

![Figure 6](image-url)

**Figure 6.** Out of proportion in a virtual wood setting, Phoenix Dance Theatre’s Reynaldo Santos struggles to pull Mirabel Huang-Smith out of a hole in the ground.

![Figure 7](image-url)

**Figure 7.** Phoenix Dance Theatre’s Mirabel Huang-Smith tries to bite Alabama Seymour’s foot as they experiment with hole images placed at different angles and points of view.
green cloth, the whole body of the dancer outside could remain visible all of the time, apparently sitting at the edge of the hole with legs dangling into it, and able to visually interact with the dancer inside by pulling their arm or biting their leg. In one such improvisation, an interesting and dramatic contrast was emphasised between the lyrical and extended nature of the movements of the dancer on the outside, and the minimal, contained and constricted movements of the performer inside the hole.

Other scenographic backgrounds the company explored included a woodland scene, a country road at night, and a Mad Hatter’s Tea Party in the forest, each evoking different moods and atmospheres, and prompting varied types of interactions. The Mad Hatter’s Tea Party inspired a humorous three-way improvisation where dancers Alabama Seymour and Reynaldo Santos were located in the same physical space, working with Mirabel Huang-Smith in a different physical space. Their actual proximity enhanced their togetherness within the digital scenography, highlighting the challenge to Mirabel as she attempted to join the party (Figure 8). Alabama and Reynaldo were in the scenographic layer behind the tea table with Mirabel in the layer in front of it, enabling Alabama to drop down and hide behind it, and to suddenly jump up to surprise Mirabel whenever she got close to the table. Such playful ‘trickery’ of appearance and disappearance helps to instigate a sense of co-presence and togetherness in the digital space even though the dancers are in separate real-world locations. The group also played extensively with copying, mirroring, and hiding behind each other’s images, which helped them in realising connection at an embodied level and learning to understand digital space. But perhaps most noticeably and fundamentally, the group continued to explore sequences and narratives that involved moments of simulated contact, from stroking and holding hands to pushing, pulling, punching and kicking.

The telematic embrace

While the human senses of seeing and hearing are retained during these telematic interactions and operate similarly to real life situations, the ability to touch one another is
missing. But somewhat paradoxically, playful explorations of ‘virtual touching’ – from attempting to shake hands or embrace to staging a fist fight – are among the first things participants want to engage in, and in Phoenix’s case, continue to explore over multiple improvisation sessions. A real sense of wonder and delight is commonly experienced by those working within telematic environments for the first time, and the strange intimacy of virtual touching is frequently a highlight.

It also brings the ‘uncanniness’ of telematic environments to the fore, where everything seems at once relatively ordinary and real, yet simultaneously eerie, odd and unreal. This sensation of uncanniness is also amplified in the act of bodily displacement and the witnessing of oneself as other (on the screen). A third-person perspective is achieved, and a perceptual shift takes place whereby there is an oscillation between one’s sense of subjectivity and objectivity. The resulting psychological effect is more uplifting and liberating than disturbing, however. As Machiko Kushahara points out, telematic interactions in immersive virtual environments provide a new sense of freedom to the participants, releasing them

from the logic and restrictions of daily life … and the biological environment of the body. … [It] enables experimentation with and enjoyment of the role the body plays in communication. The virtuality of the space enables it to maintain both theatricality and the context of daily life at the same time (Kushahara quoted in Wilson 2002, 520).

This sense of theatricality while being grounded in the everyday means that ‘A Telepresence Stage’ in many ways provides an ideal platform for drama and dance companies to explore and create in (and on). In some ways, the remote connection and the urgent desire to reach out and telematically touch fosters a heightened sense of intimacy and presence, which prompted Roy Ascott’s famous conundrum ‘Is There Love in the Telematic Embrace?’ (Ascott 1990). The answer has been explored in different ways by the authors over many years, including by Sita Popat Taylor and her Satorimedia company in TouchDown (2000). A dance ‘duet for hands’ conducted over the Internet, as the live hands meet on screen the delicacy is highlighted and the sense of intimacy is intense, as they explore one another with extraordinary sensitivity. The company call the piece ‘a celebration and a warning’, reflecting that as our communication becomes increasingly technologised ‘we have more cerebral contact than ever before, but the comfort and sensual pleasures of physical touch may be fading sensations in this advancing world’ (Satorimedia 2000).

Telematic artists the Corpos Informáticos Research Group have discussed their work through the theoretical lenses of Wittgenstein and Deleuze to go as far as to suggest that electronic/telematic communication has now eclipsed its real-world counterpart. They suggest that virtual bodies now excite us and elicit our desire for encounters even more than physical ones, to the extent that ‘the quotidian is jealous of the telepresence, jealous of the virtual … The researches on teleperformance demand a higher engagement (Corpos Informáticos Research Group 1999).

It can be seen from the images within this report that many of the project’s residency groups have chosen to work with unrealistic or uncanny imagery, often playing with impossible movements, bizarre sets, or disrupted scale. We have found that our participants have tended to want to explore the limits of the telepresence stage technically and creatively, and they have been attracted to the uncanny possibilities. However, it
would be entirely possible to create something far more traditionally theatrical, as the research team could see in the creative process for both Creation Theatre’s and Pigeon Theatre’s residencies. Placement of green cloth over furniture can create realistic shared scenery, and scripted dialogue can be delivered in a natural manner. There is a greater challenge for dance as realistic simulation of touch is often difficult to achieve at any speed due to latency, and weight-bearing work can only be done through complex trickery. Sharing a rhythm across participants would also be unachievable, even with minor latency. However, a non-contact piece without strict rhythm could be created, rehearsed and performed with confidence.

Harnessing a range of technologies

As noted previously, the project was designed to experiment with different techniques and technologies, with systems ranging from free, user-friendly online tools to more sophisticated hybrid and custom-built platforms. For example, during the first five sessions of the Phoenix Dance Theatre residency, three different software system setups were explored to discover their qualities, advantages and disadvantages. The following applications were used to enable a networked audio/video conferencing system between a central compositing node and the ‘satellite’ participants:

- **Sessions 1 and 2:** Internet communications via Skype, audio/video compositing with Resolume Avenue 6, streamed on YouTube Live
- **Session 3:** Internet communications via Google Chrome and LiveToAir, audio/video compositing with VDMX, streamed on YouTube Live
- **Sessions 4 and 5:** Internet communications via Google Chrome and vMix, audio/video compositing with vMix, streamed on YouTube Live (Figure 9)

![Figure 9](image)

**Figure 9.** The networking and compositing system used in Phoenix Dance Theatre’s sessions 4 and 5, with four remote participants connected via Google Chrome to the audio/video compositing node where the four images are chroma-keyed together in vMix software and returned to the participants, and simultaneously streamed on YouTube Live.
In all sessions the remote participants (satellites) used MacBook computers connected to their routers by an ethernet cable (for maximum Internet connectivity) to make a video call using a range of online communications applications to the same central (node) location, where they were audio/video composited, using differing systems and techniques. The central node relayed the composited image back to the remote satellite participants and simultaneously streamed it on YouTube Live.

Phoenix’s first two sessions used a combination of Skype and the live video mixing (VJing) software Resolume Avenue 6 to composite all participants within the same video output image. Whilst this was a successful low-cost approach, returning the composited image to a participant in a group Skype call reduced the size and position of the image in the Skype interface. This solution works best as a peer-to-peer connection between just two participants, as used in Telematic Quarantine (2020). Randall Packer’s ‘Third Space Network’ laboratory in Washington DC led the third session using a combination of LiveToAir, a networked video broadcast call-in system via Google Chrome, and a Mac based live video mixing application, VDMX. However, initially the latency of the connection was such that it proved difficult to interact in real time, although this has since been technically resolved by ensuring that network connections are made via ethernet cables rather than Wi-Fi and specific network priorities are enabled at the router. This reduces latency to an acceptable 50 milliseconds or lower in most cases. Using vMix on Windows 10 provided an immediate solution for the following two sessions. It combined the Internet video communications via Google Chrome with audio/video compositing within the same application, reducing the need for multiple computers, whilst providing low latency and full screen video return. It remains currently one of the most successful software solutions used, although the main limitation is the quality of the chroma-keying functionality in vMix. In all cases however, bandwidth and latency needs to be negotiated in telepresence performance. Aided by the script and interaction routines, the remote performers need to rehearse and learn to accommodate latency, finding a tempo and rhythm between them, and consequently increasing their concentration levels and sense of coexistence to their advantage.

Participants’ technical setup diagrams (Figure 10):

The equipment and materials provided for the dancers were as follows:

3x Green Screen (Neewer 10x12FT / 3x3.6M PRO Photo Studio 100% Pure Muslin Collapsible)
3x Stand (Fotga 2.1x3m Background Stand Support Backdrop Stand Greenscreen Heavy Duty Adjustable Photography Muslin Background Support System Kit)
1x Lights (Neewer 3 Pack Advanced 2.4G 660 LED Video Light Photography Lighting Kit, Dimmable Bi-Color LED Panel with LCD Screen, 2.4G)
3x Webcam (Logitech C930e USB 1080p Full HD Webcam)
3x Camera mount clamp (SMALLRIG Cool Ballhead Clamp Mount with Mini Magic Arm – 1138)

Computer hardware resources used by satellite participants:

2x MacBook Pro 2017 OS High Sierra and 1x MacBook Air OS High Sierra, Broadband Internet (ethernet connected)
Computer hardware resources used by the central compositing node research team:

1× Mac Book Pro 2019 OS Big Sur, 1× PC Laptop Windows 10 with NVIDIA GeForce GTX 1060 Graphics Card, Broadband Internet (ethernet connected)

Conclusion

The Telepresence Stage project takes a phenomenological viewpoint and methodology, aiming to provide a more immersive, fully embodied approach to web-conferencing beyond the head and shoulders compartmentalising of ubiquitous commercial platforms. When in Zoom meetings, we often find ourselves glancing at our own image as well as looking at the person we are meeting, in an attempt to perceive these views of ‘self’ and ‘other’ as existing in the same space. This is the first step towards creating a telepresent space, which the project significantly extends by combining performers’ whole bodies and perspectives within the same specular image. By seeing one’s own body in the same virtual space as another geographically distant participant, we are effectively conflating a mutual sense of co-presence for dynamic interaction (Figure 11). Thus, proprioceptive body movements, facial expressions and hand gestures become far more direct, intrinsic, expressive and free within the online encounters. As Phoenix Dance Theatre’s Executive Director reflected in a letter to the researchers:

This project is highly important to performing arts companies, as we seek ways to rehearse and create new work in the wake of COVID 19. It has the potential to reinvent collaborative workshopping, rehearsal and performance spaces in virtual environments that support social distancing even when dancers are working closely together. We are excited by the opportunities that it offers at a time when new possibilities are few and far between for the arts.

Through observations and reflections on the residency projects, the research team have been provided the opportunity to witness emotional bonds and to understand the subtle intricacies of the participant’s interactions and experiences within telematic practice. The act of moving our eyesight from the internalised position in our head to a
third-person view outside of our own body offers an entirely new sense of self and conscious experience. Combined with other geographically distant participants, we are effectively sharing the same eyes – the same point of view, where one’s gaze on the other and view of oneself can converge. The objectification of gaze is met on equal empathetic terms through this process of conflating our presence in a telematic third space using the same single and, importantly, unified viewpoint. Justly seeing the situation from someone else’s point of view, which is simultaneously your own, opens the way to a warmer and more palpable sense of coexistence, co-presence and empathy in videoconference encounters.

Since theatre has always been a place of illusion and artificial sets where performers act, to use Stanislavski’s phrase, as if they were in a castle in Denmark or at a crossroads with a leafless tree, the Telepresence Stage paradigm actually remains in perfect keeping with theatrical traditions. Performers therefore generally respond to telematic theatre work with great eagerness, enthusiasm and even ease since, from their living rooms, though the act of entering a brightly lit stage to meet other live performers, they find themselves doubly ‘at home’. In these shared virtual spaces, the project is enabling performers to workshop ideas together, improvise, rehearse and perform in new ways that provide a heightened sense of communion and engagement, reframing collaborative experience, theatrical artifice and creative play for a post-pandemic society.

Our interdisciplinary team have been working at the forefront of research and creative practice with telecommunication technologies, and are seeking to peer deeper into the issues telepresence raises as well as new potentialities for performance. Beyond the exploration of novel creative and technical ideas, the project hopes to develop profounder understanding and to advance new knowledge around phenomenological questions of coexistence, intimacy, immersion and remote presence. It looks to collectively reframe online communication protocols and address the urgent problems of networked social engagement that has frustrated the performing arts since the onset of the pandemic.

Figure 11. ‘Making it memorable’ in telematic theatre, Paul Sermon (centre left) in Brighton, UK confronts his split personalities in an improvised therapy session with tele-visitors from Singapore (left to right) Steve Dixon, Indumathi Tamilselvan and Felipe Cervera, in Telematic Quarantine (2020).
Whilst we look forward to the day that we can return to our physical engagements and social interactions as we once knew them, we might want to consider one optimistic outcome from it all … its unprecedented positive effect on our environment. As pollution levels drastically drop in cities across the world and our carbon footprints have been significantly reduced, this will be an opportunity to learn from our COVID-19 videoconference encounters and ask ourselves if we really do need to jump on the next long-haul flight for the sake of a handshake or a memorandum signing. Some participants in project residencies have said that they intend to use telepresence stage techniques in the future for elements of long-distance/international creative collaborations, saving money on travel and associated costs as well as being ecologically mindful. There have also been strongly positive responses from participants with caring responsibilities, several of whom have found it liberating to be able to create and rehearse collaboratively whilst being in their own homes. Some participants have been struck by the ability to let their imaginations run wild with sets and movement that are only possible via animation, whilst retaining the liveness of interactions with fellow performers and audience members. Inevitably there are issues with broadband latency and bandwidth, which can lead to mismatched movement and timings, but these can be accommodated creatively with a little ingenuity and practice. When so much more can be achieved and saved by reframing our approach to face-to-face coexistence through more creative forms of videoconferencing, ‘making it memorable now could make a difference in the future’. (Sermon 2020)

Acknowledgement

In accordance with the UKRI-funded research policy all resources and data from this project are made openly available at the time of publication from the project website http://www.telepresencestage.org and are released under the Creative Commons Attribution license (CCBY).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Arts and Humanities Research Council: [Grant Number AH/V013890/1].

Notes on contributors

Paul Sermon is Professor of Visual Communication at the University of Brighton, UK. He has worked for over thirty years as an active academic researcher and creative practitioner and has developed a series of celebrated interactive telematic art installations that have received international acclaim. Having worked under the visionary cybernetic artist Professor Roy Ascott as an undergraduate Fine Art student at the Newport School of Fine Art in the mid 1980s, Paul Sermon went on to establish himself as a leading pioneer of interactive media art, winning the prestigious Prix Ars Electronica Golden Nica in Linz, Austria, shortly after completing his MFA at the University of Reading in 1991. It was an accolade that then took Paul to Finland in the early 1990s to develop one of the most ground breaking telepresent video installations of his career ‘Telematic Dreaming’ in 1992.
Steve Dixon is President of LASALLE College of the Arts in Singapore, one of Asia’s leading arts and design institutions. His 800-page book Digital Performance (MIT Press 2007) remains one of the most comprehensive studies of the field and his latest book Cybernetic-Existentialism (Routledge 2020) fuses insights from both titular disciplines to present a radical new critique of contemporary arts and performance. He is an interdisciplinary artist working across multimedia theatre, film, installation, telematic arts and Virtual Reality, with recent productions including an internationally toured one-man theatre show based on T.S. Eliot’s The Waste Land and a VR homage to a Jean-Paul Sartre play for two live actors and one tele-present audience member, Virtually No Exit (with Paul Sermon, Khalid Al McKhlaafy and Felipe Cervera).

Sita Popat Taylor’s research is concerned with embodied experiences of new media and digital technologies. Previously Professor of Performance and Technology at the University of Leeds, she is now working as an independent scholar. Her work is grounded in a background in dance but the majority of her research is interdisciplinary. Over the years she has collaborated with theatre, dance and performance design professionals, digital artists, computer scientists, engineers, and medics. Her projects have explored live control of digital scenography, used dance analysis to design robotic movement, studied embodied experiences of medical prosthetics, and considered the productivity of error. Her most recent book is Error, Ambiguity, Creativity: A Multidisciplinary Reader with Sarah Whatley (Palgrave 2020). She is Advisory Editor of the International Journal of Performance Arts and Digital Media (Taylor & Francis) and serves on the AHRC’s Advisory Board. Outside of academia, Sita is a member of the Board of Trustees for Phoenix Dance Theatre.

Randall Packer works at the intersection of electronic music, interactive media, live performance, and networked art. He has received critical acclaim for his socially and politically infused critique of media culture, and has performed and exhibited at museums, theatres, and festivals internationally. As a writer and scholar, he is the co-editor of Multimedia: From Wagner to Virtual Reality. He has taught at the Maryland Institute College of Art, American University, California Institute of the Arts, and most recently at Nanyang Technological University (NTU) in Singapore where he was an Associate Professor of Networked Art. Currently he is the Creative Director of the Third Space Network in Washington, DC, overseeing artistic research and production in live Internet performance and online creative dialogue.

Satinder Gill is based with the Centre for Music and Science, University of Cambridge. Following her PhD (1995) at the University of Cambridge, she has worked in Japan, Finland, USA and UK, including NTT’s BRL lab (Japan), CKIR (Finland) and CSLI, Stanford University (USA). She investigates rhythm and sense making in gesture, speech and silence as a critical lens on the changing nature of presence and tacit engagement in technology mediated communication. She is Managing Editor of the journal AI & Society, editor of the book Cognition, Communication, and Interaction (Springer 2007) and author of Tacit Engagement: Beyond Interaction (Springer 2015).

Artists credits

Creation Theatre
Artistic Director: Lucy Askew
Actors: Graeme Rose and Giles Stoakley
Telematic Quarantine: telepresent stories of self [isolation]
Producer/Director/Performer: Paul Sermon
Co-Producer/Performer: Steve Dixon
Performers:
Singapore – Felipe Cervera, Indumathi Tamilselvan, Nurulhuda Hassan and Alex Kong
Australia – Cynthia Schwertsik, David Blaiklock, Dan McLean and Mostyn Jacob
London, UK – Kristina Pulejkova and Birgitta Hosea
São Paulo, Brazil – Tania Fraga
Singapore Technical Director: Khalid Al Mkhlaafy
Phoenix Dance Theatre
Dancers: Alabama Seymour, Carlos Martinez, Reynaldo Santos and Mirabel Huang-Smith
Artistic Director: Dane Hurst
Rehearsal Director: Joanne Bernard
Technical Director: Kieron Johnson

ORCID
Paul Sermon http://orcid.org/0000-0002-0827-5258
Steve Dixon http://orcid.org/0000-0003-0723-3379
Sita Popat Taylor http://orcid.org/0000-0001-9864-5496

References
Ascott, Roy. 1990. “Is There Love in the Telematic Embrace?” Art Journal 49 (3): 241–247.
Corpos Informáticos Research Group. 1999. ‘Entrasite’, Database entry, Digital Performance Archive. http://art.ntu.ac.uk/dpa.
Dixon, Steve. 2007. Digital Performance: A History of New Media in Theater, Dance, Performance Art and Installation. Cambridge: MIT Press.
Dixon, Steve. 2020. ‘The New Abnormal and Where We Shouldn’t Zoom To’, The Business Times, Singapore, Accessed 30 May 2020. https://www.businesstimes.com.sg/life-culture/the-new abnormal-and-where-we-shouldnt-zoom-to.
Grau, Oliver. 2003. Virtual Art: From Illusion to Immersion. Cambridge: MIT Press.
Kozel, Susan. 1994. “Spacemaking: Experiences of a Virtual Body.” Dance Theatre Journal 11: 3. http://art.net/~dtz/kozel.html.
Lovejoy, Margaret. 2004. Digital Currents: Art in the Electronic Age. New York: Routledge.
Packer, Randall. 2020. “Our First Plunge into the Deep Third Space”. https://randallpacker.com/our-first-plunge-into-the-deep-third-space/.
Paik, Nam. 1984/2001. “Art and Satellite.” In Multimedia: From Wagner to Virtual Reality, edited by Randall Packer and Ken Jordan, 41–43. New York: W.W. Norton & Company.
Reaves, John. 1995. Theory and Practice: The Gertrude Stein Repertory Theatre.” CyberStage 1 (3) (Summer), Toronto, Canada: CyberStage Publishing.
Satorimedia. 2000. “TouchDown”, Database entry, Digital Performance Archive, http://art.ntu.ac.uk/dpa.
Sermon, Paul. 2020. “Be creative with your videoconferencing, make it memorable, it makes a difference”. https://blogs.brighton.ac.uk/creative/2020/04/21/be-creative-with-your-videoconferencing-make-it-memorable-it-makes-a-difference/.
Wilson, Stephen. 2002. Information Arts: Intersections of Art, Science and Technology. Cambridge: MIT Press.