

EMBODIED IMAGINATION:
**An Exploration of Participatory Performance and Interactive
Technology to Support Stroke Recovery**

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Abstract

Life after a stroke leads to the challenge of adjusting to new possibilities and fosters an increased risk of social isolation and depression. Re-building personal narratives and creating new community networks are key to conceiving an identity beyond the stroke. In this context, participatory performance provides methods for exploring physical and social identities, imagining new ways of being. Meanwhile, digital technology offers tools to help envision these possibilities.

A participatory performance workshop supported by real-time motion capture technology has been redesigned in collaboration with the performance company Split Britches. The *Green Screening workshop*'s objective is to help stroke survivors imagine new physical and social possibilities by enacting fantasies of things they have always wanted to do. Participants construct storylines supported by a custom-built interactive scenography. Movement data is collected and transformed into real-time visualisations to progressively build fantasy narratives enacted with and for other participants.

Three research studies conducted with stroke support groups around England analysed progressive iterations of the *Green Screening workshop*. The first study focused on the project's feasibility in aiding social support. The second study explored embodied imagination and social collaboration in enacted storylines. Finally, the third study analysed communication as a means of recovery and further potential to foster social collaboration.

Findings are based on qualitative analysis of the participants' experience. Results reveal that the narrative process and visualisations encouraged a rich repertoire of improvised movements, and the communal aspect of the process was found especially important in achieving these results.

This work argues that this framework can simultaneously bring a rich, prospective and political understanding of people's lived experience to the design space in HCI and provide community stroke support.

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Statement of originality

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London, United Kingdom, November 2021

Rosella P. Galindo Esparza

Associated publications and public engagement

The *Green Screening workshop* is a collaboration with Lois Weaver (Split Britches & Drama Department, QMUL) and Patrick G.T. Healey (Cognitive Science Research Group, QMUL); individual contributions are noted where appropriate through section 3.4.

Portions of the work detailed in this thesis have been presented in national and international scholarly publications and public engagement platforms, as follows:

- Rosella P. Galindo Esparza, Patrick G.T. Healey, Lois Weaver, and Matthew Delbridge. 2019. Embodied Imagination: An Approach to Stroke Recovery Combining Participatory Performance and Interactive Technology. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. ACM, New York, NY, USA, Paper 505, 12 pages.
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Chapter 1

Introduction

A stroke is a serious medical condition caused by the disturbance of blood supply to the brain. This cerebrovascular accident results in the damage or death of a localised area of brain cells, which leads to significant long-term effects (Stroke Association 2018b). There are currently 1.3 million stroke survivors in the UK (Stroke Association 2022, National Institute for Health and Care Excellence 2019, Office for National Statistics 2020). Once they leave the hospital, the challenge of adjusting to their new possibilities and life routine fosters an increased tendency towards social isolation and depression. Rebuilding personal narratives, forming new communities and receiving social support are substantial to managing such problems and conceiving an identity beyond the stroke.

Peer support is recognised as a viable option against social isolation and depression after a stroke. It brings together people with shared experiences and concerns to support each other. Along the same lines, performance allows for the exploration and embodiment of the inner self through creative expression. Socially engaged forms of performance seek to involve people and communities in participation and collaboration, particularly empowering concealed communities like stroke survivors. Moreover, emerging technologies have the potential to delve into self-perception and elicit positive change when mediating both the social encounter and personal experiences fostered in these contexts.

This thesis explores the combination of feminist participatory performance methods and interactive technology. A participatory performance workshop supported by real-time motion capture technology has been designed in collaboration with the performance company Split Britches, conformed by Peggy Shaw and Lois Weaver. To aid stroke support, the format encourages participants to envisage and enact imaginative fantasies of things *they have always*

wanted to do (e.g. climb a mountain, play at a concert, swim on a coral reef) in places they always wanted to be and with people with whom they most want to communicate.

Peggy Shaw had a stroke in January 2011. Rather than lament the memories she lost, Shaw and Weaver decided to fill those blank spaces with new insights and experiences in a process they called *green screening* (Split Britches 2019). To reconstruct missing memories, the process is supported by chroma key technology (also known as the *green screen*). The workshop format stems from the solo performance *RUFF* (Shaw et al. 2013). In this piece, a green screen on stage enables Shaw to perform her more significant fantasies, such as singing with her favourite band, while reflecting on her old memories and new possibilities after the stroke.

When Weaver and Shaw realised the potential of the green screen as a memory reproduction space to recall life experiences through a new lens, they created the *Green Screening workshop*: a performance-based approach to addressing the problems of recovering from a stroke by implementing participatory performance methods initially assisted by chroma key technology.

The work presented here proposes a redesign of the workshop format. The new framework couples participatory performance and interactive motion capture technology to expand the potential of such methods. The objective of the project is twofold. On the one hand, it seeks to research the value of this approach as a social support intervention. On the other hand, it explores the relationship between design and Split Britches' feminist approach to participatory performance, arguing that such a combination can bring a rich, prospective and political understanding of people's lived experience to the human-computer interaction (HCI) realm.

1.1 Disciplinary perspectives

This multidisciplinary work explores theories and practices from performance studies and the design space in HCI. The intersection between these two disciplines highlights participatory approaches and community engagement as fundamental methodological aspects. This thesis narrows the concepts to implications for embodiment and imagination in stroke.

People are embodied beings. They perceive and inhabit the world through a constant flow of bodily activity (Merleau-Ponty 1945). In contrast to the Cartesian mind-body dualism that argues mental phenomena are non-physical, *embodiment* suggests that body and movement are essential both to the physical experience as they are to cognition and the mind. *Imagination*, on the other

hand, is generally understood as the ability to form new ideas, images or concepts that transcend the empirical realm (White 1990, Gosetti-Ferencei 2018).

This thesis intends not to delve into imagination's multiple viewpoints because that falls out of the scope. However, it departs from Vygotsky's and Hume's theories of imagination that suggest it simultaneously builds on and impacts experience, emotions and reality (cognitive, aesthetic and artistic principles) (Hatt & Graham 2018).

Real-life experience and imagination allow the individual to contemplate different possibilities, such as exceeding bodily capacities or challenging physical laws. Furthermore, people blush, turn pale, tremble or smile, moved by their imagination; witnessing other people's experiences can also impress imaginative thinking (Gosetti-Ferencei 2018). This perspective suggests that imagination and embodiment are closely related.

Imagination incites the exploration of fantasy and fictional worlds. This work argues that comparing these imaginaries with the real world facilitates a better understanding of the latest. In this case, performing arts are an interesting route due to the expression potential they offer.

The feminist participatory performance approach explored in this project provides a range of techniques for helping people explore social identities and social situations and to imagine new ways of being (Boal 2008, Harvie & Weaver 2015, Light et al. 2009). These methods are important for design because they are both prospective and contextualised. They provide a way for people to explore the implications of new ideas, e.g., abstract concepts like *wearable computing* or the *internet of things* from their own lived experience lens (Light, Weaver, Healey & Simpson 2008, Light 2011, Hansen & Kozel 2007).

Participatory performance also connects with more routine design concerns. Like more conventional theatre, participatory performance is typically created in coordination with designed scenographic elements, including the layout of space, the physical arrangement of the performer(s) and audience, and the use of materials and objects (Light, Weaver, Healey & Simpson 2008, Hansen & Kozel 2007). Digital technologies expand the scenographic possibilities, providing new ways to support people envisioning and enacting their ideas.

The approach proposed in this thesis focuses on participatory performance in the context of stroke recovery but engages with a broader argument about the value of performing arts approaches both as social support interventions and as design methods.

1.2 Methodological approach

As previously mentioned, the aim is to research the value of this approach from two perspectives: as a social support intervention and as a design tool. It seeks to assess the potential of embodied enactment to encourage a reconfiguration of stroke survivors' personal narratives and examine how motion capture and visualisation technology can be usefully integrated into this participatory performance-based format. Furthermore, it explores how this process contributes to the understanding of people's lived experience in the HCI realm.

With these aims in mind, the thesis sets out to answer the following research questions:

- How can the implementation of participatory performance methods in a stroke community context advance the understanding of technology-mediated interactions among its peers?
- How can this approach inform the design of interactive digital tools to exploit the potential of embodiment, enactment and intersubjectivity in the same context?

These questions raise subsidiary research questions related to the Green Screening workshop:

- How can theories and applied practices of participatory performance aid social stroke support through performative interpersonal relationships?
- How can digital avatars, storytelling, and imagination contribute to understanding participants' embodied experience in such participatory performance approaches?
- How does the intersection of both scopes contribute to an understanding of enacted embodiment and imagination?

To achieve a detailed investigation of the *Green Screening workshop's* unexplored potential, a *research through design* methodology particularly outlined for this project is followed. The approach considers both the research aims mentioned above and data collection challenges in live performance and community settings.

Through four iterative phases, Split Britches' participatory performance methods are incorporated into the *research through design* process. A series of workshop formats were produced in collaboration with a multidisciplinary team, including performance practitioners, cognitive scientists, and creative technologists.

The team's dynamics shifted through the process, with different people joining the team at different stages to bring the specific expertise and attention required during each phase. Furthermore, each phase prototyped a new iteration of the workshop format and technology, followed by an evaluation from the key stakeholders: stroke community and creative practitioners, to inform design choices in the next iteration.

These tasks are reflected in three resulting workshop formats and corresponding research studies. Firstly, the original Green Screening workshop's protocol and methods were scrutinised (more information in Chapter 4). The design task was then addressed by developing an interactive scenography prototype and subsequent adaptation of the workshop's structure and narrative. This allowed to explore the first format's potential to uphold community stroke support and how the motion capture-based technology can become a supporting tool (first study, Chapter 5).

The following workshop formats were evaluated to explore participant's enactment, imagination and embodied experience (second study, Chapter 6) as well as the potential of embodied narratives and collective enactment to aid stroke support (study three, Chapter 7) in the workshop. The rationale and decision-making process behind this methodology approach and a detailed description of the research methods used are presented in Chapter 3.

1.2.1 A note on the author's role

When developing the *Embodied Imagination* research project, I played a multifaceted role by coordinating multiple aspects. As a doctoral researcher, I iteratively delineated the research methodology, conducted the research studies presented in this document, performed the data collection and analysis, and reported on the findings with the purpose of making an original contribution to knowledge.

As a project manager, I actively involved multidisciplinary collaborators and stakeholders, coordinated the logistics, and balanced multiple calendars (sometimes with international reach) to carry out design meetings with the multidisciplinary team and workshops with stroke support groups from the Stoke Association.

As a producer, I ensured that all aspects of the project were practically realised. This was particularly important when communicating with the stroke community and external partners, materialising into a public engagement grant awarded after the doctoral research process concluded.

As an interaction designer, I also led the project's design and software development aspects, closely supported by the core team: Lois Weaver (perfor-

mance studies expertise) and Patrick Healey (cognitive science expertise). In addition, Healey and I scouted and selected the team collaborators to expand on the interactive motion capture technology that I initially developed.

Finally, I also supported facilitating the Green Screening workshops as the audiovisual technician, which allowed me to become a participant/observer (Mack et al. 2005) during the sessions. As the project progressed, and with it her understanding of Split Britches' methods, I was able to become more confident in supporting the facilitator by providing performance prompts and directions to the participants when required.

As a hub for the team, this level of involvement allowed me to comprehend the nature of collaborative research and creative-based projects that aim to involve communities within the practice itself. Furthermore, it permitted me to lead the project by ensuring the expertise and goals of all people involved were considered and embedded into the process as appropriate.

1.3 Background to the research

The PhD research presented in this thesis was developed within the *Centre for Doctoral Training in Media and Arts Technology* at Queen Mary University of London. As part of this four-year programme, it was required to undertake a five-month full-time work placement to develop an advanced research project within the industry sector.

Galindo Esparza undertook the Advanced Placement Project with the performance company Split Britches. She was introduced to Lois Weaver and Peggy Shaw in the spring of 2016, five years after Peggy had a stroke and four years after *RUFF* (Shaw et al. 2013) was first released. The company was interested in exploring how digital forms of *intelligent* scenography could support their *green screening* process when working with stroke survivors. The project was part of a wider collaboration with the Stroke Association (UK) and the Wellcome Trust foundation.

As Split Britches' *interaction designer and researcher*, the author surveyed technology-supported stroke therapy tools and contemporary scenographic techniques, such as motion capture and virtual reality (VR), that could advance the Green Screening workshop's technical setup. She also conducted a short study with an East-London stroke club to test their technical infrastructure. The project delivered the proof of concept for a motion capture-based Interactive Scenography.

In contrast to more traditional PhD programmes, the four-year *Media and Arts Technology* (MAT) programme required students to identify a research topic only after the conclusion of the Advanced Placement Project. After concluding, Galindo Esparza was interested in how the new real-time visual effects had boosted participants' engagement, the contrasting effects of talking and performing about their stroke experience, and the potential for individual and group storytelling development. Furthermore, she was inspired by Split Britches' strategies for public engagement and radical inclusion.

Having practised contemporary dance for many years, the author was intrigued by the power of creative movement to delve into inner exploration, convey a whole range of human emotions and tell unspoken stories. Through the years, she also noted the potential for dance and performance to engender communities and a feeling of belonging, particularly positive and empowering for practitioners from underrepresented backgrounds.

Along with this artistic practice, Galindo Esparza worked in the field of digital media, where emerging technologies such as projection mapping and mixed reality seemed promising for *new-of-a-kind* experiences in dance and performance. Before her PhD, she conducted academic research exploring such phenomena. Her MRes project investigated the performer's aesthetic experience when interacting with their digital double through motion tracking on stage. Findings highlighted digital technology's potential to transform the perception of space while bridging communication between digital and physical partners.

When first joining the MAT programme, Rosella was looking forward to expanding her master's research work. She was also inquisitive about the potential to develop and study new technology tools for audience engagement and participatory performance. Thus, building on the work undertaken as part of this placement was a unique opportunity to combine both research scopes and produce new knowledge within the HCI and Performance studies areas.

By choosing to work with Split Britches in the Green Screening workshop project, the author acknowledged her commitment to an issue of social concern: the inclusion of underrepresented communities, such as stroke survivors, in the design, research and development of social systems and technologies that directly impact their lives and can either improve or challenge their experiences. She also acknowledged her lifelong belief that arts can sustain community transformation.

The work presented here is a natural progression from work carried out during the Advanced Placement Project. However, it separates from it in the sense that this project's research questions and outputs were delineated under a robust methodological doctoral research framework.

1.4 Contributions

This thesis contributes to the fields of HCI and performance studies by investigating how Split Britches' participatory performance methods, coupled with interactive technology in the context of community stroke support, can be used to expand the design space of HCI. This approach is not often brought together, specifically framed under a feminist scope. Thus, this thesis makes the following contributions as described below:

1. This thesis suggests a new methodological approach to stroke social support in community settings. There is currently little work in the socially engaged practice that combines participatory performance and mixed reality technology to aid marginalised communities. The Green Screening workshop methodology is a participatory approach that works with fantasy and desire to invite stroke survivors to explore their personal narratives and construct collaborative storylines; thus, exploring the participants' lived experience. Furthermore, the workshop is supported by an interactive scenography that permits people to visualise imaginary worlds and share them with their peers. The development of this methodology is supported by findings from the three studies presented in Chapters 5, 6 and 7. Chapter 8 provides a detailed discussion.
2. Within the performance studies framework, this thesis has practical value for practitioners working with vulnerable or underrepresented communities. The feminist participatory performance methods implemented here create accessible, coalitional spaces that recognise every participant's individuality while providing room for growth and imagination. They involve participants in exploring the social identities and social conditions that inform and often constrain their experience. As proposed in Chapter 3 and further explored in Chapter 8, such methods are placed in a similar context as the Theatre of the Oppressed (Boal 2008); however, they heighten radical inclusion instead of political *spect-actorship*.
3. Within the design framework in HCI, this project expands the understanding of performance. Participatory performance mediated by interactive technology is an approach not often brought together in the context of community support and the lived experience informing design. Chapter 3 discusses the feminist participatory performance's ethos implemented here to involve stroke survivors, stroke professionals, community artists and creative technologists in the research process. The iterative methodology crafted for this project included multidisciplinary collaboration and community sessions to test the workshop format and redesign the narrative and technology accordingly.

4. The project produced a low-cost, portable technological infrastructure: the Interactive Scenography. This system uses Kinect infrared motion sensing, custom-built software, and a large screen. It discards the need for a physical green screen and ambient light. It does not require the physical markers or special costumes that professional motion capture systems do (like OptiTrack and VICON), making it practical for use outside the lab. This open-source project is available for creative practitioners wishing to implement the technology (see Appendix A). Chapter 4 discusses the technical specifications, and Chapter 8 discusses how it can support people's engagement, fantasy embodiment and collaborative contributions.

1.5 Document structure

This thesis is structured around eight chapters.

Chapter 2 begins with an overview of stroke, its impact on people's lives and a review of current approaches to aid stroke community support. A subsequent section offers an account of terms relevant to the stroke survivor's lived experience in community-based interventions and when engaging with digital technology. The third section contextualises participation and performance in the community domain, presenting a review of participatory performance interventions for stroke. The chapter concludes by addressing digital technology for performance and community engagement framed in the HCI domain and current implementations for stroke.

Chapter 3 provides an overview of the research through design approach and presents the foundation of Split Britches' feminist participatory performance methods. It describes the original Green Screening workshop methodology and defines its key aspects. The chapter concludes by introducing this thesis' iterative phased methodology, the research design for data collection and analysis, its limitations and ethical considerations.

Chapter 4 presents the preliminary work carried out before conducting the research studies. The main focus here is to describe the project's initial exploration findings: origin, development, structure, and objectives. It defines a framework for the Green Screening workshop's structure and technical requirements, guiding the redesign process described in the following chapters.

Chapters 5, 6 and 7 present and discuss the three studies conducted in this research. Links between each study and its preceding one are also offered. The first study explores the overall Green Screening workshop's potential to uphold community stroke support, as well as how the motion capture-based technology can become a supporting tool. Informed by the results, the second and

third studies propose alternative adjustments to the format and technology, investigating how participants' performance transform and the corresponding opportunities and implications for design.

Chapter 8 presents reflections on the work and draws together the findings of the three studies. It particularly highlights the main elements that consolidated the new approaches developed through this PhD: participatory performance (under a particular feminist approach) as a design tool for human-computer interaction and the importance of the lived experience when designing for under-served communities. It also reflects on the methodology guidelines, work limitations and proposals for future work.

Chapter 2

Literature Review

2.1 Introduction

How can the implementation of participatory performance methods in a community setting advance the understanding of embodiment, enactment and intersubjectivity in stroke survivor social support? And how could we design interactive digital tools that expand the potential of these participatory performance methods in the same context?

To address these questions, it is essential to consider the basic characteristics of a stroke, its impact on people's lives, and typical approaches to rehabilitation. A discussion about the lived experience contextualises stroke as an embodied experience that affects all aspects of the sentient body.

One of the most salient problems for stroke survivors is social isolation. Both social participation and participatory arts have proved relevant in supporting this issue. A discussion of these concepts around the stroke context is provided in the second part of this chapter. Finally, concluding with an exploration of digital technology for stroke, performance and community engagement through the presentation of representative projects and studies.

2.2 Stroke

2.2.1 Overview of stroke

Stroke is classed among the leading causes of complex disability worldwide. Almost two-thirds of stroke survivors leave the hospital with a disability (Stroke Association 2018b); it is also a contributing factor to develop dementia and depression, equally serious conditions in the global mortality and disease rates (Owolabi et al. 2015, Office for National Statistics 2020).

There are over 1.3 million stroke survivors across the UK (Stroke Association 2022, National Institute for Health and Care Excellence 2019, Office for National Statistics 2020); many of them face serious health complications and disabilities. Even though stroke mortality has decreased in the UK during the last two decades, statistics indicate that stroke survivors living with disabilities will increase by a third by 2035 (Patel et al. 2017, National Health Service 2019b). A cross-speciality and inclusive approach to health and social care strategies could help mitigate this prospect.

2.2.2 What is a stroke?

A stroke is a serious medical condition caused by the disturbance of blood supply to the brain. This cerebrovascular accident results in the damage or death of a localised area of brain cells, which leads to significant long-term effects. Stroke sequelae includes sensory, cognitive, and psychological alterations, as well as motor and communication problems (Muir 2009, O'Brien 2008, Oye-wole et al. 2016, Donnan et al. 2008, National Institute for Health and Care Excellence 2019).

There are two main types of strokes: ischemic and hemorrhagic. Ischemic strokes result from an artery blocked by a blood clot or fat deposition. Studies suggest that 90% of stroke events belong to this category. Only the remaining 10% is classed as hemorrhagic stroke, and their primary cause is the rupture of a blood vessel causing internal brain bleeding (Donnan et al. 2008, O'Brien 2008, National Institute for Health and Care Excellence 2019).

The probability of suffering a stroke increases with age. However, one-quarter of the affected population is under 65 years old (Muir 2009, Pompili et al. 2015). The major risk factors for stroke are classified as modifiable and fixed. Modifiable risks include hypertension (high blood pressure in abnormal levels), atherosclerosis (thickening of the arteries due to fat deposition), excessive alcohol consumption, drug treatments, diabetes and cigarette smoking. Fixed risks include valvular heart disease (any cardiovascular disease involving the heart's valves), atrial fibrillation (irregular and often fast heartbeat), and Transient Ischemic Attack (TIA - a 'mini stroke' with complete resolution of the symptoms in less than 24 hours) (Donnan et al. 2008, Muir 2009, O'Brien 2008, World Health Organisation 2014, Stroke Association 2018b).

Stroke's symptoms vary for each individual and begin suddenly. Overall, they can be recognised as numbness on one side of the body, difficulty speaking, walking or seeing, and trouble communicating or understanding. They can be remembered with the acronym FAST: Face (facial weakness and not able to smile), Arm (arm weakness and not able to raise both arms and keep

them in that position), Speech (slurred speech or not being able to talk at all) and Time (seek medical help immediately) (National Health Service 2019a).

Other symptoms include a sudden and severe headache, loss of balance or dizziness, a stiff neck and vomiting. These signs could resolve spontaneously, but they tend to last more than twenty-four hours, and some could remain for months or even years (Donnan et al. 2008). Because each stroke is different, the degree of the symptoms varies from one individual to another. When they resolve quickly or are bearable, people could ignore the level of emergency involved. Immediate medical diagnosis and evaluation are essential aspects of successful treatments.

2.2.3 Stroke and disability

The human brain holds numerous cortical areas, each in charge of a specific body function; it depends on which area was damaged during the stroke to determine which functions of the body will be affected. Some brain injuries directly relate to a particular area; for instance, damage to the visual cortex leads to vision impairment. However, injuries that damage diverse areas of the brain cause other problems, like memory loss which relates to the frontal and temporal lobes, as well as the limbic system.

Consequently, stroke is related to a wide range of disabilities that can be organised in the next main areas (Stroke Association 2020a, National Institute of Neurological Disorders and Stroke 2020, National Institute for Health and Care Excellence 2019, Stroke Association 2012, Donnan et al. 2008):

- Movement and motor control. Loss of voluntary movement in the face, limbs or an entire side of the body, paralysis (hemiplegia) or weakness (hemiparesis) on one side of the body. Trouble swallowing (dysphagia), balancing (ataxia) or controlling specific body movements and posture. Fatigue.
- Sensory processing. Issues sensing how the body is positioned (proprioception). Pain, heaviness, numbness or a tingling sensation in a weakened or paralysed limb (paresthesia). Loss of bladder and bowel control. Loss of the ability to recognise objects (agnosia) or their own limbs, as well as a loss of the ability to feel touch, temperature or pain. In contrast, chronic pain can be developed in joints that have been immobilised for a prolonged period; neuropathic pain, although rarer, is caused by a damaged brain area that controls the nervous system.
- Language. Problems speaking, writing or understanding spoken and written language. These issues can range from losing the ability to speak

and write coherently (expressive aphasia) or trouble understanding others' spoken or written communication (receptive aphasia) to a nearly complete loss of linguistic abilities (global aphasia).

- Thinking, memory and awareness. Issues with memory loss or trouble laying new memories after the stroke. Difficulty concentrating and processing bodily information. Difficulty making decisions. Loss of the ability to learn new tasks or to carry out complex mental activities such as following instructions or a proper sequence (apraxia).
- Emotions. Fear, sadness, anxiety, frustration, and a sense of grief over what they lost due to the stroke. Other emotional challenges and personality changes are directly caused by physical damage to the brain. Post-stroke depression is a growing target in stroke recovery interventions.

2.2.4 Stroke survivors and rehabilitation

A stroke survivor is an individual who endured a stroke episode and is currently receiving rehabilitation services or has already been discharged. Stroke requires immediate medical attention to initiate the appropriate treatment and maximise its benefits (Nor et al. 2005, Clarke & Forster 2015). The aim of rehabilitation in this area is to help the patient relearn skills lost due to brain damage, learn new skills to manage longer-term disabilities and achieve independence.

The variety of post-stroke effects indicates that there is no single method that supports all patients' recovery in the same way. The level of recovery varies in each particular instance. Approximately 50% of the survivors achieve functional independence after treatment, 25% require walking aids to move, and the remaining 25% endure severe disabilities (O'Brien 2008). Therefore, some patients will need special equipment to move and perform daily activities; this includes walking sticks, walkers, ankle-foot orthopaedic devices, aids for bathing, dressing, eating, and communication aids (US Agency for Health-Care Research and Quality 1995).

Stroke rehabilitation is possible due to neuroplasticity: the nervous system's ability to reorganise its structure and develop new synaptic connections and functions due to intrinsic or extrinsic stimuli (Mateos-Aparicio & Rodríguez-Moreno 2019). This process allows recovering sensory-motor and cognitive functions when an adequate medical team works with the patient to meet specific objectives (O'Brien 2008).

Stroke recovery and post-hospital support

Depending on each case's symptoms and severity, rehabilitation involves diverse medical domains and practices such as doctors, nurses, physiotherapists, dieticians, speech and language therapists, ophthalmologists, clinical psychologists, and social workers (National Institute of Neurological Disorders and Stroke 2020, Clarke & Forster 2015).

Treatment and rehabilitation methods address psychological and cognitive impact, movement issues, communication and swallowing problems, bladder and bowel control, as well as the possibility of reintegrating into daily activities. Stroke treatment starts when the patient is in acute care, aiming to help the patient survive and control associated complications. Medical intervention, assessment and prescriptions are the key elements of treatment at this stage.

After leaving the hospital, survivors of stroke continue with personalised rehabilitation programs. The rehabilitation team monitors each patient and determines the therapy activities required; they also provide information about local resources such as adequate leisure activities and voluntary support groups. Usually, there are follow-up appointments six months and one year after the stroke, and one year ongoing after that.

Typical forms of rehabilitation for a stroke patient include physiotherapy, repetitive task training, electrical stimulation or walking training for strength, balance and movement support; implementation of routines, keeping a diary or using keywords to improve memory and concentration; speech-language therapy and communication aids (i.e. Smartphone applications) to support language and communication; counselling and recreational therapy to support mental well-being (Stroke Association 2020b, 2012, US Agency for HealthCare Research and Quality 1995, National Institute of Neurological Disorders and Stroke 2020).

The recovery time depends on the severity of the stroke and related complications. Some recuperate quickly. However, most patients require rehabilitation for a period that ranges from months to years. Motivation and persistence are critical in this stage; a steady and continuous therapeutic exercise practice provides a more significant opportunity to relearn skills and adapt to the patient's new physical and cognitive possibilities.

2.2.5 The social life of a stroke survivor

The level of community reintegration is different for every patient. Stroke survivors should adjust to a new routine according to their physical, cognitive and emotional possibilities. Thus, tend to isolate themselves from society and develop post-stroke depression due to the degree of changes they undertake.

After leaving the hospital, stroke patients carry high expectations to rehabilitate. With time, such expectations can diminish due to the challenges of stroke recovery. It can take up to one or two years for a stroke survivor to accept their new lifestyle (Eilertsen et al. 2010). In the UK, Pallesen (2014) found out that stroke survivors had accepted their situation after five years, but they had also experienced other illnesses and never regained complete stability. Hence, permanently altering their sense of self and subsequent social reintegration.

Studies (Oyewole et al. 2016, Pompili et al. 2015, Robinson 2003, Salter et al. 2010, Ploderer et al. 2017, Obembe & Eng 2016, Rittman et al. 2007) demonstrate that approximately one-third of the stroke survivor population experiences a reduction in the quality of their life after their reintegration into society. The main reasons include the lack of sense of self and social connectedness, as well as the loss of employment and recreation opportunities due to their level of physical and cognitive impairment.

Impairment in stroke is also the cause of activity intolerance, particularly among the elderly. Consequently, other physical complications are developed, such as reduced cardiorespiratory fitness, osteoporosis, muscle atrophy, and circulation problems in lower extremities (Gordon et al. 2004). Moreover, stroke survivors endure a greater dependence to carry out daily activities and a reduced ability for social interaction. These sequels inflict a negative psychological impact on the individual.

Mental health after a stroke

After discharge from the hospital, stroke survivors face many challenges, such as adjusting to a new life routine, limited employment possibilities, and limited recreation options. This can lead to social isolation and depression, and the longer a stroke survivor is isolated from society, the harder it will be to re-join society (American Stroke Association n.d., Volz et al. 2016). Hence, it is important that stroke survivors find accessible and inclusive spaces in society, acknowledging their current physical and cognitive possibilities.

The Stroke Association (2018b) reports that almost half of all stroke survivors feel abandoned after leaving the hospital (45%). In 2015, 1 in 5 stroke survivors disclosed that the emotional impact of having a stroke was complicated, having a negative impact on their closest relationships.

Depression is recognised as the most frequent mental disorder after a stroke event (Volz et al. 2016). Beyond the presence of a low mood, post-stroke depression carries physical and emotional symptoms that impact well-being negatively (Cohen-Cole & Stoudemire 1987). The main physical symptoms reported include weight loss, delayed sleep, early awakening, anxiety and loss

of libido. In addition, main psychological symptoms include catastrophic reaction, hyperemotionalism, suicide plans, low self-esteem, pathologic guilt, and self-depreciation (Pompili et al. 2015, Robinson 2003).

While depression should be treated clinically, other approaches could mitigate stroke's emotional impact. Social support is mostly based on the positive influence of significant relationships with family, friends or acquaintances, and programs created specifically to bring emotional, practical and informational assistance, like stroke clubs (Salter et al. 2010).

2.2.6 Stroke communities

Stroke survivors constitute a socially excluded population typically seen as vulnerable. Although this concept varies depending on the context, vulnerability here is acknowledged as the indication that an individual, group or community is susceptible to harm due to lacking resources to support their life challenges (Aldridge 2014, Mechanic & Tanner 2007, Larkin 2009). For stroke survivors, such vulnerability derives from the individual's new possibilities, healthcare availability, well-being support, as well as social and community resources that aid interpersonal relationships. In particular, community networks are key to finding emotional and functional help in dealing with stressors and coping.

The latent problem here is that, without adequate resources and programs that specifically cater for stroke, this community will often be marginalised 'and maybe encouraged into deviant associations and activities that [do not] serve [...] the community's long-term interests.' (Mechanic & Tanner 2007, pp. 1225-1226). In particular, this thesis emphasises the interest in designing improved social support interventions at the community level.

Social support is any support provided outside clinical and formal settings, such as social programmes, counselling, home visits and peer support. It develops functional independence and increases self-confidence while becoming part of a community (Kruithof et al. 2013). Social support requires clear objectives, an understanding of the stroke context, and being perceived as adequate by the individual to succeed in eradicating a depressed mood (Salter et al. 2010).

Kruithof et al. (2013) investigated the efficiency of existing social stroke support strategies. They reported that helping stroke patients is complex and maintaining social networks is challenging. Previous projects' downsides included overprotection, social relationship as a source of tension, and unintended support failures. Attention to improving available social support could be an asset in reducing post-stroke depression (Salter et al. 2010).

Studies acknowledge that reliable social relationships in the first weeks after a stroke are essential to cope with the potential life-changing sequels of a stroke (Robinson et al. 1999, Volz et al. 2016, Kruithof et al. 2013, Salter et al. 2010). In addition, Salter et al. (2010) reports that support from social workers, family support organisers, and community outreach nurses could effectively form social networks but fail to establish trust and intimacy. On the other hand, talk-based programmes are perceived as a burden when implemented in the early post-stroke stages and are inaccessible for individuals with communication limitations. Here, peer support can be valuable in reintegrating stroke survivors into society while promoting trust and familiarity.

Peer support in the social context

Peer support is the social, emotional or practical help that people with lived experience can provide to one another; it provides mutual support, enabling peers to benefit from giving and receiving it. This type of support is offered in various formats like one-to-one visits and social or education programmes. However, peer support available in community settings was reported as more successful (Kessler et al. 2014) due to factors like empathy, shared personal experience, comradeship and focusing on individual strengths, not weaknesses (Fisher et al. 2015, Dorning et al. 2016).

Sharing experiences and related issues empower survivors of stroke to acknowledge their life changes more positively and detect beneficial solutions. The provision of mutual help, information and emotional support in a community setting facilitates social validation and stimulates self-expression (American Stroke Association n.d., Stroke Association 2018a).

The main benefits of stroke support include reduced social isolation, increased confidence, a more positive acceptance of long-term conditions, and improved mental well-being. As indicated previously, the positive effects also impact both the individual receiving support and the one providing it (Dorning et al. 2016, Kessler et al. 2014). In this setting, stroke survivors find the opportunity to discuss stroke topics that are not fully accessible to family or friends, furthering their sense of belonging and self-expression.

In summary, stroke can severely impact the quality of life and lead to social isolation (Robinson 2003, Salter et al. 2010). Stroke rehabilitation focuses primarily on regaining motor control and speech therapy. Once people are discharged, they need to adjust to their changed physical, cognitive and emotional possibilities. Peer and social support can be critical to this by providing opportunities to share their concerns and experiences. This promotes functional independence, self-confidence and cooperation (Kruithof et al. 2013).

2.2.7 Effective interventions for stroke

Social participation and community-based interventions for stroke are essential to facilitate post-stroke recovery (Magwood et al. 2020, Boden-Albala et al. 2014). The benefits of these interventions include increasing community participation, promoting independence and raising awareness about stroke challenges.

Usually, nurses and community health workers (lay health workers and trained peer and patient supporters) are the main providers of these initiatives (Magwood et al. 2020, Obembe & Eng 2016). Both roles focus on establishing effective connections between patients and the healthcare system, managing the home-care transition and, important to this project, reducing social isolation. However, it seems that other post-stroke rehabilitation professionals tend to be less involved in these practices.

Community-based interventions can take many forms. A significant amount of such initiatives focus on outpatient communication to provide health guidance, counselling or company but leave aside the communal aspect, targeting only one individual at a time and sometimes their family (Hamilton Health Sciences 2018, Vloothuis et al. 2019, Chumbler et al. 2012). Other interventions highlight certain community aspects, like creating open platforms to store messages of hope and knowledge for and from stroke survivors but disregarding social congregations (Newell et al. 2009, Kelly et al. 2017, Ostwald et al. 2014).

Even though social participation is the ultimate goal of rehabilitation (Obembe & Eng 2016), fewer projects directly aid this aspect to create safe social environments for stroke survivors. Some of the interventions that target this objective include socialising, group discussions, physical activity classes, and outings (Mayo et al. 1999, Marsden et al. 2010, Harrington et al. 2010, Lund et al. 2012, Ellis-Hill et al. 2015, Sadler et al. 2017).

One project that specifically resonates with the present thesis' approach is *Remembering Who I Am* (Rosetta Life & The Place 2013). This project worked with the participants' loss of identity and body connection by using mental imagery, touch and sensation visualisation. The group meetings appeared to improve patients' moods. They helped them both to express their feelings and articulate whom they want to become after their traumatic event (more information can be found in section 2.4.3).

In their systematic review, Obembe & Eng (2016) report that physical activity was paramount for effective social participation in post-stroke recovery. Here, most movement approaches focus on exercise to improve balance, fatigue, and endurance and reduce depressive symptoms. The key elements of success in such interventions included the support of a trained instructor fa-

cilitating the activities, 'encouragement from other group members to attempt new exercises and challenge negative perception of ability' (Obembe & Eng 2016, p. 389), and the opportunity to acquire new knowledge.

Although Obembe & Eng (2016) also emphasise face-to-face interaction and the act of getting out of the home, there is no inquiry about the impact of self-expression, emotional sharing, or creativity in the analysed interventions in his work. This might be due to the fact that few interventions cared for these elements. Section 2.4 (*Participation, community and performance*) will deepen into participatory arts projects that enable social participation and promote health and social well-being.

2.3 The lived experience

Understanding the stroke experience from the individual's point of view is critical. The concept of lived experience derives from phenomenology, a branch of philosophy that explores human experience, consciousness and the meaning conceived through such individual's experience (i.e. the unique way in which an individual perceives, thinks and feels) (Sokolowski 2000, Gallagher 2012). This research accounts for the individuality of the lived experience to access an understanding of the stroke domain that is otherwise limited.

In its most basic form, the lived experience originates before rational thought in the immediate consciousness of life. It is an awareness that is unaware of itself (Van Manen 1990). In other words, the acknowledgement of *being in the experience* right at that moment would be a distraction from the experience itself. For that reason, the own lived experience is always understood reflectively as something that has already happened.

Lived experiences gather hermeneutic significance as we (reflectively) gather them by giving memory to them. Through meditations, conversations, day dreams, inspirations and other interpretative acts we assign meaning to the phenomena of lived life. (Van Manen 1990, p. 37)

For instance, "going for a walk in the park" after having a stroke carries a certain kind of moving, a particular attentiveness to the environment that is quite different from the walks taken in the hospital while recovering or the walks taken in the same park before having the stroke. This specific, meaningful aspect of an individual's life is something unique that allows the stroke survivor, upon reflection, to call it "going for a walk in the park" and not something else.

The lived experience intrinsically relates to the human body. It ponders how bodies are experienced as ‘active, interactive, visible, material [...] and always embodied in the physical world’ (Loke & Robertson 2011, p. 181) at a subjective and intersubjective level. Merleau-Ponty (1945) developed an in-depth analysis of the body in his *phenomenology of perception*. He stated that the body is the starting point between conscience and the physical world, identifying the human experience as an embodied process. This thesis recognises Merleau-Ponty’s *human experience* as the lived experience.

The notion of embodiment was fundamental to Merleau-Ponty. He did not conceive the body as a subject or as an object but as something in between. The body mediating between internal and external experiences through its embedded consciousness. Thus, ‘embodiment is about the relationship between action and meaning’ (Dourish 2001, p. 126). The next section discusses the embodiment concept in accordance to this thesis’ praxis.

2.3.1 Dimensions of embodiment

Over the last four decades, social theory has become more interested in the body. However, theories tended to look at it as the outcome of the process and not as an embodied agency (Joy & Sherry 2003).

Embodiment is a complex multi-dimensional phenomenon applied in many fields under correlated conceptions (Rohrer 2007, Longo et al. 2008). In broad terms, it refers to the conventional way in which the individual experiences physical and social reality in the everyday world (Dourish 2001). This chapter presents a series of conceptions for embodiment relevant both for HCI and performance studies methodologies, narrowing the concept to implications for embodiment in stroke.

Embodiment denominates a field of research in which the reciprocal influence of the body as a living, animate, moving organism on the one side and cognition, emotion, perception, and action on the other side is investigated with respect to expressive and impulsive functions on the individual, interactional, and extended levels. (Koch & Fuchs 2011, p. 276)

Embodiment takes account of the living, feeling body situated in a physical world. Theories around this concept explore how the body and lived experience configure one’s own perception, thoughts and feelings (Marshall & Hornecker 2013, Körner et al. 2016). Hence, this is a key concept for this thesis due to its conceptualisation about the body in constant action: movement can influence affect and cognition and, reciprocally, affect and cognition can change

movement (Koch & Fuchs 2011). Furthermore, embodiment is both a means for the own lived experience as it is a genetic marker and a filter of socio-cultural and political influences (Barbour 2006).

In this context, the sense of one's own body has been embraced as a somatic, non-conceptual form of knowledge. Multiple notions model this approach, such as the role of the lived body (Merleau-Ponty 1945), kinaesthesia (Gallagher & Lindgren 2015), and somatics (Castillo Gallusser 2009, Schiphorst 2007, Sheets-Johnstone 2010). Concepts such as coenaesthesia (Critchley 1953), bodily self-consciousness (Bermúdez 1998, Legrand 2006), and corporeal awareness (Berlucchi & Aglioti 1997, Critchley 1979) also align closely with embodiment's precepts.

Embodiment contains three key components: body-ownership, self-location, and agency. *Body-ownership* refers to self-awareness of the own body. *Self-location* is the sense of being in the place where the own body is located. And *agency* is the potential to move and control the own body. Such components are relevant both for HCI theories and performance studies (Giummarra et al. 2008).

From all the approaches discussed here, it can be stated that embodiment encompasses a holistic experiencing individual (Barbour 2006), constructed by a biological, somatic, emotional, intellectual, and social experience embedded into a cultural, historical and geographical location. Therefore, it should also acknowledge recognition of diversity.

Embodied interaction

The HCI community has developed a growing interest in the concept of embodiment during the last two decades. Embodied theories have the potential to explain the fundamental role of the physical body and the lived experience in the way people understand, experience and interact with digital technology nowadays.

Dourish (2001) established a theoretical foundation for HCI drawing from the phenomenological theories of embodiment (Antle, Marshall & Van Den Hoven 2011, Marshall & Hornecker 2013). He coined the term *embodied interaction*: a significant and engaged interaction with artefacts that allows people to create and organise meaning. Embodied interaction is characterised by a conjunction of embodiment, practice and meaning grounded in day-to-day experience. *Practice* by indicating a constant engagement with the world in order to accomplish practical tasks. And *meaning* resulting from such embodied practice: 'we find the world meaningful primarily with respect to the ways in which we act within it' (Dourish 2001, p. 125).

Interaction is embodied not merely in the fact that there is physical contact between real fingers and a solid, three dimensional mouse; it is embodied in the sense that its occasion within a setting and a set of specific circumstances gives it meaning and value. By implication, it loses both if removed from those circumstances again. (Dourish 1999, p.8)

After Dourish, a growing body of projects in the interaction realm concentrate on bodily action, lived experience and physical presence. These projects account for a computationally mediated world and create interactive technologies to investigate embodied HCI (Bakker et al. 2012, Antle, Corness & Bevans 2011, Hornecker & Buur 2006, Klemmer et al. 2006). Relevant work includes the study of embodied metaphors in interaction models (Antle et al. 2009, Bakker et al. 2012), the lived body experience in interaction with wearable systems (Schiphorst 2006, Fallman 2003, Hornecker & Buur 2006), and socially situated embodied interactions to inform technology's design or implementation (Robertson 2002, Robertson & Loke 2009, Hornecker & Buur 2006). Overall, these approaches clearly contrast embodied theories to the Cartesian dualism that separates the physical body and the mind.

To fully appreciate embodied interaction, it should also be noted that the concept of embodiment is usually proposed as a twofold structure. The body is both a subject and an object of perception. It is a subject of perception because it allows the individual to perceive an external affect and relate to it. In turn, it is an object of perception because the individual's body is also perceived by others (and imperfectly perceived by oneself). 'Having a body is thus always mediated by others, and in turn a confrontation with ourselves as other' (Wehrle 2020, p. 514). Hence, a human being is both a subject and an object of experience.

An embodied interaction is conceived and designed to place embodiment as a central element, in contrast to an individualistic approach (Dourish 2001, De Jaegher & Di Paolo 2007, De Jaegher et al. 2016, Galbusera & Fuchs 2013). Schutz (1999, 1972) extended phenomenology beyond the individual to incorporate the social world. He questioned previous phenomenology theories, such as Husserl's and Heidegger's, due to their lack of attention to intersubjectivity. 'How can we achieve, between different individuals, a common experience of the world, and a shared framework of meaning?' (Schutz 1999, p. 111). Schutz concluded that the lived experience includes the social understanding of each individual, that is, how individual actions look to others and how others look to the individual. This refers to intersubjectivity, a practical achievement of engaging with each other in specific social actions.

The following section further discusses the notion of intersubjective embodiment. However, before moving on, it should also be established that embodiment is recognised as a prerequisite for other types of sensations and knowledge (Merleau-Ponty 1945, Kant 1973, Johnson 2013, Piaget 1999). This is the reason why it is assumed as a key element for individual psychological identity (Longo et al. 2008). Its implications around the sense of self and the access it offers to sensations and knowledge place it as one of the foundations of mental life, and as a key point of interest for this research project.

2.3.2 Embodiment as an intersubjective exchange

So far, this chapter has discussed the lived experience as an individual event. However, some hints have been given about the sense of community. To summarise, people experience the world through the body and their internal representation; however, these are generated through intersubjective relationships.

The previous section discussed embodiment mainly grounded on the individuality of the process, overlooking the fact that embodiment affects not only oneself but also others. Nonetheless, phenomenology theorists have also investigated the experience of *being in the world with others* (Samaritter & Payne 2013, Plant 2017), referring to an intersubjective exchange.

Intersubjectivity is understood in this thesis as an embodied practice that addresses such comprehension between people: the other's inner experience indirectly lived by the self through perceiving the other's exterior (Plant 2017, Gallagher 2005, Samaritter & Payne 2013, De Jaegher et al. 2017, Fuchs & De Jaegher 2009). Collective actions depend on this intersubjective understanding of the world and each other's actions (Dourish 2001). Such actions are socially attuned and kindled by cerebral processes in direct correlation with the body (De Preester 2008, Samaritter & Payne 2013). In other words, bodily intentionality is shared between the perceived subject and the other's direct perception.

In the somatic praxis, Koch & Fuchs (2011) suggest three levels of embodiment: the embodied self, the enactive self, and the extended self.

- The embodied self relates to an individual's corporeality, mind-body unity. It unifies embodied cognition, perception, emotion, and action. This aligns with the concepts discussed in the previous section (see 2.3.1).
- The enactive self is the self-individual extended to a dyad or a group. At this level, the individual is acknowledged as a living system that presents autonomy, self-reproduction, sense-making and coupling with the environment. This aligns with the concept of intersubjectivity as discussed

by Plant (2017), Gallagher (2005), Samaritter & Payne (2013), Fuchs & De Jaegher (2009).

- The extended self is intertwined with and related to the environment. Thus, it is considered a cultural externalisation, like clothing, housing, or artistic expression. This suggests that embodiment influences the interaction person-environment. In a few words, it is the externalisations and symbolisation of the self-individual, for instance, in the form of an artwork like an improvised theatre piece to fight anxiety, or a personal poem to reflect upon trauma recovery.

A body of studies has examined the effects of intersubjective exchange (Barsalou et al. 2003), highlighting the fact that perceived social stimuli cause bodily states (Dijksterhuis & Bargh 2001). These bodily states, in turn, can cause one's own bodily imitation when perceived in others (Bavelas et al. 1986) or can cause affective states when perceived in the own body (Hatfield et al. 1994, Laird 1984). The latter case refers to the influence of movement in affect and cognition, considering the effect of facial, auditive or kinaesthetic feedback.

In the case of bodily states inspired by perceiving the other, Creely (n.d.) recalls this intersubjective aspect of embodiment by accounting for the relationship between a dancer's embodiment and a man in a wheelchair's embodiment (e.g. a stroke survivor) when looking at the dancer. Their movement capacities are different: the dancer can master the movements under scripted sequences and rhythms, while the man observes without the possibility of recreating the movements fully.

As a performer in action, the dancer's embodiment is a mix of inner and external states that create a unified embodiment. On the opposite, the man in the wheelchair's embodiment does not mainly account for the external motor skills; his embodiment is a felt state, an inner experience that might not be evident for external observers but is authentic for him. The observed dance could awaken emotions, memories or fantasies in the observer.

This relation dancer-man in the wheelchair suggests a multi-layered embodiment process where both individuals influence each other. Nonetheless, considering intersubjective exchanges in embodiment is more complex. The self does not have access to the other's inner experiences; hence it can only make an approximation from their own experiences. Embodiment enables recreating another individual's experience, becoming a facilitator for intersubjectivity (Plant 2017) and enabling a social understanding (Fuchs & De Jaegher 2009).

The previous example underlines that intersubjectivity is an interaction process with meaningful engagement between active, feeling, thinking and

moving subjects, as defined by Sheets-Johnstone (1999). Beyond a combination of multiple first-person perspectives, it is the co-existence and exchange of co-created and influenced perspectives of more than one subject to create meaning (De Jaegher et al. 2017, Reddy 2010).

Although theories of intersubjectivity are extensive and focus on different embodied cognition perspectives, from Husserl (1952) and Merleau-Ponty (1945) to more current scholars such as Gallagher (2005), Fuchs & De Jaegher (2009) and De Jaegher et al. (2017), the intention of this section is to highlight the fact that embodiment is a social phenomenon. Each subject's lived experience is constantly influenced and influences the other's lived experience. This project aims to explore stroke survivors' social interactions and community engagement as a meaningful embodied experience in which the lived body is fully engaged with each other, particularly in the case of participatory performance, which in essence is a relational form (Breel 2017).

2.3.3 Embodied engagement in performance

Performing arts transmit aesthetic and creative expression through the body itself, for instance, by implementing movement, voice or physical manipulation of an instrument. Forms like theatre and performance are included in the concept. Traditionally a performer enacts a storyline with the intention to be seen by an audience. From this statement, it can be considered that: a) movement (Sheets-Johnstone 1999) is an underpinning part of performing arts, b) the relationship between performer-audience implies an intersubjective experience, and c) embodiment shapes and gets transformed through engagement in this type of interactions.

Human experience, overall, is an embodied process. In the case of performing arts, people experience them by engaging with the artwork, such as attending a theatre show, observing a musical scene, applauding at the end of a dance piece or reacting to a performer that is asking for a dramatic contribution into the performance itself. This last one refers to participatory performance, and embodied engagement in this practice presents particular characteristics that are different, for instance, from the embodied experience of being an audience member spectating a show.

Participatory performance practices establish intersubjective relationships between performer and participant. Performance studies define participants as the audience members that engage with the performance itself by *doing*. This is the key element of participatory performance. Hence, the type of relationship addressed here is based on reciprocal interactions that impact both the other individuals (performers and participants) as well as the performance

work itself. Embodied engagement, in this case, ‘represents an agentive act as well as a way for them to interpret and create meaning (additional to theatre’s visual and aural means)’ (Breel 2017, p.112).

Breel (2017) divides participatory performance’s embodied engagement into *agency of engagement* and *narrative agency*. Agency of engagement consists of the participant deciding how to engage with the work, placing the power of action into each individual. And narrative agency requires the participant’s awareness about the impact of their action on the performance, that is to say, an awareness of their intersubjective experience.

In this case, agentive action is closely related to body movement. Movement validates the sense of self, not as a conceptual entity, but in the sense of agency and capability; it provides the basis to experience the individual’s possibility to act and react in the world.

The concepts of proprioception and kinaesthesia are closely related to movement and body position in space. Proprioception refers to the sense of position and action of the limbs (Hillier et al. 2015, Sheets-Johnstone 2019), a sort of *sixth sense* that informs the spacial self. It is grounded on the internal stimuli (i.e. central nervous system) that drive body movement, in opposition to exteroception that addresses stimuli received from outside the organism (Reason & Reynolds 2010). Proprioception is available via the proprioceptors: sensors in joints, muscles, and tendons, which provide the required information to perform a coordinated movement.

Kinaesthesia involves both types of stimuli: internal and external. Therefore, it includes proprioception in its concept but is not limited to it. Kinaesthesia refers to a multisensory awareness of movement and body position through sensory organs in muscles and joints (Reason & Reynolds 2010); it provides the ability to navigate physical space. Kinaesthesia poses a greater emphasis on behavioural aspects and the sense of body motion.

Both kinaesthesia and proprioception indicate that body movement is a broad concept related to diverse functions in the body (Sheets-Johnstone 1999, Varela et al. 1993, Ziemke et al. 2007). This thesis’s main interest focuses on the movement that facilitates expression and communication with others.

In this sense, participatory performance works with *meaningful movement* to build narratives intended to be staged and enacted. Beyond its semantic and cognitional attributes, this type of movement is also affectively motivated and informed, that is to say, the emotions are not opening impulses but embodied into the movement itself (Sheets-Johnstone 2010, 1999).

Participatory performance narratives are not only concerned with expressing such storylines through language. Beyond this intention, they are concerned with affective and kinaesthetic movement-based dynamic experiences.

If narrating an experience cannot ‘verbally capture and do justice to its dynamic structure and flow’ (Sheets-Johnstone 2010, p. 8), the kinaesthetic experience allows to *communicate* such experience in a more complex way. For instance, a stroke survivor might be able to create detailed and more complex descriptions of the psychological challenges of stroke when communicating their experience through creative, meaningful movement supported by kinaesthesia and affect than merely by verbalising the same experience.

This kinaesthetic communication also makes use of gestures as a supporting resource. Defined as ‘sense-making practices that abstract communicative forms from everyday actions and construe experience in terms of action’ (Streeck 2015, p. 426). Gestures accompany, complement or substitute the linguistic content of messages delivered to others. Such messages are formed by idea units containing both linguistic and imagery information (McNeill 1992).

Gesturing is a form of non-verbal communication that enables the expression of imagistic elements; it is performed by hand, face or other physical movements. Furthermore, gestures are not only considered to carry action but also spatial information (Alibali 2005, Kita & Özyürek 2003); they establish a link between spatio-motoric representations and speech production processes. Gesturing encodes and organises non-linguistic, spatial and motor properties in order to find a compatible pathway of expression by using language (Alibali 2005).

This dissertation defines gestures as the small sets of meaningful body movements produced when engaged in an effortful cognitive activity to represent ideas and share them with others. Such body movements can involve hands, arms, legs, and head movements.

Gestures carry different intentions. Streeck (2009)’s *ecologies of gesture* propose a taxonomy based on communicative purpose. Relevant categories for the present research involve:

- Gestures that model imaginary and abstract worlds or depict impalpable experiences, such as memories.
- Gestures that embody communicative aspects of performance, such as giving a speech, praying, or telling a story.
- Gestures that produce meaning and features of the *world in sight* and orient the interactions in relation to them.
- Gestures that regulate others’ behaviours.

In addition, gestures become predominant when lexical access is difficult; this suggests that people with communication difficulties benefit from gesturing to make their ideas available and raises the question of how people with

recently-acquired movement disabilities would adapt their gesture processes accordingly.

In summary, this research is supported by the notion that gestures contain embodied processes that connect mental imagery with an external physicality in a feedback loop.

2.3.4 Enactment

Terms like acting, representation and enactment have been borrowed by scopes like philosophy and sociology. *Acting* closely relates to a form of theatre predominating in the late European culture, but it is hardly relatable to earlier forms of theatre and the most recent trends in performance. *Representation*, on the other hand, carries a philosophical load focused on defining the whole concept of theatre (Hamilton 2008).

Enactment refers to start doing, to perform, or to act (Warburton 2011). It is the 'social practice in which audiences attend to the physical and verbal expressions and behaviours of performers who, by those means, occasion audience responses to characters in stories' (Hamilton 2008, p. 23).

Enactment, in this thesis, is acknowledged as a social practice in which the performer embodies the artistic message and represents it in front of others (an audience). The recipients of the message react to it deliberately or unintentionally; they could cheer, applaud, laugh or grimace as a response, but they could also become still or switch positions inadvertently (Theodorou et al. 2016).

Away from the notion of theatrical enactment, an enactive approach has been in development since 1990, with work from Varela, Thompson and Rosch about the embodied mind, inspired by Merleau-Ponty's phenomenological resources (Gallagher & Lindgren 2015). In this case, the term enactive metaphor describes imaginative ideas that are put into action or brought into existence; in other words, they are enacted. Enacting a metaphor involves an embodied process similar to acting in theatre or pretend play by children.

Pretend play involves linguistic abilities and internal representations. Here, sensorimotor skills are in charge of reproducing imaginative capacities. Gallagher & Lindgren (2015) also indicate the ability to see affordances in objects. Such pretence involves a metaphorical transformation: pretending to see something as something else (i.e. a banana for a phone); this entails detecting possibilities for action and interaction beyond the mere physicality of the object.

Another form of pretence is role-playing: subject substitutions, pretending to be somewhere else or representing activities that are not happening in reality. This is the closest link to theatrical enactment: enact a metaphorical transformation of the self in actions (Gallagher & Lindgren 2015).

In the case of participatory performance, embodied engagement is closely related to enactment. The performance's participants do not only observe but engage in the narrative by providing performative cues that guide the storyline's development. The intersubjective relationship devised into the narrative facilitates that each of these cues impacts and is impacted by other people's contributions.

Embodied engagement in performance also proposes a compelling, expressive tool for stroke survivors. It enables inclusion and flexibility into the practice by welcoming all kinds of movement, intuition and lived experiences as possible and relevant (Barbour 2006, 2004, Fraser 2004); it opens space for active experimentation with new questions and challenges (Balkin 1990, Fraser 2004, Barbour 2006); and it provides flexibility to explore methods and means of self-representation accounting for tensions, ambiguities and resistance (Csikszentmihalyi 2013, Barbour 2006, Green 1996).

2.4 Participation, community and performance

A diversity of contemporary practices in the context of the arts could frame the project presented in this thesis: participatory performance, socially engaged art, community art, applied performance or interactive art, to mention a few.

This chapter is not interested in establishing the origin and transformation of the shifting theories and labels behind this practice.¹ Instead, it discusses such topics to contextualise participation and performance in the community domain.

2.4.1 Social participation

Social participation is a significant component of human functioning. It is defined as the individual's involvement in a life situation that enables interpersonal interactions in society (Vincent-Onabajo 2013, World Health Organisation 2001). Thus, participation refers to the people's lived experience into their ordinary context (Obembe & Eng 2016). It is an activity simultaneously intersubjective and symbolic (Breel 2017).

There are multiple domains in social participation, such as community life, social integration, politics, creative and cultural activities, recreation and education (Vincent-Onabajo 2013, Fryer et al. 2016). An appropriate implementation of participation in these areas is linked with an improved quality of life and well-being for all society members, including stroke survivors (Kwok et al. 2011, Levasseur et al. 2008, Croezen et al. 2015).

¹More information about this topic can be found in Matarasso (2011, 2019, 1997)

Participation in this context includes individual-based activities, such as hobbies and neighbourhood relationships, and community-based activities, such as volunteering, local events, clubs and religious activities. Active involvement in these activities relieves social isolation, provides emotional support and a sense of belonging, and meaning, empowerment and self sufficiency (Bennett 2005). However, "being present" is not the only component of participation. Engaging and collaborating with others is fundamental; in this case, inclusion is also necessary (Mars et al. 2008). Catering for each individual's needs increases the opportunities for successful cooperation and engagement.

Stroke survivors, for instance, endure communication and physical issues, which can limit participation. Nowadays, community support approaches promote accessible spaces and activities that accommodate a broader diversity of individuals. Still, many of these activities do not fully understand underserved populations' needs, such as those required by stroke survivors. As a result, they participate to a certain degree in work and leisure activities but tend to feel less included and collaborative than people without a stroke; consequently, this has a negative impact on their well-being and self-perception (Fryer et al. 2016, Mars et al. 2008, Schnitzler et al. 2019).

Findings suggest that stroke rehabilitation should include participation in leisure activities performed before the stroke (i.e. doing arts, playing board games, playing sports, going to the movie theatre) (Schnitzler et al. 2019). Creating spaces and activities that directly respond to the stroke survivors' needs is also necessary instead of exclusively adapting what already exists. Then, successful participation can be achieved through active involvement, meaningful choices, and the possibility of self-expression and identity exploration among other people equally involved (Fryer et al. 2016).

The artistic turn

As mentioned above, the concept of participation can be applied to many domains. In addition to the social outlook, this thesis focuses on the creative and arts domain. Here, participation reconsiders the traditional relationship between art object, artist and audience (pertaining to the Western culture) by democratising the creative process. The audience becomes a participant or co-producer of the work, collaborating with the artist; the artwork transforms into an ongoing, open-ended project (Bishop 2012, White 2013).

Participatory arts refer to artwork created by professional artists in collaboration with people without art expertise; they are the main medium and material. This broad field of artistic practice involves people collectively while still catering for individual development and expression (Matarasso 2019, 2011,

Bishop 2012). Nonetheless, the practice has developed in many directions. It accounts for members of an art audience making creative contributions that affect the outcome of the artwork, as much as it refers to the development of projects that equally include community members and arts professionals to represent and explore social ideologies (Breel 2017, Matarasso 2019). In both cases, participatory work is only fully achieved when the participants are intrinsically involved instead of playing the role of an external audience.

Participatory approaches emphasise experience over performance; the main focus is the creative reward of the collective activity instead of the aesthetic outcome (Bishop 2012). Breel (2015, 2017) presents a division between participation as a process and as an outcome. Works with a participatory outcome concern art pieces that follow a fixed structure; the participants contribute to this piece, filling in the gaps in the structure. Thus, their participation is the performance itself.

On the other hand, participation as a process introduces applied and socially engaged practices. The artist facilitates the process, and the participants become co-producers of the work by making creative decisions on the work's structure. Their participation is the collaborative process involved in the creation of the piece. This approach usually aids a particular community or demographic group; it develops relevant projects for them. This is the type of participation that concerns this thesis due to its potential to examine stroke survivors' experiences and needs from within the societal context.

Therefore, it seems that social participation and participatory arts are both deeply rooted 'in the live encounter between embodied actors in particular contexts' (Bishop 2012, p. 3). Furthermore, such experiences rely on intersubjective exchange. Liveness, then, is fundamental in any kind of participation, which reveals that theatre and performance are crucial to many of these practices.

2.4.2 Performance, community and participation

Performance is a structured event constructed by a continuum of human actions specifically framed, displayed or highlighted. This includes not only the performing arts but also ritual and everyday life performances, as well as the enactment of social, professional, gender or race identities (Schechner 2002). This is an intensified experience (Harris 2017, Spence 2015) with the fundamental condition to bridge performer and audience interactions within a specific performative structure (Spence et al. 2013b).

Performances mark identities, bend time, reshape and adorn the body, and tell stories. Performances - of art, rituals, or ordinary life

- are made of “twice-behaved behaviours,” “restored behaviours,” performed actions that people train to do, that they practice and rehearse. (Schechner 2002, p.22)

From its earliest days, performing arts have enabled diverse ways of interaction between performer and audience to communicate ideologies, fantasies and experiences of everyday life. During the first half of the twentieth century, artists like Yves Klein and Merce Cunningham contributed to the evolution of performer-audience interactions. Cunningham showed interest in technologies dictating the routes of the live spectacle, while Klein worked on happenings where the spectator’s reactions guided the direction of each performance event (Calvi 2013).

Eventually, performance became an accepted medium of artistic expression in the 1970s (Goldberg 2011). Since then, it has expanded into several directions, merging practices like drama, dance, physical theatre, mime, happening and installation (Broadhurst & Machon 2006, Goldberg 2011). Beyond entertainment, performance can express identities to teach, persuade, heal, and foster community (Schechner 2002). However, it is still argued how long these shifts in emotions, attitudes and behaviours last (Fischer-Lichte 2008).

‘The last decade has seen a participatory turn in contemporary theatre and performance, emphasising the audience’s experience’ (Breel 2017, p. 8). Nowadays, performance proposes permissive, open-ended work that pushes the boundaries of more conventional forms. The premise is to engage audiences in active participation with the work, regardless of context, type of public or location, to interact socially with each other (Goldberg 2011, Harvie 2013).

The alteration of traditional parameters has produced performance sub-genres like participatory performance, in which the spectator transforms into a co-creator of the piece. Coinciding with the definition of participatory art previously discussed, this type of performance reconfigures the audience’s role by allowing contributions to the performance, either into the context itself or by crafting a performance work that positions both performer and audience at the same level.

In performance studies, audiences are visualised as part of a more extensive system: the performance itself (Gardair 2013). Participation pushes the boundaries of performer-audience interactions by integrating the audience as a collaborator; hence, their choices will affect their own experience during the performance. It is a particularly involved encounter of real or virtual proximity to others, creating a democratic spectatorship (Calvi 2013, Rost et al. 2011).

An implication of participatory performance is its ability to stimulate embodied actions and enactive movement, especially for those who are not pro-

fessional performers; this is an act of doing. The project presented here pays particular attention to such practice because it is a simultaneously intersubjective and symbolic activity (Breel 2017) that enables community collaboration and reconfiguration. Through this process, stroke communities can find a space for interaction that upholds identity exploration, shared experiences and community development.

From community arts to socially engaged performance

As discussed above, participatory practices can take multiple forms in the arts realm. Instead of labelling and defining each of them - which oftentimes is imprecise - this section briefly introduces the type of practices that inspired and, at certain stages, informed the project's development. The objective is to make clear what pertains to the project and what falls out of its scope.

Participatory arts were originally recognised under the umbrella term of *community art*, a radical and political approach to participation characterised by community empowerment and cultural democracy. Under these principles, it allows people without previous access to art to create their own art while bringing art out of the galleries. Community artwork takes a wide range of forms based on society, culture or political needs of the location where they are created, as well as the artist's interests and ideas. Nonetheless, community activism and social engagement are key elements of these works (Matarasso 2019).

Participatory performance practices focused on community development flourished in the late 1960s in the UK. The movement was preceded by *social documentary theatre*, a line of work that communicates local stories of real people's lives and experiences told in their own words, especially those of concealed communities or people that rarely have the opportunity to share their experiences. These stories, however, are performed by professional theatre artists who might take aesthetic credit into the work (Beumers & Lipovetsky 2010, Black & Lipscomb 2017), inevitably transforming the essence of the stories.

Community theatre (from the 1970s) employs modes of practice that give voice to communities at the margins of society. It makes theatre available to people that do not have access to it; local communities participate in the creative process, highlighting current social and political issues. It establishes a mutual dialogue in which artists become social agents, and the local community participates in the art-making process (Erven 2000). This movement is characterised by social inclusion through the arts. Theatre techniques focus on the development of stage plays to be presented in front of the community.

Older people are particularly vulnerable to social isolation and loneliness; there is also an increased tendency to experience stroke at this life stage. From the 1980s, Reminiscence theatre worked with the stories and memories of older people as co-creators or co-performers to develop documentary-style performances (Schweitzer 2006). This became the basis for most artwork with older people in the next three decades. Participatory arts for the elderly are now recognised as the Creative Ageing movement (since the 2010s); this promotes arts as physical and mental health support (McAvinchey 2013), 'aiding mobility, as well as unlocking and evoking memory and cognitive functions' (Thwaite 2017, p. i).

The Theatre of the Oppressed was created by Augusto Boal during the 1970s in Brazil. It is a method that reveals systemic oppression and exploitation in everyday activities. It seeks to liberate disadvantaged communities (the oppressed) through dramatic techniques that place actors and audience on the same level, impacting the outcome of the work. Its ethical poetics believe people become political actors in everyday life when becoming actors within a dramatic setting. Techniques developed by Boal, such as *forum theatre* and the *rainbow of desires* are of particular interest in this project, because they allow people to explore introjected psychological, social or political oppression through dramatic games (beyond only using words), and to reveal desires, thoughts and strategies to their peers as alternatives for real life, especially to defy systemic issues (Boal 2008, 2006). Nowadays, this approach is still a basic form of British participatory theatre (Campbell 2019).

Applied performance (the 2000s) is a cross-disciplinary field that offers practices with social and political aims in education, community and social contexts. The term is currently popular in academic circles and directly addresses collaborative, participatory and community practice as an agent for social change and sustainable transformation. These applied methodologies respond to current political and social affairs, engaging with individuals through understanding their background context. Applied performance follows applied drama and applied theatre, which originated through the social rupture of modern preconceptions. Politics and social ideologies gave rise to problems with immigration, race, war and crime, to mention a few; the applied practices initiated creative work with people affected by these shifts. The objective was to support the transition and give them a voice through drama and performance techniques (Prentki & Breed 2021, McAvinchey 2006, Nicholson 2014). Applied performance, then, gives voice to marginalised communities whose stories have been silenced by society, seeking to transform their context.

However, as discussed in Fischer-Lichte (2008) 's work, sustained change is questioned in any type of performance, including the approaches discussed

above. Rodricks (2018) warns about presenting these types of work as automatically transformative and intrinsically ethical; there are latent issues, such as being perceived as a superficial one-time event and not thoroughly interrogating the politics of collaborative creation. Socially engaged performance practices should continually question and examine power relations and the project's reach.

2.4.3 Participatory arts for mental health and well-being

In 2017, the World Health Organisation (WHO) declared that the diagnosis of mental illnesses as a whole had increased worldwide in recent decades. For instance, depression was detected in more than 300 million people of all ages and contexts, including stroke survivors. This condition propitiates functional health challenges, mental and physical difficulties, becoming not only an individual's issue but also a worldwide burden for public health (Jensen & Bonde 2018, Stuckey & Nobel 2010).

The healthcare environment increasingly acknowledges that health may not only be concerned with the absence of disease but with complete physical, mental and social well-being (Stuckey & Nobel 2010). Subsequently, a more holistic medical approach proposes the arts as an important factor when delivering health care (Moss & O'Neill 2014). Consequently, the arts and health field has developed in western culture over the past 30 years. In the UK only, it has been explored across practice, academia, research and policies.

Arts interventions cover a broad spectrum, ranging from clinical arts interventions and activities with a therapeutic approach to non-clinical participatory arts activities and experiences. Studies demonstrate that participating in any type of arts intervention promotes a significant impact on personal and public health. A constant engagement with arts and culture is linked to higher levels of subjective well-being, positive effect on physical health, reduction in levels of anxiety and depression, increased social interaction and a better understanding of one's own body and the inner self (Mowlah et al. 2014, Clift et al. 2009, Jensen & Bonde 2018, Stuckey & Nobel 2010).

The scope of this thesis is non-clinical participatory arts. These can be defined as creative or performing arts projects devised by professional artists in community settings; they target specific underserved populations, such as stroke survivors and their carers. The primary purpose of these practices is to promote health and well-being. Thus, the therapeutic and aesthetic objectives of the projects complement each other during the process.

The main participatory arts used in this context are performance, theatre, music, dance and poetry. Such creative methods and techniques have the po-

tential for accessing the social, creative and experiential aspects of peoples' lives (Zeilig et al. 2014, Jensen & Bonde 2018, De Botton & Armstrong 2013); they might also provide unique access to emotional and physical memories for people whose cognitive capacities are diminishing (McLean et al. 2011). Mostly, these approaches have been explored for people with dementia, depression, post-traumatic stress disorder (PTSD), and Parkinson's disease (James & Johnson 1996, Dupuis et al. 2016, Jaaniste et al. 2015, Bradt et al. 2015, Kiepe et al. 2012).

On the other hand, clinical arts interventions are usually delivered by health-care professionals in hospitals and clinic settings, aiming to "treat" specific health conditions. Here, the arts are seen as tools to achieve measurable ends (Zeilig et al. 2014). In the case of non-clinical participatory arts, the outcomes are not specific or easily measurable; the therapeutic ends and goals in this type of project are therapeutic in a broader sense.

The basic premise in participatory arts projects is that creative activity and self-expression have intrinsic value for participants and positive effects on health and well-being. They activate and improve psychosocial resources that enhance self-esteem, identity building, social participation, and positive life experiences (Jensen & Bonde 2018), and help people cope with challenging routine changes. These impacts are inherently difficult to assess, especially using standard clinical methods such as randomised control trials (Zeilig et al. 2014).

2.4.4 Participatory performance for stroke recovery

The project presented in this thesis focuses on participatory performance arts as a possible means to engage stroke survivors rather than treating the symptoms and physical repercussions of the stroke. This approach can take various forms but always involves some form of direct participation by an audience in the production of the artwork. Nonetheless, there are fewer projects based on the application of participatory performance to stroke recovery compared to social participation and community-based interventions (see section 2.2.7, *Effective interventions for stroke*).

The project *Remembering who I am* (Rosetta Life & The Place 2013) implemented performance techniques in a community setting for stroke survivors. This intervention was offered to patients of the National Hospital for Neurology and Neurological Surgery (UK). Therapists treated the patient's loss of identity and disconnection with their body by using mental imagery, touch and sensation visualisation. The group meetings were reported to have improved patients' moods, enabled the expression of positive and negative feelings towards their stroke, and determined who they wanted to become.

Also by Rosetta Life (2019), *Stroke odysseys* was a participatory arts-based research project that worked with stroke communities around south London. The project applied an interdisciplinary practice combining performance, music, song-making and dance to help stroke survivors overcome issues that could obstruct stroke recovery, such as anxiety, depression and low self-esteem. It consisted of a touring performance company comprising six professional artists - two dancers, two singers and two musicians - who supported five stroke survivors to co-produce a theatrical piece, performing themselves on stage. The objective was to explore how effective performing arts could be in aiding stroke recovery.

In 2018, the project toured around England and Northern Ireland. The intervention showed an improvement in the patient's health. The project was adopted for further trial with larger groups of people within NHS hospitals through the study SHAPER - Scaling-up Health Arts Programmes: Implementation and effective research (Estevao et al. 2021).

Eventually, the project evolved into *Brain odysseys: recovery through performance arts* (Rosetta Life 2019), a programme that continually delivers workshops and co-designs performances with local stroke communities. Participants are encouraged to share their stroke experiences, stories, and feelings during the workshops and final performance. Beyond the positive effects of engaging with the arts mentioned in the previous section, the outstanding element here is the co-production of novel performance work using the stroke experience as an aesthetic mechanism. Furthermore, the voice of stroke survivors reaches local communities opening up new spaces for them in society and eliminating stroke stigma.

Beyond the work of the company Rosetta Life, there is little evidence of long-term participatory performance projects for stroke support. It might be worth mentioning other similar and long-term participatory workshop approaches successfully used in the context of people with dementia. For instance, the interactive theatre company Ladder to the Moon (Parsons 2009, Gage 2007) involves both staff and older people, including people living with dementia within care homes, an immersive performance that promotes open-ended interactions. Similarly, Magdalena Schamberger's approach to co-created performance involves people with dementia (Zeilig et al. 2014, 2018).

Shorter participatory performance projects for stroke support include *My Mind's I* and *Turning Points*, a couple of live performances co-designed by nine stroke survivors to tell their stories after the stroke. This project was a collaboration between the Hunter Medical Research Institute, the University of Newcastle, Australia and the Community and Aged Care Services Stroke team. It was promoted as a healing experience; the researchers explored the potential



Figure 2.1: *InterAct* actors and stroke survivors sharing stories. Photographed by Eleanor Bentall. © InterAct Stroke Support

for neuroplastic stimulus, the change in stroke's perception during the process and survivor's confidence. Through verbatim theatre, the participants developed informative and emotional pieces that explored stroke issues, such as finding a job and the power to redefine themselves.

Alternatively, some art projects for stroke support do not intend to generate a public performance but still engage with performing arts techniques. For example, the InterAct Stroke Support charity (InterAct 2000) employs professional actors to enact reading material specially selected for stroke patients. Beyond being a recreational activity, the project's objective is to stimulate memory, language and conversational interaction in stroke survivors. The charity states that this activity has shown the potential to stimulate the brain, boost memory and alleviate depression.

As can be perceived in this brief account, most participatory performance projects for stroke focus on creating an original theatre piece. The creative process engages non-artists (usually stroke survivors) in the co-production and performance of the piece; such activity stimulates diversity of mechanisms, such as memory and creative physical expression. The final goal tends to be the presentation of the live show to a neurotypical public, with the intention to bring the stroke experience to light and stimulate empathy.

Nonetheless, this participatory approach engages participants with the ability to communicate with others verbally, a certain range of physical independence, the possibility to attend regular rehearsals and, of course, the interest in performing in front of a public. There is an access gap (McAvinchey 2013) for stroke survivors who still wish to engage in participatory performance-based activities without the need to perform in front of a public audience due to physical, health or personal reasons. People with aphasia, for instance, might not be able to recite a monologue piece, or people in a wheelchair might find a lack of

accessible spaces to tour around the country. Yet, they may seek spaces to interact, communicate and play through the power of participatory performance.

Technology as a supporting tool

Nowadays, technology is a growing medium in participatory arts projects. However, similarly to the lack of diverse participatory performance work for stroke survivors, technology as a therapeutic tool in this context is still young.

Currently, digital media has mainly been adopted in visual arts therapy. However, therapists in this context have shown reservations due to confidentiality, ethical concerns, and a lack of training in using the technology (Orr 2012). Furthermore, some dramatherapy projects have used video to simulate mirror work, enabling observation, feedback and repetition (Petitti 1989).

Reynolds (2012) provides an example of visual media-based therapy for stroke survivors. It reports benefits for physical coordination, language recovery, cognitive abilities, social interaction and the facilitation of communication verbally and through their own imagery.

The project *A world first!* (Hillier & Stewart 2015) was born from an artistic accident: video technology with motion capture was developed for the Australian Dance Theatre's performance *Proximity*. During rehearsals, a visiting stroke survivor (not part of the company) played with the interactive video projections and commented on the sense of empowerment and neuroplastic stimulus. The company's director teamed up with a neuroscientist to run a medical experiment exploring visual and physical feedback's impact on stroke recovery. Unfortunately, the results of this were never released.

During the Covid-19 pandemic (2020 - 2021), technology became a critical tool to enable participatory projects, particularly considering that many stroke survivors were required to shield themselves for an extended period in countries like the UK. Rosetta Life once more pioneered projects for stroke support by implementing video call technology. *Choochi* is a project that explores the challenges of living under a lockdown and how pets helped participants cope during that time. This project was remotely created and produced with stroke survivors living in London (Rosetta Life 2020).

Thus, there is potential for further research and practice in participatory performance projects for stroke support. This thesis presents a project that implements feminist participatory performance methods and interactive technology to assist embodied performance and stimulate the imagination to create a new space of collaboration and interaction among stroke peers.

2.5 Digital technology for performance and community engagement

In the human-computer interaction (HCI) context, performance is characterised as an intensified experience that stimulates awareness and sensory perception, allowing participants to engage and explore the artefacts around them (Jacucci et al. 2005, Spence 2015, Harris 2017). As discussed in 2.4.2, participatory performance pushes the boundaries of theatre and other traditional forms. It overlaps tangible and virtual, real and imaginary through material presented, not to be interpreted but to be experienced and lived within; performers and spectators constantly shift roles or even remain absent (Lavender 2016).

Borrowing knowledge from performance studies and applied performance, the HCI community has used theatre and performance to explore interaction in multiple ways. Departing from Laurel's (1993) theoretical framework based on the Aristotelian dramatic principles (Aristotle & Halliwell 1987) to inform interface design, performance has found itself once more pushing new boundaries in the last three decades: this time, boundaries in the HCI research and practice domain.

On the one side, some of the approaches have implemented drama methodologies to foster exploration and evaluation of the user experience (Mehto et al. 2006, Murray 2017, Read et al. 2010) or to focus on the performative aspects of interaction with digital tools (Dalsgaard & Hansen 2008, Jacucci et al. 2005, Murray 2017); on the other side, new frameworks have been proposed to develop digital performance, augmented and virtual scenography (Benford & Giannachi 2011, Geigel & Schweppe 2004, Owen et al. 2013, Spence 2015), as well as to foster and investigate participation and engagement in mediated performance (Corness et al. 2011, Spence 2015, Reeves et al. 2005, Newell, Morgan, Gregor & Carmichael 2006).

As can be seen, the practical implementation of this concept includes many routes. This project addresses the implementation of participatory performance methodologies to mediate human interaction through digital technology and explore people's lived experiences with the potential to inform design. The present section focuses the discussion on the first instance: mediated human interaction. Subsequently, the upcoming chapter will examine performance and theatre methods to inform design (see particularly section 3.3, *Feminist participatory performance*).

2.5.1 The role of performance within HCI

HCI has frequently delved into the work of Erving Goffman from the social sciences and Augusto Boal from the community theatre domain (Light & Wright 2009, Spence et al. 2013a, Dalsgaard & Hansen 2008, Coutrix et al. 2010). Particularly, both theorists' contributions relate to drama narrative and participatory theatre, which is relevant to this thesis' approach.

Goffman's (1990) *dramaturgical analysis* proposes theories of social behaviour in different settings. His work implements drama methodologies as a guiding metaphor to study social interaction. HCI has drawn from Goffman's insights into how people present themselves and adapt to social circumstances to examine users' engagement with devices in different contexts.

Goffman proposes social life as a *performance* that takes place in the *front stage* and *back stage*. He argues that people play different roles and display a variety of behaviours based on the context, location, norms and cultural practices; these shape the performance and influence people's *appearance*. Front stage encompasses public behaviours, where people are aware that others are watching.

Personal, intimate topics (such as only shared topics with people of trust) are considered back stage. This notion is closely related to the concept of *public dreaming* coined by Schechner (2002): an intersection of the public, the private and the secret (Hansen & Kozel 2007).

These conceptions aid digital interface design because they provide access to the sometimes neglected *back stage* sphere, they enable to witness the *secret* aspects of relevance to place the user at the core of the development Light & Wright (2009), Healey & Light (2007).

Boal (2008, 2006) and his Theatre of the Oppressed (also discussed in section 2.4.2, *Performance, community and participation*) proposes the notion of *spect-actor* as audience members providing dramatic input into a theatre scene written about relevant social affairs. The objective is to empower deprived communities and individuals through theatre as a means for dialogue and expression. HCI often cites this work to propose the participants as active agents in the design process, re-imaging the piece while exposing the underlying assumptions through dramatic conventions (Turner et al. 2012, Szaniecki et al. 2020, Kantola et al. 2007, Moderator et al. 2019).

Goffman and Boal's approaches are mainly found in theatrical practice and the staged scenario (Spence et al. 2013a). However, beyond these models, performance has the potential to account for embodied, intersubjective, aesthetic and transformational practices (Fischer-Lichte 2008). This establishes different routes in the HCI scope to explore the non-representational and the performa-

tive, contributing to areas that deal with physical, social or emotional responses to mediated environments (Spence et al. 2013a, Jacucci et al. 2005, Jacucci 2006).

2.5.2 Technology in participatory performance

Digital technologies in performance convey interaction possibilities that amplify or entirely transform everyday experiences. They are particularly well suited to enable performance's risky, insightful and potentially transformative experiences (Spence 2015, Benford & Giannachi 2012). These interfaces can elicit emotional contagion, leadership, entrainment, and co-creation in shared experiences (Fan & Sciotto 2013).

When a live performance is mediated by interactive technology, the audience's experience is not only affected by the performers' direct actions, such as movement and organic sounds produced. Instead, a new and complex set of interrelationships between artists, audience members, instruments and the environment lead to the senses of community, presence, tension, uniqueness and admiration felt during the show (Hook 2013, p.2).

The implementation of interactive technology in this area presents a clear focus on audience engagement and participation (Cerratto-Pargman et al. 2014, Kim et al. 2011, Rostami et al. 2017, 2018, Fan & Sciotto 2013, Wong 2009, Cerratto-Pargman et al. 2014). Performance studies conceive audiences as part of a larger system: the performance itself (Gardair 2013). Although performance practices and theories have been studied in the HCI context for many decades, the trend is to analyse the audience member as a user not as a participant, with the main focal point placed on the technological development of the interface (Spence et al. 2013b). This digital interface, or *system* (Bongers 2000), enables communication between performer and audience. As a result, the audience can participate and influence the performance, even through subtle and non-verbal communication.

Sheridan et. al. (2004, 2007) conceived the *performance triad model* for the analysis, deconstruction and understanding of interactive performance. The model seeks to generate a common language for the technology-based performance discourse between performers, curators, technologies, theorists and researchers. It proposes observer, participant and performer as equal performance collaborators, assuming that not all audience members are equally engaged during a performance event. Effectively, the work diverts from a masses perspective that considered audiences as a unity instead of a group of individuals (Bennett 1997).

The model also suggests more than one technology layer enabling human interaction within the performance. Each layer presents a different complexity, sophistication and extent. Along with Bongers' model, they demonstrate that HCI theories acknowledge technological mediation as a tool to negotiate interactions between participants of the performance. Hence, interactive digital interfaces are envisioned as a) the support for interaction between performers and performance, b) the aid to engage participants in an open-ended manner, and c) the support to encourage observer's engagement with the performance.

Other experts have agreed that participation takes place in different degrees and modes, proposing their own models and taxonomies (Calvi 2013, Rost et al. 2011). However, such a body of knowledge is still segregated and requires further study to create important links that could bring forward this subject matter.

Related projects

Technology has always played an essential role in theatre productions. From lighting the stage to using props during a scene, these elements were implemented to either allow a *more realistic* representation of fictional worlds or to provide with or to experiment with alternative reality on stage. However, using digital and interactive technologies provided theatre and performance with new scenographic tools to explore different routes: mediating performer-audience communication, augmenting the space through video projection, interacting with digital doubles, and expanding the body's capabilities (Galindo Esparza 2014).

Particularly in participatory performance, current interactive technology trends generate mixed reality environments or augment the experience (Wiseman et al. 2017). They include gesture and motion recognition through infrared camera or sensors, SMS-based communication through mobiles and portable devices, body-worn sensors, wearable computing, and online interaction (Wiseman et al. 2017).

These interfaces allow audience members to become a co-creator, a participant or a performer (Sheridan et al. 2004, Dalsgaard & Hansen 2008). They can collect text, motion, biometrics, continuous ratings and physiological responses; furthermore, the log data becomes available for artistic and research objectives.

Because performance is overall an art form that constantly pushes boundaries and explores contemporary trends, interactive technology implementation in this realm varies in each case. Performance artists engaged in digital practices have innovated and experimented broadly, based on their creative

and artistic intention. A summary of artistic projects to exemplify current trends in interactive technology for participatory performance is presented below.

BioSync (Fan & Sciotto 2013) is an interactive interface that tracks brain waves and heart rate activity through a mobile headband unit (see Figure ??). The project's objective was to collect a large number of the audience's biometric responses to co-create audiovisual content in real time - presented as abstract, responsive visualisation on screen. Furthermore, the logged data also enabled the artists to study audience participation techniques and methods.

Wong (2009) explores co-creation in participatory music performance. The project uses an augmented music instrument: a mushroom-shaped ball with a hidden Wii controller that produces notes when thrown among the participants creating a unique musical score. The performance revealed that participants preferred collective interactions in contrast to one-to-ones.

Cerratto-Pargman et al. (2014) identify that audience participation had been mainly studied in public spaces such as galleries, museums and concert halls; however, environments with different rules, like theatres, had been ignored. Therefore, they conducted an empirical study of the interactive performance *ADA FTW*. Participation was encouraged when, at the end of each scene, the audience was required to answer a question using mobile technology, social media (Twitter) or the performance's website. The text answers would then appear projected on the screens on stage during the following scene. The project studied the main characteristics of participation in the theatre context and found that the audience's input created a unique narrative through a polyphonic and dialogical performance.

Finally, the following projects were not developed under an academic research scope. However, they implement interactive interfaces to establish audience participation in immersive environments.

The company The Other Way Works developed *A moment of madness* (Day et al. 2019) and *Agent in a box* (Day et al. 2014). Both are immersive performance projects that implement interactive mobile technology and gamification guidelines. Participants receive a set of cues for the storyline and determine the performance route based on their choices.

Likewise, National Theatre Wales and The Space conceived *Bordergame* (Norton et al. 2015), based on video and mobile technology for participatory audiences that collaborate as performers, as well as online chat and surveys for remote audiences who are in charge of determining the storyline of the performance.



Figure 2.2: Adaptive mixed rehabilitation system (Duff et al. 2013, p. 309).
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2.5.3 Technology in stroke support

A variety of contemporary approaches to stroke rehabilitation use technology. Furthermore, a growing body of HCI research is focused on supporting stroke survivors. However, the primary focus of HCI work and assistive technology development for stroke is physical rehabilitation and neurodevelopment treatment. This includes assistive robotics and wearables (Patton et al. 2006, Saebo UK 2021, Bustamante Valles et al. 2016), virtual reality rehabilitation (Subramanian et al. 2007, Boian et al. 2003, Borrego et al. 2019, Rand et al. 2009, Borghese et al. 2013), serious games (Duff et al. 2010, Pastor et al. 2012, Dukes et al. 2013, Burke et al. 2009, De Santis et al. 2015, Mainetti et al. 2013), and interactive rehabilitation systems (Baran et al. 2015, 2011, Lehrer & Olson 2009, Lehrer et al. 2011, Kim et al. 2011, Pastor et al. 2012, GestureTek 2001).

Interactive rehabilitation systems involve mixed reality environments and motion capture technology (see Figure 2.2). A key advantage of these systems is that they can automatically track movement and provide a wide range of feedback: exercise instructions and prompts, movement assessment, and multimedia feedback in the form of audio, visual or mixed and virtual reality environments to interact with in real-time (Baran et al. 2015, 2011, Duff et al. 2013, Lehrer et al. 2011, Pastor et al. 2012, Subramanian et al. 2007, GestureTek 2001). Most feedback is generated in real-time, although there are systems that also (or only) include post-trial feedback.

Stroke therapy enhanced by multimedia feedback has proved successful in encouraging sensorimotor integration, promoting motor learning, and developing confidence in using the affected limb. Serious games also use gamification reward mechanisms to engage people (Duff et al. 2010, Pastor et al. 2012, Dukes et al. 2013, Burke et al. 2009, De Santis et al. 2015, Mainetti et al. 2013). These systems target motor disability and use devices like the *Kinect sensor* or

the *Nintendo Wiimote* (see Figure 2.3) to detect limb movements using infrared technology (Ines et al. 2011, Hocine et al. 2011, Pastor et al. 2012, Robertson et al. 2013). Motion capture technology plays a significant role in *mixed reality* approaches which augment task-oriented physical therapy with multimedia feedback to help engage the user. They focus on either upper or lower body movement and exploit specific tasks like pressing a button or stabilising objects on the screen (Chen et al. 2010, Baran et al. 2015, Hossain et al. 2016, Kizony et al. 2004).

Virtual reality (VR) systems tend to focus on arm movement rehabilitation. Usually, this involves a head-mounted display, limb sensors or reflective markers to detect and measure movement (worn on hands, forearm, or fingers), and a motion capture system (OptiTrack, VICON, Xsens). The patient is immersed in a virtual environment where specific tasks will be set based on the therapy's target, like interacting with a virtual 3D elevator button to assess movement (Subramanian et al. 2007, Boian et al. 2003, Borrego et al. 2019, Rand et al. 2009, Borghese et al. 2013). Unfortunately, VR therapy systems are expensive, cumbersome and require a dedicated space, limiting accessibility.

Serious games approaches also use mixed reality technology with fun activities as an engagement factor (Ines et al. 2011, Hossain et al. 2016, Burke et al. 2009). Nonetheless, like VR systems, in many of these approaches, the technical set-up can be complex, involving cameras, projectors, screens and suits or body markers to track users' movement (see Figure 2.4).

Kinect sensor-based systems are a popular option for cheap and portable home, clinic, or school usage systems. They also focus on limb therapy but are less cumbersome. While some projects were developed under the serious games rubric (Pastor et al. 2012, Mainetti et al. 2013), others are intended to extend existing therapy techniques (Robertson et al. 2013). Kinect sensors also enable full body interaction and group engagement (Rand et al. 2018).

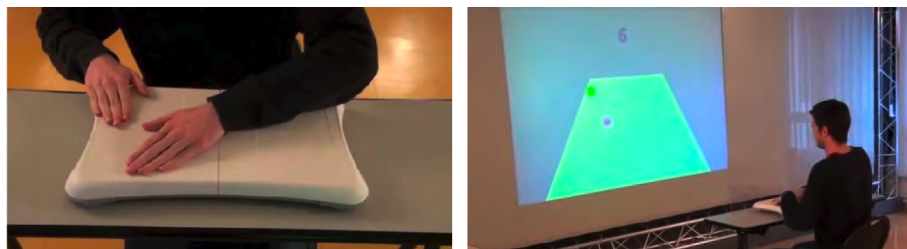


Figure 2.3: Patient using a Wii-based interactive system for upper limb rehabilitation. The system requires upper limb movement. Hocine et al. (2011, p. 4).
© 2011, IEEE



Figure 2.4: User sitting in front of a green screen while interacting with the IREX System® (by Vivid group, Toronto, Canada). Kim et al. (2011, p. 452).
© 2011 by Korean Academy of Rehabilitation Medicine

Mixed reality therapeutic potential

Mixed reality integrates virtual and real environments to create a new space of interaction in real-time; this enables 'adaptive scenes for interactive practice and feedback that engage the user physically and mentally' (Duff et al. 2010, p. 2015).

Studies determine that mixed reality implementation in stroke support is a valuable tool (Ines et al. 2011, Baran et al. 2015); it has the potential to stimulate self-assessment and facilitate daily practice at home. When creating a mixed reality environment, feedback is critical to support the therapeutic objectives.

Visual feedback is ideal for spatial information and guidance in movement; audio feedback communicates temporal knowledge, and tactile feedback stimulates physical motor performance (Lehrer et al. 2011). A mixed reality environment also permits self-awareness and the development of sensory and motor strategies to fulfil the tasks (Lehrer & Olson 2009).

Experts in technology-assisted stroke physiotherapy (Baran et al. 2015, Lehrer et al. 2011) advocate for a multidisciplinary approach to the subject matter. This method includes arts, creative practice and computing knowledge. The arts aid self-awareness in complex displays. The creative practices provide constructivist learning methods. And computing is the core element of interactive media development.

Technology design for social stroke support

A review of HCI's lines of inquiry and technological development for stroke rehabilitation indicates that support is needed in other areas of stroke recovery, such as fatigue management, forming a personal narrative, care provision

at home, and medication management (Ploderer et al. 2017). These areas are under-explored in HCI work with stroke survivors.

Stroke survivors endure the challenge of adapting to a new life routine once they are discharged from the hospital. They are in a constant reconstruction of what their life is. For many people, this includes accepting their new life instead of trying to return to the activities and lifestyle they had before the stroke (Ploderer et al. 2017).

Corbin & Strauss (1985) studied the challenges of managing chronic illness at home: tasks involved and who performs them, how and when such tasks are performed, and the issues related to these practices. They proposed a three-line work division in a successful recovery: *illness work*, *everyday life work* and *biographical work*.

Biographical work refers to the continual or occasional reconstruction of a person's own life narrative. Studies demonstrate that stroke survivors seek to develop a new narrative about themselves after the stroke: who they are, what they do, and where they belong (Ploderer et al. 2017, Littooi et al. 2016, Rittman et al. 2007, Eilertsen et al. 2010, Pallesen 2014). This narrative makes sense of the illness and explains it to others. Furthermore, biographical work also impacts illness management. The story a stroke survivor forms about their stroke experience will impact their self-perception and how they perform and present themselves to others.

Ploderer et al. (2017) suggests that biographical work should include accepting the person's own weaknesses and vulnerabilities. Daily activities also shape personal narratives (what Corbin & Strauss (1985) refers to as everyday life work) and meaningful moments (i.e. finding a new hobby, achieving a new recovery milestone). Similar concepts about this sense of self have been discussed by Frankl (2004) on living a meaningful life and by Littooi et al. (2016) on the concept of *global meaning* in stroke.

Biographical work requires effort by stroke survivors and their caregivers to re-build a personal narrative that hinges on striving towards independence, acceptance of their health condition, and finding meaningful activities that help to build an identity beyond the stroke (Ploderer et al. 2017, p. 7).

Nowadays, biographical work and everyday life work do not strongly feature in HCI work and technology development for stroke support. However, some outstanding contributions to everyday life include health apps to support self-directed speech therapy and to enhance verbal communication (e.g., Proloquo2Go, Lingraphica) and games to train fine motor skills and memory (e.g., Lumosity, Angry Birds) (De Simoni et al. 2016, Zhang et al. 2015).

Consumer technologies such as WhatsApp and Skype can support family relationships. They can help stroke survivors maintain constant communication with family and friends outside their households. Nonetheless, there is space for HCI design that aids intimacy, such as the expression of emotional aspects of intimacy (Schulte & Hornecker 2020, Vetere et al. 2005), individual and joint actions for well-being and interdependence (Kitson et al. 2018, Silva et al. 2020), or gift-giving to demonstrate care (Spence 2019).

On the other hand, technology design can support biographical work by providing tools for reflection on stroke survivors' lived experiences and building or reconstructing personal narratives. Mainly, this has been facilitated through online forums (Ploderer et al. 2017). Personal narratives are presented through blog posts, describing people's journey towards independence, celebrating minor achievements, and accepting a significant life change to move forward. However, it is reported that people could feel embarrassed to discuss sensitive or embarrassing issues with others, and a further line of enquiry about encouraging contributions from stroke survivors about challenging or intimate topics is missing in HCI.

2.6 Summary

This chapter has set this thesis' research topic in the context of performance studies and HCI. Thus far, it has been argued that the intersection of both scopes brings new possibilities to critically observe stroke survivors' lived experiences. Furthermore, it has been suggested that participatory performance and interactive digital interfaces are able to engage communities in participation and the development of personal narratives.

The chapter started with a brief overview of stroke. The discussion was particularly focused on social support and communities. A review of the lived experience, including embodiment, intersubjective and enactment, proposes the perspective through which stroke will be accounted for when designing for it.

Subsequently, a review of both performance and digital technology with a focus on participation and community engagement was presented, along with a representative selection of related projects and studies. Although many other studies were not included in this framework, the ones discussed in this chapter were selected due to their close relevance to this research project's scope.

Chapter 3

Methodology

3.1 Introduction

How can theories and applied practices of participatory performance aid social stroke support through performative interpersonal relationships? How can digital avatars, storytelling, and imagination contribute to understanding participants' embodied experience in such participatory performance approaches? And how does the intersection of both scopes contribute to an understanding of enacted embodiment and imagination?

This research implements a multidisciplinary framework that combines a participatory performance approach and human-computer interaction (HCI) design to answer these questions. Such approaches are not often brought together. While there are some notable exceptions of performance and theatre practices embedded into HCI (for example Spence 2015, Tholander et al. 2021, Vines, Denman-Cleaver, Dunphy, Wright & Olivier 2014, Jacucci 2006, see *section 2.5* for further discussion), none of them is framed under any feminist participatory performance practice.

Focusing on design through applied participatory performance has allowed conducting this research within the reality of peer stroke support groups from a community-based perspective and a socially engaged arts practice. This thesis' methodology implements different levels of collaboration through the design process, engaging multiple stakeholders, such as stroke communities within the evaluation cycle. This chapter will detail the methodologies used and how they complement each other.

3.2 Research through design

Combining design and research is a practice-based approach increasingly integrated within HCI (Gaver 2012, Zimmerman et al. 2007) and a well-known tradition for applied performance (Candy 2006, Nelson 2013). The project discussed in this thesis follows a *research through design* process that explores the implementation of participatory performance methods and interactive motion capture technology within the social stroke support scope.

Research through design studies the production of new knowledge that occurs through design artefacts and the resulting design processes (Frayling 1993). It comprises an investigation of innovative conceptual development, materials and technologies, as well as strategies and methods to enable creative collaboration (Roggema 2016).

Within the HCI realm, research through design allows for exploring and discovering opportunities for new and existing technologically-mediated systems. Furthermore, research in this context permits framing problems in such a way that behavioural gaps in theory or models can be identified or contextualised within a specific problem space (Zimmerman et al. 2007), e.g., discovering unanticipated interactions within the Green Screening workshop.

This project understands design as a stream of circular processes happening simultaneously while shaping ideas, knowledge and materials into systems and experiences. Such a stream requires a conception and ongoing revision of the problem space, its key agents, and the power dynamics fostered in between. Design here is supported by an ever-shifting multidisciplinary collaboration and evaluation within the community to draw on multiple perspectives and skills. The project implements iterative creation as an essential tool to address the experience and to evaluate, understand and improve the diversity of processes generated during the whole project (Zimmerman et al. 2010).

Under this framework, it has been possible to engage at different levels and through different dynamics with various key agents (i.e. stakeholders), including performance makers and stroke survivors, acknowledging the importance of exploring the lived experience to inform design.

Research through design, hence, allows for an open process (Wilkie et al. 2010), similarly to participatory performance (Fischer-Lichte 2008). Both approaches have exploratory qualities that have permitted a designerly inquiry focused on potential implementations of the Green Screening workshop while studying the workshop's embedded experience at each phase of the project. This openness permitted creative collaboration, public participation, and engagement with other sectors (i.e. Stroke Association).

3.3 Feminist participatory performance

As discussed in previous chapters, participatory performance can take a variety of forms, but it always involves some type of contribution from the participants in the production of the artwork. The project described here uses a specific socially engaged, feminist performance tradition that involves participants in exploring the social identities and social conditions that inform and often constrain their experience.

3.3.1 Feminist traditions

Feminist theatre and performance have become increasingly present as a variety of cultural forms since the early eighties in the West. Born within experimental theatre groups motivated by the Civil Rights and the Second Wave Feminism movements in the sixties and seventies, it initiated as an arena for women artists to discuss and explore issues of protest and gender marginalisation while developing the idea that *the personal is political* (Keyssar 1996, Mackenny 2001).

Feminism does not encompass a singular concept. Instead, it embraces different traditions to reclaim cultural change 'through imaginative interdisciplinary work and critical political engagements' (Ferguson 2017, p. 270). Initially, feminist theatre and performance were concerned with projects that bolstered the consciousness of women as women, dramaturgy coupling art and the condition of women, performance that deconstructs sexual differences, and agency in creating women characters as a key subject (Keyssar 1996, Turner & Behrndt 2016).

Over time, feminist practices have expanded to critically assess the construction of the self and other sources of inequalities. Contemporary practitioners struggle against interlocking and oppressive systems related to race, gender, class and any form of marginalisation, seeking to transform the perpetuation of systems of power and to create inclusive and equitable spaces through diverse practices and approaches (Collective 2001, Coalition 2022, Ferguson 2017).

In feminist participatory performance and theatre work, it is possible to identify practitioners that seek to work collaboratively with the community and create spaces in which people (e.g., from under-served communities) can communicate, explore, play or perform while sharing and creating with others within workshop, intervention, urban, private or public settings, to mention a few. For instance, *Katherine Low* (2021, 2019) explores both sexual health-related challenges, predominantly with young adults and women living with

HIV, as well as the struggles of motherhood within academia through real-life conversations.

Other examples include *Rosana Cade* (2022) addressing identity and intimacy in workshops that intersect with experiences of public space, particularly related to LGBT safety, through walking and cartography creation. And *Erene Kaptani* (2021, 2018, 2017) devising public encounters to stage counter-narratives that challenge hegemonic public and institutional interactions, mainly collaborating with migrant mothers enacting citizenship and young girls in school.

Similarly, through the collaborative project *The Verbatim Formula* (People's Palace Projects, 2022), *Maggie Inchley* (2022, 2019) follows an unspoken feminist agenda of care by creating spaces for dialogue and change with social care-experienced children and adults. Through verbatim theatre techniques, a dialogue is established to create audio testimonies that can be shared safely and anonymously.

This recount is, of course, a simplification of a broad and rich socio-political movement. However, it allows to contextualise Split Britches' feminist participatory performance, devised through more than forty years of socially engaged artistic practice.

3.3.2 Split Britches: a feminism of desire

Feminist participatory performance methodologies promote social exploration and transformation 'through the creation of new artist-audience relations that blur the boundaries between *us and them* and challenge stereotypes' (Clover 2011, p. 14).

Originally inspired by traditions like the Theatre of the Oppressed (Boal 2008) and Sociodrama (Sternberg & Garcia 2000), these approaches overall encourage the individual's imaginative potential while seeking to breach inequitable power dynamics and enable criticism through creative expression.

We make public displays of policies by making public displays of ourselves. We perform a feminism of desire. We begin locally by talking personally and then travel to find a global conversation. (Weaver & Shaw 2007, p. 174)

Split Britches, co-directed by Lois Weaver and Peggy Shaw, are one of the seminal performance companies in this tradition, voicing their sense of injustice about social oppression and contemporary social problems (Harvie & Weaver 2015, McAvinchey 2006, Gorman et al. 2018). They create performance

work that focuses on the intersectional (i.e. overlapping and individual) circumstances that affect each participant, especially their experience concerning gender, race, class and other disparities.

Lois Weaver, in particular, implements performance and creative expression techniques to create methodologies of understanding (i.e. understanding life, understanding each other, understanding social constructs) (Weaver 2019). Through her particular feminist approach, she has conceived the *Public Address Systems*: a series of socially engaged, portable and adaptable interventions created to foster social encounters and conversations (Harvie & Weaver 2015). The Public Address Systems' goal is to create accessible, coalitional spaces that recognise every participant's individuality while providing room for growth and imagination.

Weaver's (2019) feminist practice acknowledges that everyone *has a place at the table*, everyone deserves to be heard and to tell their stories in order to make sense of their reality. In contrast to the Theatre of the Oppressed's narrative and uniform political framework, Lois' feminist participatory methodologies are radical, multidimensional and embrace diversity.

Consequently, her work is created collectively with communities that are marginalised by their age, social status, gender or sexuality. This work, often, is implemented in *non-theatre spaces* and with *no regular theatre-goers*; participants are prompted with risk, curiosity and transformation, avoiding any kind of judgement or censorship (McAvinchey 2006).

Lois tends to work outside of places where her work might get most attention and recognition. This is not because her work lacks ambition or, indeed, is afraid to fight; it is ambitious and up for a fight. Lois makes work where and how she does because she is principally committed to exploring social and political topics that are socially repressed, and she seeks out people whose stories and priorities are socially neglected. (Harvie & Weaver 2015, p. 11)

The feminist approach in Lois' methods is formally innovative both as participatory performance work and as an exploratory tool; which is not the exception within Split Britches' practice. They challenge traditionally exclusive environments (i.e. a panel of experts or a classical theatre audience) by merging them with familiar, domestic sites and forms of conversations; for instance, 'around the super table, on the porch, over a game of cards, in a sing song' (Harvie & Weaver 2015, p. 10). Heddon (2015) defines this work as an aestheticised social practice for prompting dialogue and debate.

One of the key principles of this feminist participatory performance approach is fostering everyone's imagination, whatever the circumstances. The

work implements fantasy drawn from reality to access unexplored desires and concerns through the creation of fantasy personas and storylines. As a result, it also addresses autobiography, celebrating experience and the blurry boundary between reality and imagination to promote change (McAvinchey 2006, Light et al. 2009, Weaver 2019). In addition, other guiding principles include encouraging participation and inclusivity, committing to the ethics of collectivism, and cultivating coalition (Harvie 2015).

Through a collaborative, participatory and social-change-oriented approach, the methodologies establish an inclusive dynamic of conversation. Participants are invited to practice the familiar in decontextualised environments, such as a porch in a gallery or a dinner table in a theatre studio. Conversation topics can also be unfamiliar to them. However, Lois and Peggy configure their practice so that people can draw from familiar starting points, providing a sense of ease and expertise despite embarrassment, awkwardness, or simplicity.

This practice has been developed with various groups, including female prisoners in the UK and Brazil (McAvinchey 2006, Weaver 2009), domestic violence survivors in New York state, emerging feminist performers in Taiwan, and university students around the world (Armstrong 2005).

3.3.3 Performance as a HCI design tool

In recent years, HCI practices have embraced *user-centred* and *user-experience* design, among other approaches. These traditional user-based processes place the user at the core of each development stage to build empathy and understand their circumstances, needs, challenges and expectations. Although this research project shares the same interest in engaging people (recognised here as communities, not as users), both approaches differ in philosophy and goals.

User-centred approaches can potentially fail to capture the essence of the user's lived experience; oftentimes, people are acknowledged as informants for the development of technological systems by gathering their feedback and data on predetermined solutions. However, emotions, experience and other conscious constructs are not fully grasped by their techniques and tools (Barden 2017, Vines, Denman-Cleaver, Dunphy, Wright & Olivier 2014). This scope also falls short when designing with and for the body, as well as when examining the technology's potential to produce social and political change (Weaver et al. 2008, Homewood et al. 2021).

Establishing direct communication with people is a complex and sometimes expensive task, especially when the community or specific group is located at the margins of society (e.g., older adults, people with disabilities) (Newell, Morgan, Gregor & Carmichael 2006). In this regard, Weaver's partici-

patory performance methodologies have been implemented to develop design formats engaging communities that are often marginalised (Light et al. 2009, Light 2011, Light, Weaver, Healey & Simpson 2008, Weaver & Light 2008). As a design methodology, such methods seek to 'widen participation in the design process and to help people envision and articulate the alternative social and political worlds that technology engenders' (Weaver et al. 2008, 305). In contrast to user-centred approaches, these methods aspire to aid social issues or contribute to democratising goals.

The essence of the lived experience predominates in performance. HCI has implemented theatre and performance as tools for design under a multidimensional approach. With more integrative approaches, users or stakeholders can be conceived instead as participants and be included in the power dynamic more equitably; this is especially useful when accessing the participants' perspectives, experiences, and needs is challenging. Furthermore, performance techniques encourage open dialogue between designers, researchers and participants.

Over the years, design has adopted and adapted diverse performance and theatre techniques to expand the discipline's practice. This includes the exploration of future scenarios and prototyping of systems through Experience Design Theatre (Vines, Denman-Cleaver, Dunphy, Wright & Olivier 2014), inclusion of concealed communities in usability testing through Forum Theatre (Newell, Carmichael, Morgan & Dickinson 2006), inquiry of design development with professional actors (Sato & Salvador 1999, Tholander et al. 2021), investigation of user behaviour in public interfaces through Interactive Participatory Performance (Taylor et al. 2009), exploration of civic dialogue and engagement through interactive performance (Rossitto et al. 2017), and exploration of performative autobiographical interfaces through Performative Experience Design (Spence 2015).

Feminist participatory performance methodologies, just like the approaches mentioned above, follow their own philosophy and goals. Split Britches' feminist approach, in particular, has proven effective in engaging marginalised communities through radical inclusion. It foments social change by establishing performative conversations on social and political problems. Moreover, Weaver's proposed principles (imagination, participation, inclusivity, collectivism and coalition) promote an open exploration of people's possible alternative futures (Weaver et al. 2008, Weaver 2009, McAvinchey 2006, Light 2011, Light, Weaver, Healey & Simpson 2008).

These performative strategies engage people often marginalised from design decisions. They enable active involvement by encouraging people to talk and try out ideas with each other. They also allow for de-mystifying abstract



Figure 3.1: Public conversation with Lois, Peggy and friends during a Porch Sitting session. © Split Britches' archive

concepts such as the *Internet of Things* by, for example, using everyday objects and playing out scenarios in which the objects connect or communicate (Light et al. 2009, Light 2011, Light, Weaver, Healey & Simpson 2008, Hansen & Kozel 2007, Weaver et al. 2008). Overall, they promote critical exploration of current social issues, especially those that are often neglected. Lois Weaver's Public Address Systems include:

- *Long table*. Conceived as a desperate need to change the hierarchical structure of expert panels and round tables. The long table invites everyone to engage in conversation. It offers an equitable place to each individual and honours all levels of expertise in the room (Weaver & Light 2008, Weaver 2019).
- *Porch sitting*. Protocol inspired by participatory design. This performance approach allows people to sit together on a decontextualised porch (see Figure 3.1). The conversation is not structured; instead, all ideas and topics are allowed to find out what is on people's minds (Harvie & Weaver 2015, Weaver 2019).
- *Care café*. Motivated by the need to share grief and uncertainty. The approach promotes gathering and dialogue to generate understanding and a sense of belonging (see Figure 3.2). Resources for action, activism and care are provided on each table (i.e. post-its, sign-up sheets, stickers, and posters). Food and drinks are also provided to appropriate some of the aesthetics of café culture (Weaver & Maxwell 2018, Weaver 2019).
- *Public studio*. A protocol for public problem-solving. It is based on three tables set in a triangle layout. The process is guided by a campaigner, a



Figure 3.2: Care Café session in a theatre studio. © Split Britches' archive

skills-based person, and a public engagement specialist. This is a staged process with an audience. The campaigner introduces the problem, and the skills-based person offers solutions and the public engagement specialist moderates the conversation. After this, the audience is invited into the discussion to propose other alternatives. Finally, this audience is invited to enter the triangle and *make something* (i.e. a graphic design, a plan, an approach) (Weaver 2019).

- *Green screening*. Process informed by Peggy Shaw's stroke experience. Performance techniques are implemented as a tool for recovery in a performance workshop called the *Green Screening workshop*, allowing participants to explore fantasy and desire, in contrast to reminiscing what used to be before the stroke. Beyond conversation, enactment and embodiment are key elements to include every stroke survivor's abilities (Shaw & Weaver 2018, Split Britches 2019).

The following section will revise the Green Screening workshop's methodology as initially created by Weaver and Shaw. The objective is to provide a clear perspective of the initial workshop format before this project was conceived and developed. Particularly about the aesthetic aims and technological implementation. After this, the project's methodology developed to redesign the Green Screening workshop will be discussed.

3.3.4 Revising the green screening methodology

Peggy Shaw, performer and Split Britches co-director, had a stroke in January 2011. Rather than lament the memories she lost due to the stroke, she and Lois Weaver (also Split Britches co-director) decided to fill those blank spaces with



Figure 3.3: Peggy Shaw as the leading role of her imaginary music band in *RUFF*. Photographed by Michael Conti. © Split Britches' archive

new insights and experiences in a process they called green screening (Split Britches 2019).

The *Green Screening workshop* was conceived as an interactive conversation with stroke communities. Lois Weaver and Peggy Shaw devised the concept as a novel, performance-based approach to addressing the problems of recovering from a stroke.

This format stems from *RUFF* (Shaw et al. 2013, Shaw & Weaver 2018), a solo performance piece devised by Split Britches after Shaw's stroke. *RUFF* implements chroma key technology to reconstruct memories missing after a stroke. A studio-like green screen and live projections on stage enabled Shaw to interact with a pre-recorded swing band, movie stars, family members and a motion capture avatar of herself dancing with the moon (see Figure 3.3). In this piece, the green screen was intended to act as a memory reproduction space that allowed the performer to recall life experiences through a new lens (Delbridge & McGowan 2015).

The green screening technique was initially used as a design concept for the show *RUFF*; it was developed by Delbridge (2013). The idea originated during a workshop in the Deakin Motion.lab in Melbourne (2012). Shaw, who had the stroke one year before, played with an avatar driven by her own movements. The resulting de-personalised, real-time motion feedback seemed to have a compelling and liberating effect (Weaver & Shaw 2016). Shaw interacted

almost continuously with the avatar over an 8-hour session. A similar observation is reported by Hillier & Stewart (2015) in describing the use of video technology in the Australian Dance Theatre's performance *Proximity*. During rehearsals, a stroke survivor played with the technology and commented on the sense of augmentation or empowerment it created. The Green screening technique conceived by Delbridge (2013) also allowed Shaw to metaphorically *fill* the blank spaces in her mind with new ideas after the loss of some of her memories.

While touring *RUFF*, Weaver and Shaw decided to use the same chroma key approach to place other people inside their own fantasies during interactive talks. The method employed in these talks was a shifting dialogue between the artists that prompted audience participation. The green screen, at first, was only a green presentation slide projected in front of the audience; the conversation, a discussion about empty spaces and the individual fantasies that participants would place there.

Participants' positive reactions encouraged Split Britches to implement the green screening technique used in *RUFF* to provide them with an actual image of their fantasies. This process eventually developed into the Green Screening workshop. What started as an interactive and conversational approach about Shaw's personal stroke experience, transformed into a more physical proposal assisted by technology and directed towards others' stroke experiences.

The workshop was delivered to stroke survivors for the first time during the Science Stroke Art conference in 2014. After the event, an ongoing collaboration was established with the Stroke Association UK to deliver more workshops to peer stroke support groups (Weaver & Shaw 2016).

3.3.5 Original Green Screening workshop format

The Green Screening process devised by Split Britches in 2014, prompted people to imagine new possibilities in their lives with the help of surrounding visual effects: a green screen that enabled people to become performers in front of an audience, the rest of the workshop, participants. This was not a clinical intervention for post-stroke rehabilitation. Instead, the objective was to provide participants with a space for creative expression and self-exploration while sharing their stroke experiences and fantasies about what their lives could be after the stroke.

The original workshop format implemented the same studio-like green screen and cinematography equipment used in the *RUFF* performance (see Figure 3.4). Participants would stand up in front of a video camera. The captured image was digitally processed to replace the green background with a picture



Figure 3.4: Picture of the green screening technical setup before starting a workshop session.

of a place the participant selected as their fantasy place (Delbridge 2013).

When the Stroke Association's stroke support groups adopted the green screening process, the technical setup required to be adapted for a diversity of community centres (where the stroke support groups would regularly meet). The workshop was offered as a two-hour, one-day session. Two workshop facilitators and two technicians in charge of setting up the green screen and cinematography equipment were facilitated.

Original workshop narrative

The original workshop format was comprised of the following stages.

This is what we've got. Introduction of the workshop team and how they relate to a stroke experience. Participants introduce themselves and narrate their stroke experience. This allows for building rapport with the participants.

If your stroke was a picture, what would it be? Creative expression is triggered by the question: 'If your stroke was a picture, what would it be?'. To provide context, the *icy finger of death* video is shown as an example of a stroke's metaphorical representation: an underwater finger-like icicle that grows underneath the sea ice and freezes everything in its path (see Figure 3.5). Then participants share their own metaphors.

A stroke memory. Participants share their closest memory related to the stroke experience. This self-reflection process positions participants in the situation they will address during the workshop: their life after the stroke.

The fantasy. Participants are asked where they would like to be at that precise moment and what they would like to be doing: imagining their own fantasy. Then, the ideas are individually embodied with a significant gesture or body movement and performed in front of the group. Meanwhile, the techni-

cians search online for the place's pictures to use them during the next stage.

Wish you were here. Each participant is placed in front of the green screen. A digital picture of the participant's fantasy place replaces the green background in real time. Participants are now *immersed* into their own fantasy place. After they built a self-portrait, the picture is printed on a *Wish you were here* postcard and given to the participant as a remembrance of the experience (see Figure 3.6).

Original technical specifications

Table 3.1 shows the workshop's technical specifications in its original version, using the green screen backdrop. Additionally, Figure 3.7 presents the original workshop setup. Both are evidence of heavy equipment that needed to be transported to the venue. Eventually, this proved expensive and complicated for Split Britches (discussed in section 4.3).

Table 3.1: Workshop technical specifications with Chroma Key technology.

Company equipment	Required from venue
<ul style="list-style-type: none"> * Green screen backdrop stand * Green fabric backdrop or chroma paper roll * x3 Softbox fluorescent lights and x3 stands (13amp plugs, 5A fuses) * Sony video camera with chroma 800 output * Macbook pro running Isadora * x2 5m FireWire 800 cable * HDMI to Thunderbolt adaptor 	<ul style="list-style-type: none"> * Large monitor with either VGA or HDMI input (50+ inches) * 35 chairs * x1 small table (1m x 1m ideal) * x3 1-way 13 Amp power extensions (cables A on plan) * x1 4-way 13 Amp power extensions (cables B on plan)



Figure 3.5: Sketch representation of the Icy Finger of Death image used as Shaw's stroke metaphor. Inspired by the BBC's photo archive.



Figure 3.6: *Wish you were here* postcards. A printed copy was given to each participant at the end of the session. © Split Britches' archive

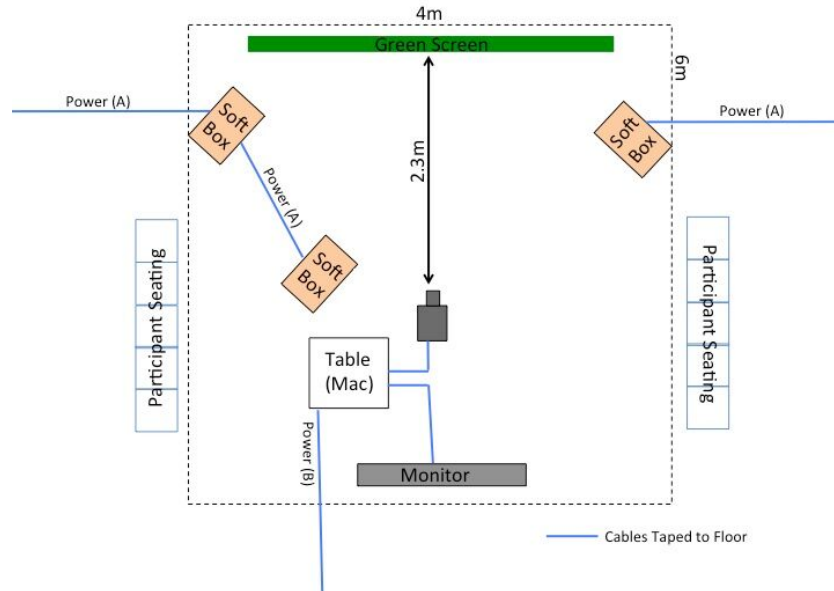


Figure 3.7: Workshop setup and dimensions. © Split Britches' archive

3.4 Methodology for the Green Screening workshop

The rationale for this research project is to combine Split Britches' feminist participatory performance methods and interactive motion capture technology by redesigning the Green Screening workshop. The aim is to research the value of this approach both as a social support intervention and as a design tool. It seeks to assess the potential of embodied enactment to encourage a reconfiguration of stroke survivors' personal narratives. It also examines how motion capture and visualisation technology can be usefully integrated into this format.

The *redesigned Green Screening workshop* is a participatory performance intervention for stroke communities. Split Britches originally devised the concept as a novel, performance-based approach to addressing the problems of recovering from a stroke. In contrast to conventional therapies, it aims to help stroke survivors imagine new physical and social possibilities by enacting personal storylines with the help of an interactive scenography. Participants explore imagination and desire through enacted fantasies of *things they always wanted to do* (e.g. climb a mountain, play at a concert, swim on a coral reef) in *places they always wanted to be* and with people *with whom they most want to communicate*.

The redesigned format discussed in this thesis emerged from an iterative collaboration between design researchers, performance practitioners, cognitive scientists, creative technologists and the stroke community. This dynamic, collaborative inquiry transformed throughout the project due to its exploratory nature, with different people integrating into the team at different stages. The aim was to embed the relevant combination of expertise based on the discoveries made in the previous phase when delivering the workshops to the stroke community.

The multidisciplinary team was broad at the beginning of the project, including people from all the above-mentioned areas. However, as the project progressed, the team's expertise and capacity shifted to respond to more immediate findings and design requirements. Such transformation acted as a kind of funnel that refined the collaborative inquiry. Nonetheless, a core team (Galindo Esparza, Healey and Weaver) continued throughout the project, ensuring the key disciplinary perspectives were accounted for: performance studies and design within the HCI realm.

Due to the project's nature, including the stroke community in each phase was a non-negotiable constant for this methodology. However, this community also transformed throughout the process by delivering the project to different stroke support groups around the country for each project's phase.

The result was a set of practices through which participants are able to enact personal embodied fantasies with an active audience of peers. The interactive scenography stimulates exploration of the physical and imagined self while it permits sharing this experience collectively.

This endeavour required not only a new design for the Green Screening workshop but also to propose a *research through design* methodology combining performance and design practices (see Figure 3.8). This unique intervention can be analysed from both fields of practice. The methodology incorporates feminist participatory methods into the process to create and study a series of iterative prototypes evaluated by the key agents: the stroke community (stroke support groups from the Stroke Association) and creative practitioners (Split Britches).

The project was conducted over a period of four years, with the thesis author playing a multifaceted role as a doctoral researcher and designer, producer and project manager (see section 1.2.1 for more information) due to the collaborative, applied and socially-engaged nature of the project.

The methodology consists of four iterative phases, each of them focused on 1) prototyping a new iteration of the workshop format and technology, 2) testing the prototype with a stroke community through an exploratory research study, 3) analysing the findings, and 4) collaborating with a multidisciplinary team to refine the prototype.

The phases are: *Phase 1: Initial exploration*, *Phase 2: Design for technical feasibility*, *Phase 3: Design for enactment and imagination*, and *Phase 4: Design for peer collaboration*.

Apart from the first exploratory phase, the rest of the phases were devised under a cyclical process involving: design meetings with a multidisciplinary team, workshop delivery in community sessions while conducting a research study, and evaluation of the process and other findings. After collecting the findings, a new iteration phase can be deployed following an updated set of design objectives and inclusion of expertise (i.e. new team members). The objectives are based on newfound results and stakeholders' requirements.

Three qualitative research studies were carried out through phases 2 to 4. This qualitative approach acknowledges explored social properties as a result of the individual's lived experience and social interactions (Bryman 2016). Moreover, it is also aligned with feminism's emancipatory goals to mitigate oppression through focusing on experience and shared meanings (Skeggs 2001).

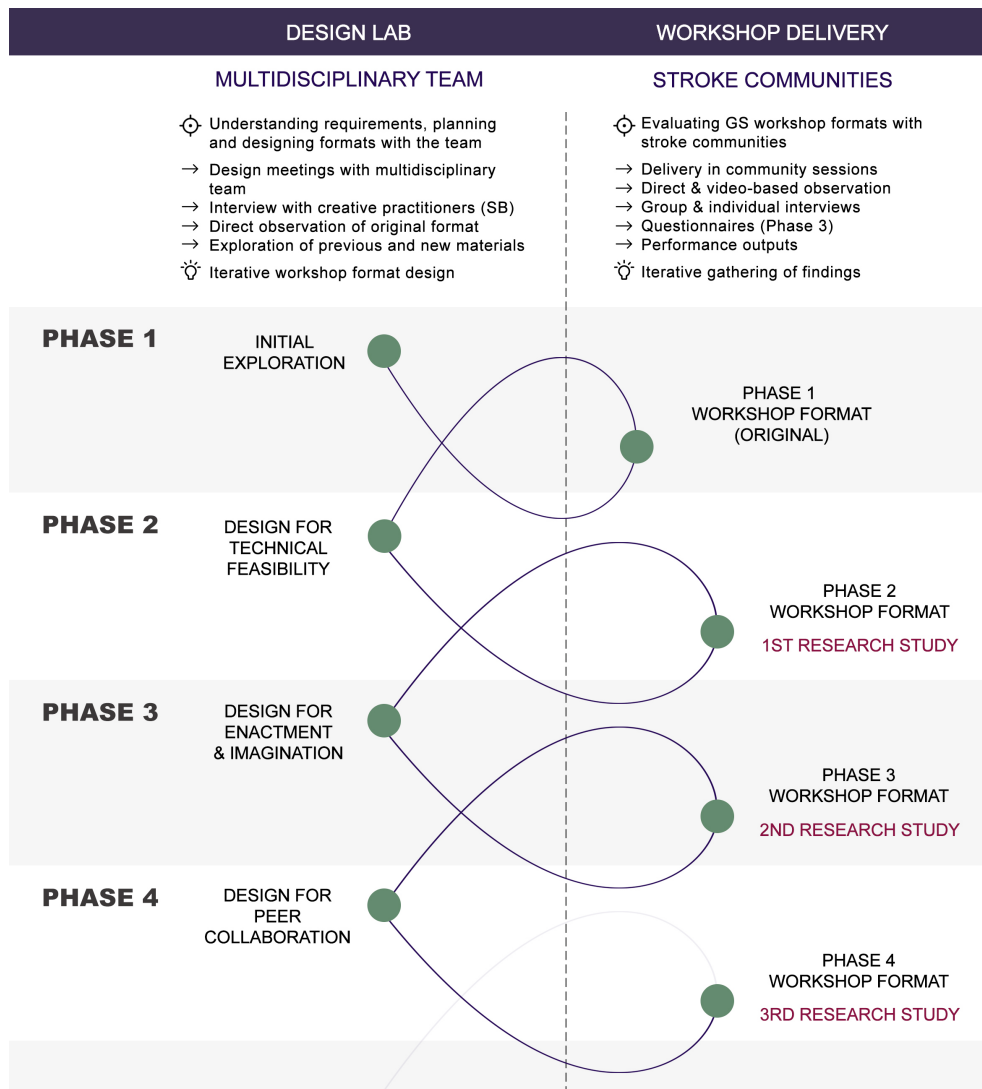


Figure 3.8: Diagram representing the Green Screening workshop's redesign methodology.

3.4.1 Phase 1: Initial exploration

The first phase was an initial exploration of: a) the project's context, b) suitable socially engaged performance methods, and c) available digital technology to stage public performance in non-theatre spaces. As the name indicates, this phase did not start with a fixed research question. Instead, the objective was to explore the workshop's ethos and existing resources to enrich the participant's experience.

This phase aimed to understand the genesis of the project: why and how it was created. The first point of encounter with the stakeholders was established by exploring Split Britches's artistic and technical requirements.

The exploration was carried out through a collaboration established by the author of this thesis (Rosella P. Galindo Esparza), with Patrick G. T. Healey (researcher from the Cognitive Science Research Group, QMUL) and Lois Weaver (Split Britches and Professor of Contemporary Performance, QMUL). Peggy Shaw (as stroke survivor), Jo Palmer (Split Britches technical designer) and Holly Stratton (Split Britches producer) also contributed during some of the design meetings.

The inquiry covered the following:

- An in-depth interview with Split Britches' directors, Weaver and Shaw (2016).
- A review of the performance and workshop documentation:
 1. Video of *long table and green screening workshops* with students from the Drama Department in QMUL.
 2. Photography, design and technical documentation of previous Green Screening workshops provided by Jo Palmer (Split Britches' technical designer).
- Live attendance to *RUFF*'s premiere at the Barbican (Shaw et al. 2013) and Split Britches' talk *Minds interrupted: an interactive conversation on filling blank spaces with new thoughts* at the Wellcome Trust.
- Direct observation of a Green Screening workshop with the workshop's original format, referred in Figure 3.8 as the *phase 1 workshop format (original)* (see section 3.3.5, for more information about the *Original Green Screening workshop format*). The session was delivered to a stroke support group from the Stroke Association in London, UK. In this session, Weaver facilitated the session; Jo Palmer and Holly Stratton managed the technology. Galindo Esparza and Patrick Healey observed the session.

A critical review of the elements above allowed to contextualise the workshop into a particular process of applied performance. Furthermore, direct observation of the original workshop format provided further design insights about the technology; particular attention was provided to participants' behaviour with the interface and related aesthetic choices made by Split Britches for the technology implementation.

Simultaneously, an exploration of the chroma key technology was carried out. The aim was to detect light, portable alternatives for digital background removal in real time. In addition, the tool should be able to be deployed in a variety of community spaces, moving away from the *stage* and *studio* environments characteristic of the chroma key's *green screen*.

A recapitulation of the Green Screening workshop's genesis, original format and technical infrastructure can be found in section 3.3.4, *Revising the green screening methodology*. Furthermore, an account of the initial exploration and the first phase's findings are discussed in Chapter 4. Overall, the workshop's genesis and technical infrastructure were examined to delineate key concepts of the Green Screening process. This allowed for solidifying the line of enquiry for the following phases.

3.4.2 Phase 2: Design for technical feasibility

The second phase started with the generation of design ideas inspired by the findings of the previous phase. Moreover, an interactive scenography prototype (discussed in section 4.4.1) was developed to enhance the workshop's narrative process, improve portability and simplify the technical setup (Galindo Esparza et al. 2018).

The second phase aimed to deploy the new *interactive scenography* and update the format according to the new performative options opened by the digital tool. Under these parameters, new design routes for the workshop's structure were investigated. The key goals were to bolster the existing participatory performance methods and further benefit from the motion capture-based technology, especially considering the stroke community context. The redesigned format is referred here as the *phase 2 workshop format*.

The author of this thesis planned, organised and carried out a series of design meetings with the multidisciplinary team. This included diverse stakeholders: Split Britches (Weaver and Shaw), Patrick Healey (researcher from the Cognitive Science Research Group, QMUL), Shaw (as stroke survivor), Could Be Good (Hannah Mason and Adele Jeffs, as a socially engaged collective), Davy Smith (creative technologist from the Media & Arts Technology Programme, QMUL), and Holly Stratton (Split Britches producer).

During the sessions, different iterations of the digital scenography were explored. It was important to select elements that could support the performance methods implemented and not hinder them.

The produced format was then delivered to the same stroke support group observed during Phase 1. The first research study was carried out during this redesign implementation with the stroke support group. Research data was collected through direct and video-based participant observation, notes and a semi-structured group interview; these methods were applied to evaluate the new format and determine the interactive scenography's feasibility to promote a more active engagement during the sessions.

In this research study, besides the multidisciplinary team's contributions, Could be Good (Jeffs and Mason) facilitated the session, and Galindo Esparza managed the technology. Patrick Healey and Davy Smith observed the session, and Holly Stratton assisted the facilitators.

A detailed description of the interactive scenography and corresponding workshop narrative is presented in Chapter 4. Furthermore, Chapter 5 discusses the design process and second phase findings.

3.4.3 Phase 3: Design for enactment and imagination

A new design iteration was carried out during the third phase. This phase also began with the generation of design ideas inspired by the previous phase's findings. The workshop format was significantly reconfigured and expanded to stimulate meaningful performative actions instead of pure physical activity, one of the most noticeable interactions observed during the previous phase (see Chapter 5, *Exploring performance and digital technology*).

The design meetings during this phase included a smaller number of collaborators most closely associated with the new scope: Lois Weaver, Patrick Healey, Davy Smith and this thesis' author, Galindo Esparza, who led the project's management.

A set of performance exercises involving the interactive system were scrutinised during the sessions. Five of them were selected, ensuring that they would foster a gradual and playful transition from simple performative movements to mini-narratives enacted with and for other workshop participants.

The new workshop format was then delivered to a couple of stroke support groups that had not participated in the project before. A second research study was carried out during this session; the main objective was to determine if the new format successfully promoted public enactment and imagination in the context of stroke.

Direct and video-based participant observation was used to evaluate the interactions during the workshop session. A subsequent group interview with an external evaluator elicited the participant's feedback about the experience. Finally, a questionnaire to the group's coordinators provided supplementary information about the community's engagement in this novel approach.

In this research study, besides the multidisciplinary team's contributions, Weaver facilitated the sessions, and Galindo Esparza managed the technology and provided facilitation support when needed. Healey observed the sessions, Alex Legge (Split Britches' new producer) assisted the facilitator, and Hannah Maxwell focused on reporting and evaluation during the group interview.

The redesigned format (*phase 3 workshop format*, see Figure 3.8) is described in detail at the end of Chapter 5. The third phase's design process and findings are presented in Chapter 6. Overall, this phase aimed to integrate the new workshop elements more consistently, according to the contributions of the stroke community and multidisciplinary team.

3.4.4 Phase 4: Design for peer collaboration

The fourth and final phase of this methodology consists of a new design iteration of the workshop's format and technology (*phase 4 workshop format*, see Figure 3.8). Again, ideas were proposed from the results obtained in the previous phase.

Previous redesigned workshop formats had all consisted of one session each. However, the format was expanded in this phase into three consecutive sessions. The aim was to study the evolution of participants' performance over time and scrutinise if it was feasible to determine the length of the workshop's effects.

Design meetings planned, organised and carried out by Galindo Esparza in this phase involved Weaver, Healey, Gideon Raeburn and Michael Clayton (both creative technologists from the Media & Arts Technology Programme, QMUL). Moreover, Raeburn was in charge of further developing the interactive scenography, adding new mixed reality scenes and features, such as screen recording. At the same time, Clayton explored the potential to create a mobile application and move away from the Processing IDE.

The final workshop format was pitched to *volunteering and community officers* and *stroke group coordinators* from the Stroke Association (south region) by Galindo Esparza, Weaver and Healey. Subsequently, it was delivered to a new stroke support group. The third and final research study was carried out with this stroke support group.

The evaluation included direct and video-based participant observation, subsequent individual interviews with an external evaluator and an assessment of the performative material gathered during the sessions.

In this research study, Weaver facilitated the three workshop sessions, and Galindo Esparza managed the technology while supporting with facilitation. Healey observed the sessions, Raeburn and Clayton assisted with the technical delivery and data collection, Peggy Shaw was a guest facilitator for the third session, and Hannah Maxwell focused on reporting and evaluation during the participants' interviews. They all provided their observation notes in subsequent design meetings to inform future work.

An account of the last redesigned format (*phase 4 workshop format*, see Figure 3.8) can be found in Chapter 6. The fourth phase's design process and findings are discussed in Chapter 7.

This was the final implementation of the design process with stroke communities. As such, it presented the challenge of consecutive participant engagement and, on the other hand, a rich account of opportunities for Split Britches' participatory performance methods to facilitate the exploration of personal narratives (Ploderer et al. 2017) and the development of coalitional spaces for stroke support.

3.5 Research design

The research methodology described here draws on qualitative research traditions. The research context is embraced as a multidimensional social encounter, focusing especially on participants' interactions. This facilitates discussion of participatory performance analysis, audience research, and design, taking into account the lived experience and embodied processes.

As explained in the previous section, three research studies were carried out during this project. Each of them was performed under an exploratory scope (Reiter 2017), with the intention to reveal concealed connections and mechanisms within the social encounter established during the Green Screening workshop sessions.

The data collection methods included ethnographic approaches (Spradley 1980, Robin Patric Clair 2003, Mack et al. 2005), such as participant observation, questionnaires (phase 3), and semi-structured interviews; audience research (Breel 2015, Reason 2010) to assert the participant's experience beyond the researcher's personal reflection; and performative inquiry (Fels & McGivern 2002, Coetzee 2009) which allowed to scrutinise participatory performance production as a valuable form of data.

Data collected consists of live-observed and video-recorded Green Screening workshop sessions, group interview transcripts, group coordinator's questionnaires, and evidence of Green Screening deliverables. Analysis across all the data centred on:

1. Observation of participants' behaviour and interactions during the workshop sessions. Workshop participants include stroke survivors, carers and facilitators. This was carried out in all the design phases.
2. Participants' reflections during semi-structured interviews and group coordinators' feedback through questionnaires. Group interviews were carried out during phases 2 and 3; individual interviews were carried out during phase 4; coordinators' questionnaires were carried out during phase 3.
3. Analysis of the sessions' outputs. This included individual sketches and postcards in all design phases, group sketches, and public service announcements in phase 4.

For the analysis of workshop sessions and performance outputs, exploration categories were delineated to locate significant embodied interactions, behaviours, use of the technological infrastructure and aesthetic choices. The process derived from the data itself, and code categories were defined during the data analysis; analysis of these categories generated a series of category clusters that allowed a discussion of the findings. This process was informed by conventional qualitative content analysis (Hsieh & Shannon 2005) and audience research methodology (Breel 2015).

Analysis was performed across all the collected data. This framework seeks to inform the original research questions: addressing the potential of the participatory performance methods and interactive technology for social stroke support as well as how to redesign the Green Screening workshop to bolster these effects.

In general, the coding framework identifies participants' verbal contributions and actions when enacting storylines, physical interaction with the interactive scenography, and audience engagement factors (i.e. body language, clapping, laughter). Each item includes qualitative analysis pointers. Subsequently, categories were built to inform the project's research questions. This coding framework was transformed during each phase based on the research through design requirements.

Participants' feedback was collected through group or individual interviews after the workshop session. A questionnaire for group coordinators was also implemented during one of the phases. The semi-structured interview and

questionnaire were outlined by the multidisciplinary team and carried out by an external evaluator to avoid biased responses from the participants. The instruments included questions that would allow exploring each individual's experience, meaningful and challenging moments during the session and their overall self-perception after the workshop.

In summary, the Green Screening workshop methodology presented here proposes a novel approach to implement and assess elements concerning both participatory performance and design under a particular scope placed away from the traditional stage performance and current socially-mediated interactions for stroke support. The approach integrates artistic and community principles found in performance practice that are able to inform design through lived experience.

The development and analysis of applied participatory performance methods through this methodology allow communities to voice their experiences, opinions and needs through a performance approach. Simultaneously, it facilitates a multidimensional discussion of participants' performative interactions ranging from small embodied gestures to the content of a collective storyline.

The upcoming chapters will carefully detail the methodology implementation within the project. However, the next section will describe the global research limitations before moving on.

3.5.1 Research limitations

For the purposes of this thesis, a team of physiotherapy specialists (approved by the Stroke Association) was consulted early in the process. The objective was to determine the best way to assess participants' performance in the workshops before running the second study. They were provided with videos of the first study (presented in chapter 5, *Exploring performance and digital technology*) to observe the workshop's structure and how the participants interacted with the digital tools.

After receiving their input, it was determined that it would not be possible to carry out a systematic assessment because the participants' movements were too varied during the workshop, and a controlled experiment would not be viable. Furthermore, the interactive scenography was not built to record and estimate the movement's range because the potential participants would present a diverse variety of movement and communication challenges, so that comparison would be inaccurate.

Instead, it was decided to conduct observations and apply semi-structured group and individual interviews to ask the participants to make direct, comparative assessments from their own experiences. In most studies, such dis-

cussions were led by an *external evaluator* without any research team members present at that moment to avoid social pressure and biased responses.

In addition to this, the nature of the project indicated that it was not appropriate to conduct a controlled experiment with stroke survivors. The workshop sessions should be run in a naturalistic environment instead of presented through lab-based methods. The environment should be familiar to the workshop participants (usually peer stroke support groups) and respect the project's community approach.

Moreover, the study logistics presented some planning restrictions. Due to the participatory nature of the project, the time allocated to carry out design meetings and facilitate workshops was defined by the stakeholders' availability. For instance, Split Britches divide their time between the UK and the USA each year; on the other hand, the Stroke Association's peer support groups plan their activities at least three months in advance. This required careful planning to bring together the relevant stakeholders for planning, implementation and workshop delivery. It also implied that some stages of the project could only study one workshop session with one stroke support group, or that agreeing on a date for the sessions took many weeks and required pitching the project to the Stroke Association's *volunteering and community officers*.

3.5.2 Ethical considerations

The project is grounded in research approved by the Queen Mary Ethics of Research Committee at Queen Mary University of London (QMERC2018/53 - date of approval: 10 October 2018; and QMERC2016/42 - date of approval: 23 August 2016).

The research assumes ethical responsibility to safeguard the privacy of participants. It also ensures that both the researcher and participants are not subject to unsafe conditions (physical, mental and emotional conditions).

Thus, special attention was provided to any possible hazard, risk and adverse effect on the stroke community's well-being. For this reason, the multi-disciplinary team made sure that activities were relevant and safe to practice for any stroke survivor. Furthermore, the technical equipment and workshop setup was guided by safety procedures to avoid any trip hazard or physical danger.

Performance is an ethically charged research methodology (McAvinchey 2006, Breel 2017). It was ensured that the workshop facilitators (Split Britches and Could be Good in Phase 2) have the professional experience to work with vulnerable communities. In the case of Split Britches, they have nearly ten years of experience working with stroke communities and more prolonged

with other vulnerable communities. In each session, they are tactful about any request to stand up, move and interact.

There was a potential risk of injury or emotional distress if participation was not carefully guided and supervised during the sessions. However, this risk was diminished due to the facilitators' experience working in this context. Furthermore, each session was accompanied by the group coordinator, carers and stroke volunteers to assist participants.

The project was only implemented with stroke survivors from the Stroke Association's groups. This guaranteed a safe environment for the participants: it already was a familiar place and had been approved by the Stroke Association itself, preventing any inadequate practice.

Queen Mary's ethical approval required that any data collected was handled in accordance with the UK Data Protection Act 1998. Participants could be uncomfortable sharing personal information. We explicitly guaranteed that, apart from their stroke experience, they would not be asked for personal information. We also provided a written document for dissemination permission, reassuring that we would not share private details outside the session.

Finally, it is important to highlight that the National Health Service (NHS) did not commission this project. Therefore, the project did not work with NHS patients, no NHS premises, and no medical device development.

3.6 Summary

This chapter has provided an overview of the project's research through design methodology. This is underpinned by socially engaged participatory approaches that engage with participants' lived experiences. Split Britches' feminist participatory performance methods provide an ethos to involve stroke survivors, stroke professionals, community artists and creative technologists in the research process. The iterative methodology crafted for this project included design meetings with an ever-shifting multidisciplinary team and stroke community sessions in which the workshop was delivered to assess the format prototypes and redesign the narrative and technology accordingly.

The long-term relationship established with the Stroke Association enabled reciprocal relationships with stroke communities and for participants to engage in the project by communicating their ideas and challenges throughout the process. Three main research studies were carried out over four years, and a public engagement protocol was established by the end of year four.

Redesigning the Green Screening Workshop

4.1 Introduction

The previous chapter introduced the *Green Screening workshop* as an intervention that couples participatory performance methods with interactive technology to help stroke communities explore physical and social identities, imagining new ways of being. Participants of the workshop are asked to imagine *things they have always wanted to do* (like swimming with dolphins or racing cars). These fantasies are progressively built and enacted for other participants using real-time movement visualisations supported by motion capture. Performance exercises encourage self-expression and imagination, stimulating movement experimentation that does not foreground physical problems. Participants play and improvise ideas, metaphors or storylines supported by the interactive visualisations, while other participants have the opportunity to direct and perform together.

Overall, the workshop format designed during the present research employs two primary strategies. First, a gradual and playful transition from simple performative movements through to mini-narratives enacted with and for other workshop participants. Second, specially designed interactive visualisations, driven by real-time motion capture, that accompanies each stage of this transition; mixed reality-based visualisations progress from 2D silhouettes through 3D point clouds to more concrete, recognisable images of each participant (see Figure 4.1). The process culminates with participants enacting the fantasies in their community group setting, supported by a customised interactive scenography (e.g. mime climbing in front of a picture of a mountain).

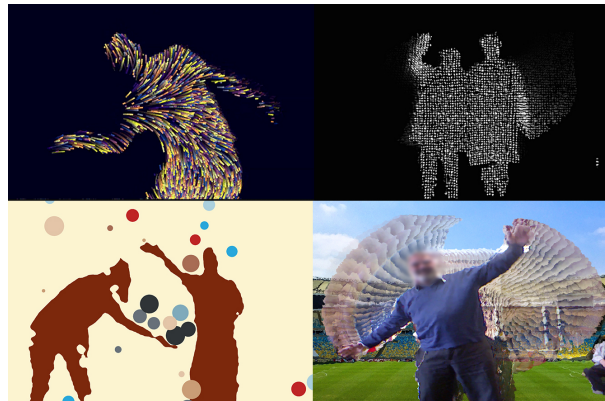


Figure 4.1: Some of the mixed reality scenes developed across all the research phases.

The format above is a result of multiple design iterations informed by participants' feedback and multidisciplinary design, which has been described in section 3.4. This chapter will discuss the project's initial exploration, corresponding to the *Phase 1: Initial exploration* (section 3.4.1).

4.2 The Green Screening workshop approach

The overall Green Screening workshop's approach fits Split Britches' feminist participatory performance practice discussed in this dissertation because it seeks to give voice to stroke survivors, a community marginalised due to disability factors. These methodologies (created by Lois Weaver in collaboration with Peggy Shaw) build infrastructures of conversation; furthermore, the Green Screening project focuses on encouraging a *social encounter* based on enacting and embodying ideas (Weaver 2019).

'If you could do anything right now, what would you like to do? Where would you like to be?' (Weaver & Shaw 2016). The approach discussed in this section originated since the conception of the workshop (Shaw et al. 2013), and was maintained through the design process described in this document.

Beyond gathering for conversation and talking about the participants' fantasies, this workshop intends to *make something*, 'to make things happen' (Weaver 2019). The performative principles (also discussed in Weaver 2009) seek to shift on impulse, create associations from stroke challenges and disruptions, and transform perspectives through desire and fantasy. A fundamental guideline is to stimulate forward-thinking about self-perception, to imagine beyond and not to grieve *what was lost due to the stroke*.

The narrative framework was constructed through a *fantasy performance* process (Weaver 2019). This process is comprised of: 1) getting participants to engage, 2) getting participants to do an action, 3) placing participants in an imaginary place, and 4) layering on these ideas.

The next chapters will explain in detail the structure of each redesigned format. However, most Green Screening sessions, both in the original format and the redesigned formats discussed in this thesis, can be divided into the following:

1. *Warm-up activity*. The aim is to build rapport with the participants and introduce them to the workshop's performance techniques.
2. *Main activities*. These activities take most of the workshop's time. Usually, they focus on generating fantasies, metaphors or stories and finding small gestures or movements to enact and embody them. They become progressively more complex. Eventually, the gestures or movements transform into individual and group-enacted storylines.
3. *Closure activity*. This last activity is the culmination of the performance exercises. Based on previous performative contributions, participants produce more complex performance pieces, individually or as a group, in the form of storylines or meaningful messages. It seeks to generate some type of deliverable (i.e. printed postcards or video-recorded public service announcements).
4. *Debrief*. Participants warm down, share their closing remarks about the session's experience, and receive any tangible deliverables created during the session (i.e. printed *wish you were here* postcards).

In addition, the inclusion of technology strengthened the shift on impulse and the transformation of perspectives. Both the original chroma key technology and new motion capture-based interactive scenography cater to the principle of imaginative exploration to 'bend our sense of body reality, take us out of ourselves' (Weaver 2019) and, ultimately, distance from ordinary perceptions of the self.

It is like a mask, or a clown, or something that allows you not to be yourself entirely as you see yourself in the world, so you take more risks. (Weaver 2019)

Anecdotal feedback provided by Split Britches (in phase 1) suggested that the technology allows people to be more outrageous and playful (Weaver & Shaw 2016). Playing, props and performance materials allow non-performers

to engage performatively more effectively. In this case, the technology provides the performative tools that participants (stroke survivors) lack. However, it is essential to point out that the chroma key technology and interactive scenography achieve this principle differently; this will be discussed in the upcoming sections.

The resulting *interactive scenography* designed for the workshop sets out a theatrical distance that divides everyday reality from a performed reality (fantasy). Through the screen, participants can see abstractions of themselves inside a fantasy space. Furthermore, they share these scenes with their peers, who become distant spectators or participants of individual fantasies as well. Beyond conversation, the workshop promotes a physicalisation of desire when interacting with the green screen. Participants embody desire through metaphors, enacted imagination and guided imagery.

The core concepts of the Green Screening workshop are self-expression, imagination, active participation, and mind-body connection. Under a playful and relaxed scope, these elements prompt reflections about new possibilities for survivors of stroke and the understanding of how community engagement provides a sense of belonging and empowerment.

4.2.1 Social support potential for stroke recovery

The project presented in this thesis focuses on participatory performance arts as a means to engage stroke survivors rather than treating the symptoms and physical repercussions of the stroke. The basic premise is that creative activity and self-expression have intrinsic value for participants and positive effects on health and well-being.

The Green Screening workshop is not a clinical intervention nor seeks to provide physiotherapy exercises for movement rehabilitation. However, this project considered some of the physiotherapy's salient challenges when re-designing the workshop's technology. Traditional physiotherapy can be demanding due to limited cardiovascular capacity and anxiety about whether exercises are performed correctly (Langhammer & Verheyden 2013). Furthermore, monitoring devices and assistive technology tools have proved to be bulky and, often, invasive (Galindo Esparza et al. 2018).

This intervention promotes guided exercises that do not foreground movement issues and that are clearly guided by a workshop facilitator. The feminist participatory performance approach provide a secure framework that recognises the individuality of every participant. On the other hand, the technology was redesigned to avoid cumbersome and invasive scenographic tools that could distract, overwhelm, or confuse participants during the sessions.

4.3 Initial exploration of the project (Phase 1)

The first approximation to the project described in this thesis encompassed two objectives: 1) to analyse the state of the art in stroke's social context, technology for performance and community engagement, socially-engaged performance, and the intersections among them; and 2) to identify the Green Screening guidelines: origin, development, structure and objectives.

From the review of background literature about stroke, performance and interactive technology, it was concluded that there is little investigation about participatory performance projects implementing motion capture and mixed reality technology for social stroke support. Although concise, this statement determines the value and scope of the present project.

Regarding the second objective, a series of design meetings were held with the multidisciplinary team during the whole phase. The topic of discussion departed from technical features and related anecdotal information. These sessions targeted prescriptive feedback.

The workshops' video documentation provided information about the ethos and requirements of the project. Furthermore, an interview with Split Britches (Weaver & Shaw 2016) provided further insights; it delivered first-hand information about the project's trajectory, current needs and future plans, and potential strategies. Information collected about the original workshop narrative and technical infrastructure can be found in section 3.3.5, *Original Green Screening workshop format*. The rest of the data will be discussed below.

Through the research activities, it was possible to summarise the main requirements for redesigning the workshop's technology (see Table 4.1). This would, eventually, ignite a restructuring of the performance exercises and aims.

Table 4.1: Design requirements for the Green Screening workshop.

Split Britches requirements	Research requirements
* Portable	* Multiplatform
* Cost-effective	* Movement-based
* Easy to operate by the facilitators	* Motion capture exploration through Kinect sensor
* Interactive	* Possibilities for future development
* Intuitive interface	

The analysis confirmed that the Green Screening workshop objective was not medical but socially grounded. It aimed to support stroke survivors in transforming their lives' narratives and filling the metaphorical *blank spaces* left after the stroke by embodying new ideas and insights. The next step was to determine the level of success in this area and how to redesign accordingly.

4.3.1 Practical perspectives to redesign the workshop

Scrutinising the Green Screening workshop from a practical perspective encompassed two new objectives: 1) to explore interactive technology possibilities and 2) to observe a Green Screening workshop following Split Britches' original format.

The technology possibilities were explored to find an infrastructure that could replace chroma key technology with a portable, cost-effective infrastructure. This would enable easy transportation to the places where the workshop occurs (mainly community centres around England). An upcoming phase (*Phase 2: Design for technical feasibility*) explores the Kinect's potential in this context.

The observed workshop was delivered to a stroke support group in East London on the 23rd of June 2016. It was facilitated by Lois Weaver and two technicians in charge of setting up and controlling the chroma key technology. On the day, however, six people in total helped set up the technology. This session's structure and technology specifications are detailed in section 3.3.5, *Original Green Screening workshop format*.

The physical setting consisted of two rows of chairs in front of the TV monitor and an additional short row on the left side of the room. The green screen was also placed on the left side, with three ambient lights pointing towards it from different places in the room, and the computer control table was on the right side (see Figure 3.4).

Data collection consisted of participant observation during the workshop. Qualitative feedback about participants' interactions, behaviours and use of the technological infrastructure was logged and assessed after the session.

Findings from original workshop format

Ten participants attended the workshop, six of them needing assistance when walking (see Table 4.2). The workshop facilitator assisted these participants during the exercises and when moving to the green screen.

Table 4.2: Workshop participant demographics.

Total	Men	Women	Total mobility support	Type mobility support
10	10	0	6	5 - walking stick 1 - walker

From direct participant observation, it was gathered that participants were engaged and agreed to cooperate during the activities. Each participant dis-

played different performative skills. However, some generated metaphors with more facility, while others showed difficulty during the process.

Table 4.3 shows the stroke metaphors, fantasy places and fantasies generated during the workshop. In the table, the lists are not correlated (i.e. the heavy storm metaphor, Disneyland and footballer fantasy in row 1 do not correspond to the same participant). In general, it was perceived that the fantasy revealed by a specific participant during the workshop did not directly relate to their fantasy place. For instance, a participant's fantasy was to be a chess champion, and his fantasy place was a Philippines beach.

Stroke metaphors tended to be the most complicated to generate, but participants seemed happy to be offered the opportunity to talk about stroke in this *new* way. On the other hand, fantasies presented a diversity of reactions. One of the participants refused to contribute his fantasy to the group because he felt it was impossible to happen (eventually, it was revealed that he desired to travel to the country where his daughters live). In contrast, others took the opportunity to reflect on how this fantasy could inform their stroke experience (i.e. being a professional writer to write about stroke).

Table 4.3: Participants' stroke metaphors and fantasies during the original workshop format.

Stroke Metaphor	Fantasy Place	Fantasy
Heavy storm	Disneyland	Footballer
Volcano with ashes	Philippines beach	Chess champion
Silent and dark night	Celine Dione's concert	Plane pilot
Blurry picture	Northern lights in Iceland	Hand-writer
Buffalo trampling	Denmark	Professional writer
Underground crawling	A plane	Independent traveller
Alone in large crowd	Westfield city	Jumping off a plane

During the last stage of the session, the facilitator invited participants to step in front of the green screen one by one. After only a few seconds of *seeing themselves* in their fantasy space (on the screen), a picture was taken posing with a gesture related to their fantasy action.

To finalise the session, it was intended to print each picture as a *Wish you were here* postcard and give it to the participants during the debrief. Unfortunately, there were technical problems. Instead, the team sent the postcards to the group coordinator a few weeks later.

The main positive outcomes detected were:

- Most participants reacted positively to generating fantasies. Their facial expressions changed, and they verbally expressed happiness, hope or ex-

citement to think about the things they would like to do or the places they would like to be.

- Fantasy places seemed to generate a broader range of ideas than fantasy actions. In general, participants responded to this exercise faster; in contrast, they reflected on their fantasy action for a few more minutes.
- Participants requested to take a group photo in the green screen. This suggested that the shared experience is an important element of the workshop.

The main challenges detected were:

- Some participants struggled to generate metaphors. One of them expressed that it was challenging to think about this if it was not really feasible. Through conversation prompts, the facilitator was especially salient in guiding them through the process to find a metaphor in the end.
- Due to the room's layout, the green screen and monitor were set up in a way that only the person standing in front of the green screen could see the monitor, but not the rest of the workshop participants (the monitor was perpendicular to the audience).
- When the participants did not know what to do, they copied the actions or metaphors previously provided by other participants.
- One participant refused to step in the green screen alone. However, when the group picture was taken in the green screen, he agreed to participate.
- Some of the participants arrived late to the session and had trouble following up on the activities, even if the facilitator explained to them upon arrival.

Furthermore, some aspects needed special attention when catering to a stroke community in the redesign process. This included the fact that many participants presented some movement limitations; it was difficult for them to move to the green screen to get their picture taken. Similarly, some participants presented aphasia or other speech problems, limiting their ability to interact with others if crafting a conversational-based format.

Particularly, the original format only made use of the chroma key technology (designed by Delbridge 2013) during the last part of the workshop. The rest of the session focused on performative exercises without technological support. On the positive side, when the green screen was used, it succeeded in

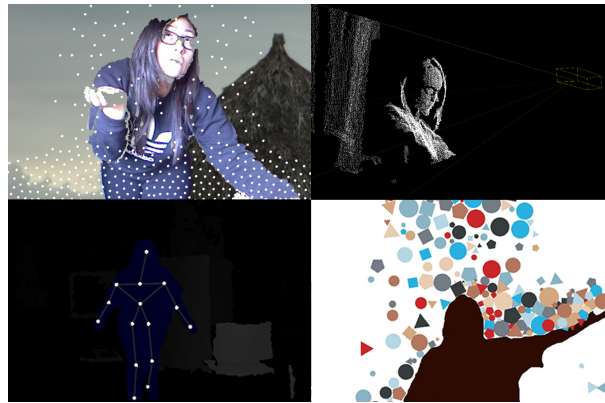


Figure 4.2: Kinect-based mixed reality interactive models developed for the design meetings.

placing participants into their fantasy places. However, it is also important to point out that setting up the space with this technical infrastructure took about 40 minutes, with six people helping.

4.4 Green Screening workshop redesign (Phase 2)

Observation of the original Green Screening workshop format allowed further elaboration on the design requirements. Design meetings in phase 2 (see section 3.4.2) consisted of exploring the Kinect's motion capture potential through mixed reality interactive models specially developed for the project (see Figure 4.2).

Decisions at this stage mainly related to the mixed reality visualisations. They were based on observations of the original workshop and Split Britches' performance aims. In further design phases, decisions would become more focused on exploring this thesis' research questions.

As previously mentioned, the workshop's overall aim is to stimulate the development of imaginative fantasies about *something participants have always wanted to do* (like swimming with dolphins or racing cars) and share them, through enactment, with the rest of the participants, as an audience.

To assist the aim, an *interactive scenography* was developed. The system's purpose is to help participants interact with fantasy worlds of their own making. It also seeks to allow the group to play both the roles of an audience and co-producer of the experience.

Observations of the original Green Screening format suggested that interaction was too static, involving only the posed photograph in the last part of

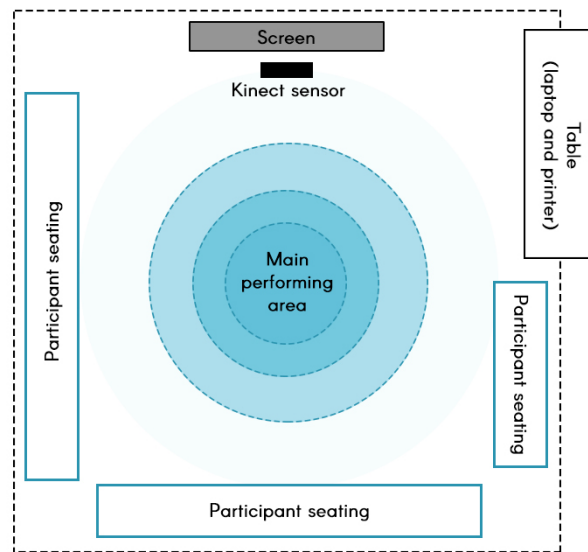


Figure 4.3: New Green Screening workshop setup. Fewer dimension restrictions compared to the initial format.

the session. In addition, the generation of stroke metaphors prompted participants to focus more on their stroke (backwards looking) and less on their fantasy than intended (forward thinking). It also highlighted the significance of group interaction for the process.

The initial system's prototype was explored through design meetings. These sessions focused on the Kinect sensor's potential to drive different visual interaction models (Zhang 2012) and the integration of these models into the workshop process.

The physical layout was also redesigned: participants' chairs were set up in front of the Kinect and screen; this way, the audience was visibly integrated into the process from the start. This also removed equipment and cables from where people stood to perform, complying with the ethics guidelines (see Figure 4.3).

The redesigned technological infrastructure employs motion capture; it digitally records body movement and translates it, in real-time, onto a mixed reality environment.

This use of motion capture might seem counter-intuitive as an environment for stroke survivors since people's body movements are often impaired, and a dynamic visual representation might simply serve as a reminder of this impairment. However, during the design process, Weaver & Shaw (2016) highlighted

their anecdotal evidence about the de-personalised, real-time motion feedback providing an empowering and liberating effect.

The first *interactive scenography prototype* consists of a Kinect sensor, a screen and custom-made software that renders mixed reality visualisations. To interact with it, the participant should move in front of the Kinect until the sensor detects them. Once this happens, the participant is free to move, play and improvise ideas, metaphors or storylines in conjunction with the mixed reality environment.

The former chroma key technology required participants to stand right in front of the green screen, and the monitor was not always visible to the rest of the group. In contrast, this interactive scenography can detect participants within a broader reach, including people sitting down or using movement aids such as wheelchairs and walking sticks. Furthermore, the facilitator and other participants can direct the participant or suggest different ideas about their performance because now everybody can see the screen from their chair.

Findings in phase 1 showed that the sessions always take place in a communal setting. During phase 2 (see section 3.4.2), the prototype was tested in different room sizes (the smallest being a 6x4m room) before deploying it with stroke support groups. Overall, it encountered no technical difficulties; however, smaller rooms proved challenging for bigger groups using the interactive scenography. Moreover, based on the findings derived from the original format's observations, the digital environment required to be adequate for a diverse variety of communication and movement possibilities. Finally, it required visual simplicity to avoid disorientation and responsiveness to detect small gestures like finger movement.

4.4.1 Interactive scenography prototype

A light, portable, unencumbered interface based on infrared motion sensing was developed using a Kinect sensor, custom-built software, and a large screen. The Kinect's combination of an RGB camera and infrared (IR) sensing enables background removal with similar results to the chroma key technique (Zhang 2012). Furthermore, it discards the need for a physical green screen and ambient light. The Kinect also offers reasonable accuracy and does not require the physical markers or special costumes that professional motion capture systems do (like OptiTrack and VICON), making it practical for use outside the lab.

The interactive scenography's first prototype was developed over a period of four months, from April to August 2016. At this stage, it is a multiplatform system supporting live features. The software integrates Processing ¹

¹<https://processing.org>

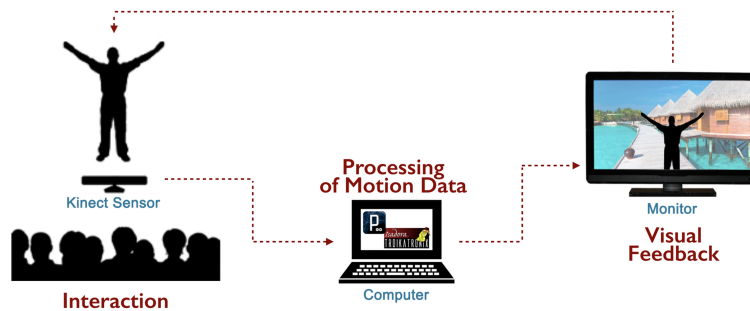


Figure 4.4: Interaction diagram of the interactive scenography prototype.

and Isadora ² languages; it is written in Processing language using a variety of libraries (such as OpenNI and PBox2D), and connects to the Isadora software (via Syphon library) to rescale, mirror and substitute the video's background. The prototype code was developed by the author of this thesis, Galindo Esparza, with support from Davy Smith (creative technologist).

In this prototype (and all the subsequent ones), the Kinect sensor detects the people's location and movement to place them in a virtual environment. Participants can stand or sit in the performance area (see the central area of action in Figure 4.3) with the Kinect sensor pointing towards them. Moreover, all the participants are now able to see the screen located above the sensor (see Figure 4.4) (Galindo Esparza et al. 2018).

This prototype provides three mixed reality scenes (Figure 4.5): *empowering silhouettes* (left picture), *embodied movement* (middle picture) and *fantasy world* (right pictures). As participants move, the Kinect sensor tracks their outlines and displays them on the screen. The software detects individual or multiple users' locations and movements; and transforms them into real-time visual scenes to interact with (see Figure 4.5). The scenes change in conjunction with the performance exercises; they will be detailed in the next subsection.

Correspondingly, the workshop's narrative framework was restructured to include mixed reality scenes in all the exercises, not only at the end like the former version. This new narrative was redesigned under the guidance of Patrick Healey, Adele Jeffs and Hannah Mason. It was decided that facilitators would guide the workshop process by providing performance prompts and directions to promote participation and interaction with the interactive scenography.

²<https://troikatronix.com>

4.4.2 Workshop structure

The new workshop structure was redesigned as follows.

Technology warm-up. Interaction with the first mixed reality scene, *empowering silhouettes* (Figure 4.5, left), while participants greet and socialise before starting the workshop activities. The system generates a silhouette of the user and random falling shapes. The user can interact with the shapes (push them, move them and *pop* them). This environment aims to empower the participant and introduce the technology.

Opening. Introduction of the workshop team and the participants.

A stroke metaphor. Through conversation, participants generate metaphorical images about their stroke experience and share them with the rest of the group.

The fantasy. Participants think ahead in their lives and imagine where they would like to be now: their own fantasy. The conversation allows each participant to share their insights with the rest of the group.

Embodied movement. The fantasy ideas are embodied with a significant gesture or body movement using the second mixed reality scene, *embodied movement* (Figure 4.5, middle). The system generates a point cloud model of the user with a delay effect to highlight movement. The aim is to stimulate unself-conscious movement exploration.

Fantasy world. Participants interact with the third mixed reality scene, *fantasy world* (Figure 4.5, right), which produces an interactive experience with each participant's fantasy. The system generates an RGB silhouette and places it into the picture of each participant's fantasy place. In addition, interactive digital elements like falling leaves, raindrops, falling snow and abstract figures were added to each scene. After performing their fantasy, they build a self-portrait.

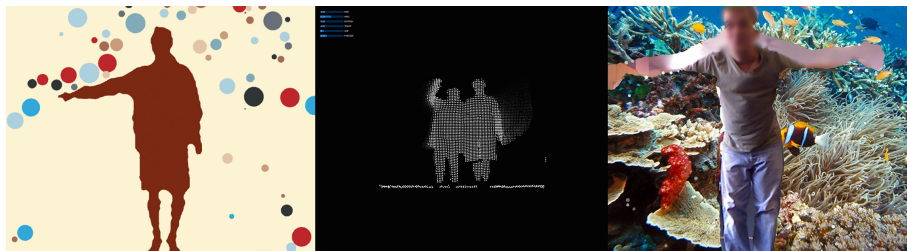


Figure 4.5: Mixed reality scenes developed for the first redesigned format.

4.4.3 Technical specifications

Table 4.4 shows the technical specifications for the interactive scenography.

A stock offline photography library was compiled to reduce equipment³. As a result, the extra computer and portable internet were not needed anymore.

Table 4.4: Technical specifications for interactive scenography.

Company Equipment	Required from venue
* Kinect sensor * Macbook pro running Processing and Isadora * Cables to connect and power the system * Printer, ink and photography paper	* Large monitor with either VGA or HDMI input (50+ inches) * 20 - 25 chairs * x1 small table (1m x 1m ideal)

4.5 Summary

This chapter has presented the project's commencing findings, corresponding to *Phase 1: Initial exploration*. It started by discussing the green screening approach followed both in the original format and kept during the subsequent redesign iterations. An analysis of the original format and a series of design meetings during *Phase 2: Design for technical feasibility*, resulted in the first redesign guidelines. Finally, an interactive scenography prototype and the redesigned structure were described (see *phase 2 workshop format* in Figure 3.8).

³Library created with stock photography from <https://pixabay.com/>
All contents under Creative Commons CC0, which makes them safe to use without asking for rights permission.

Exploring performance and digital technology

This chapter presents the first of three research studies carried out. It explores the overall Green Screening workshop's potential to contribute to social support in stroke communities and how interactive motion capture technology can become a supporting tool. The chapter discusses the project's design iteration corresponding to the *Phase 2: Design for technical feasibility* (section 3.4.2).

This study aims to obtain formative participant feedback on the changes to the workshop structure and technical infrastructure introduced in section 4.3.1. The study took place with the East London group observed during phase 1, two months later. Informed by the methods discussed in Chapter 3, the redesigned format was implemented, and participants' experiences were gathered. The following sections present a detailed description of the methodological approach, analysis of the data, and study findings.

5.1 Study methodology

This study evaluates the first redesigned workshop format in a stroke community context (*phase 2 workshop format* in Figure 3.8). The overall aim is to determine its feasibility for peer and social support. It seeks to answer the following research question:

- How can participatory performance methods supported by interactive technology stimulate the development of stroke survivors' embodied fantasies during the Green Screening workshop?

The workshop was designed as an opportunity to gain an understanding of the stroke community's requirements and potential issues within the project's

scope. A two-hour session was delivered to the East London stroke support group (Stroke Association) on the 4th of August 2016. The session took place in the group's usual community centre. Two artists from the creative collective Could be Good facilitated the session, and one technician was in charge of the interactive system. The Green Screening narrative and technical infrastructure implemented for this study are described in section 4.4, *Green Screening workshop redesign (Phase 2)* (see also Appendix I).

Overall, a Kinect motion capture system replaced the green screen and filming lights (see Figure 4.4). Accordingly, the structure was transformed to include the technology in all the exercises (see section 4.4.2, *Workshop structure*), and the space was reconfigured to accommodate a broader action area, allowing all participants to look at the monitor and removing trip hazards (see Figure 4.3).

Findings are presented as a set of category clusters: enactment of fantasy worlds; interaction, body movement and gestures; imaginative exploration derived from body's *abstract* representations; and participants' engagement and interaction as participatory audiences.

5.1.1 Role of the researcher

This thesis' author was embedded into the study as the workshop audiovisual technician. Through this stage, she acted as a participant/observer during the session, taking an active role that allowed her to document and understand the workshop's delivery process. This role permitted her to become a member of the community as well as a researcher. Under her researcher and designer role, particularly at this project stage, her research prompts focused on participants' engagement mediated by the technology in contrast to the original workshop format. Taking on an embedded role enriched her understanding of the community's environment.

Due to the participatory nature of the project, a single researcher approach would not have been comprehensive enough (Mack et al. 2005). Other members of the multidisciplinary team were involved in this study: Adele Jeffs and Hannah Mason as workshop facilitators ¹; Patrick Healey and David Smith were present throughout the session as observers. They all provided observation notes in subsequent design meetings to inform future redesign.

¹At the time this study was carried out, Lois Weaver and Peggy Shaw were working outside of the UK. Could be Good was invited by them, as guest collaborators, to facilitate the session and participate in the design meetings with the multidisciplinary team



Figure 5.1: Interactive scenography is placed at the front of the room, leaving an open performance area for the participants.

5.1.2 Participants

Participants were stroke survivors that regularly attended the stroke support group (Stroke Association). They all arranged their transportation to attend the session. In total, there were six participants; four of them required walking aids (see Table 5.1). Two of them were new to the workshop format, while the rest had attended the Green Screening workshop with the chroma key technology. They did not have previous experience with interactive technology or the Kinect sensor.

Table 5.1: Participant demographics (first research study).

Total	Men	Women	Mobility Support
6	4	2	2 - walking stick 1 - walker 1 - moving assistance

The contact with participants was established through the Stroke Support group coordinator, selecting people with a significant degree of independence to travel to the meetings, socialise and take decisions (see Figure 5.1).

5.1.3 Ethical considerations

The Queen Mary Ethics of Research Committee approved all components of this study (ethical approval reference number: QMERC2016/42), and participants gave written consent before the start of the session. They were not paid for their involvement and did not receive another type of incentive (see Appendix B for the Ethical Approval). For more information about the ethical guidelines followed in this study, please refer to section 3.5.2, *Ethical considerations*.

5.1.4 Data collection and analysis

Data collection consisted of participant observation during the workshop, filming their performative contributions and interactions with the system; recording of performance outputs (*wish you were here* postcards); and group interview at the end of the session to gather qualitative feedback about their experience.

The entire workshop session was observed and filmed. During the session's debriefing, the workshop facilitators conducted a semi-structured group interview to examine their experience. The rest of the multidisciplinary team attending the session (the technician and two observers) was present during this interview. The video data was coded into categories to study interaction with the system, embodied imaging, fantasies enactment, participant's gestures and body range of movement.

The interview feedback was organised into categories of satisfaction and stimulus of imagination. The analysis is based on data coding and categories comparison to detect qualitative relations. The interpretation of such results is informed and contextualised under a double scope: the Split Britches workshop guidelines and their participatory performance rationale.

Documentation limitations

The workshop session was filmed with two cameras: one fixed-point professional camera attached to a tripod and one mobile reflex camera. The fixed point camera recorded a time-lapse of the entire session from the back of the room, gathering information about the participant's physical location in the room (e.g., arrival to the session, when sitting down or standing in front of the system), body posture and gestures, as well as interactions with the interactive scenography prototype. This recording did not include any audio.

The mobile camera recorded specific participants' interactions during the whole session. The camera shots were taken from different parts of the room, especially the lateral areas. It was important that this filming was not obtrusive or distracting for the participants. The recording included audio, which captured some of the participant's verbal input during the session.

Positioning a front camera to film the whole session (including audio) was impractical due to the room's layout. The camera would have been very close to the participants (less than 1 meter), and the shot could not include participants sitting on each side of the room. The closeness of the professional camera and tripod would have also been disruptive to the session and could potentially alter the participant's engagement during the activities. To complement this approach, the researcher used field notes to document the experience (see Appendix D for an example of the field notes instrument).

5.2 Findings

Findings from the qualitative analysis of data collected during the study are presented here. Data analysis explored the challenges and practicalities of implementing performance methods and interactive technology in a stroke community context. The resulting categories are the most relevant to this study's research question. The discussion centres around discovered areas of opportunity (such as participants' engagement and facilitators' guidance) and unanticipated constraining elements (such as room layout, fixed furniture and gatekeepers).

Noting attendance, three participants arrived late to the session (P6, P5 and P3). After arrival, one of them struggled to understand some of the workshop activities; however, it was unclear if this was due to late arrival. Of the rest, one of them was new to the workshop, and the other had already attended the session with the chroma key technology. Furthermore, another participant (P4) had to leave early due to personal commitments.

During the session, participants were free to decide when to contribute with ideas and perform in front of the group. The facilitators prompted everybody to share experiences but also supported their decision not to do it. The main reason for this approach was that facilitators were unsure of how demanding both the performance exercises and the technological infrastructure could be for stroke survivors. This was their first time facilitating a Green Screening workshop, and they were new to Weaver's methodologies.

Participants' response was mixed: while some engaged in all the exercises, others chose not to share their metaphors or fantasies or not to play with some of the interactive visualisations; others avoided individual interactions but performed in pairs or as a group. Table 5.2 shows the order in which participants performed in front of their peers and played with the interactive scenography.

As mentioned above, the new physical arrangement resulted in a wider area of action to perform. Instead of rows, the chairs were placed around the room in a horseshoe shape. The green screen filming equipment was no longer used; participants could see the monitor from all angles and sit closer to it. As a result, they could move around the space more freely, and the audience could see the interaction from their seat without elements obstructing the way.

5.2.1 Fantasy enactment

Table 5.3 shows the metaphors and fantasies generated by the participants during the session. During the session's main activities, the facilitators introduced the concept of *stroke metaphors* by showing Shaw's *Icy finger of death* and ex-

Table 5.2: Order of participants performing with the interactive scenography.

Technology warm-up	P1
	P4
	P6
	P5
Embodied movement	P3 and facilitator
	P2 and P6
	P5
Fantasy world	P1
	P2
	P3
	P5
	P6
	Group

plaining how she related it to the moment she had the stroke. Then, they invited participants to think about images that could depict their stroke experience and share them with their peers. Once most of them had talked about their metaphors, they were asked what they would like to do if they could, and where they would like to be: their own fantasy. It was noted that the metaphor was a conversation exercise, and there were no performance prompts, only imagination stimulus. On the other hand, there were no visual examples of the fantasy. Instead, the facilitators explained the *fantasy* concept verbally. This second activity was supported by conversation and movement-based exercises (such as enacting a gesture related to their fantasy).

Table 5.3: Participants' stroke metaphors and fantasies.

	Stroke Metaphor	Fantasy
P1	Dark Space	Lake District large field
P2	Suffocating, or Violent shout	Philippines beach
P3	Beautiful field with flowers, or Butterflies	Place with flowers and a river, or Canary Wharf canals
P4	A heavy storm	Thailand beach
P5	<i>non stated</i>	Hummingbird flying without care
P6	World collapsing	Westfield shopping centre, or Museum

During this study, the participants produced metaphors and fantasies faster than the first Green Screening workshop observed (using the chroma key green screen). Arguably, the reason could be that some of the stroke survivors had participated in the first session. However, new participants also took a simi-

lar amount of time sharing fantasies and metaphors than those with previous experience.

Two first-time participants (P3 and P5) quickly generated fantasies, and one (P3) also developed the metaphor with ease. Both participants were able to propose fantasies focused on action instead of place. On the other hand, second-time participants (P1, P2, P4 and P6) either proposed new ideas or repeated the ones from the previous workshop. However, they added a more detailed description of their fantasies or metaphors in the second case.

It is important to emphasise that half of the participants provided more than one metaphor or fantasy (reflected in Table 5.3). Although eventually, the facilitators asked them to pick one to move on to the following session stages, most participants added more detail to each image in contrast to participants from the original format session.

Participants talked broadly about their stroke experience, but it took them longer to generate a metaphor about it. Similarly, when the focus shifted to the idea of a fantasy, most participants struggled to let go of the metaphor topic. Generating fantasies, hence, took a bit more effort from them than generating metaphors about the stroke.

5.2.2 Interaction, body movement and gestures

Recalling the Green Screening workshop with chroma key technology, the approach was static: participants only generated gestures while sitting in a chair using their upper body (torso, arms, and facial expression). When they stepped in front of the green screen, they could repeat the gesture to pose for the photography. However, the movement was static and limited because the gestures were created while sitting.

During this study, participants range of movement included full-body action focusing on the upper body area. The most physically engaged participants (P2 and P6) displayed dynamic gestures (i.e. simulating *Karate* movements, clapping with a fist or pushing imaginary objects), slightly walked around the space, and used ample movement resources like swinging arms back and forth, shaking their body and exploring their frontal and three-quarter profiles in the mixed reality environment. It is also relevant to point out that one of them arrived to the session with a walking stick, but he did not use it while performing; his movements seemed slightly more limited by the lack of mobility support, but not enough to disrupt his performance.

One participant mirrored another participant's contributions later in the session: P5 swung her arms back and forth when looking at her abstract body silhouette. Her movements were more limited, targeting only the upper body



Figure 5.2: Participants enacting their fantasies.

in a T-pose. In contrast to the previous descriptions, she was clearly engaged by her reflection on the screen, displaying a more reflective, less playful attitude. As an example, in the *embodied movement* scene, she performed a *flying hummingbird* by opening her arms wide and moving them as if they were wings to create an extended pattern on the screen; then she experimented with different arm positions to alter this pattern (see the right picture in Figure 5.2).

Other participants' motions were somehow impacted by their moving restrictions. For instance, one of them used a walker and, a few times, required assistance from the facilitators to move to the centre of the room. Other times, he used his walker and moved his arms from side to side but kept one hand close to the walker in case he needed support. In comparison, another participant was more audacious because the facilitator supported her at all times when standing: she moved the right arm at different heights and positions, shook her hips, bent the knees to go down slightly and rotated the right arm rhythmically without the presence of music (see the middle picture in Figure 5.2).

Furthermore, during the last stage (*fantasy world*), these two participants sat on chairs in front of the interactive scenography. When they used the chair, their movement was much more limited. Nonetheless, one of them managed to slightly jump with the chair when the sensor lost track of him and, after that, only kept his arms wide open to interact with the virtual falling leaves. In contrast, the other participant just moved the right arm to stop some virtual floating shapes in her fantasy but remained mainly static during the last exercise (see the left picture in Figure 5.2).

From this example, two findings can be drawn. In the first place, movement limitations endured by stroke survivors were not directly restrictive for the workshop's activities when a performance prompt guided the interaction. Although these participants could not move as freely as the rest of their peers, they could stand up or position themselves in front of everybody and perform.

However, this is a limited account, and a broader participant diversity would have provided more precise insights about the limited-movement impact in the fantasy performance activities.

In the second place, the community aspect was salient when another person supported the participant with movement limitations. The case described above hints that peer support can be beneficial when somebody is struggling to participate, in this case, due to mobility issues. It is worth wondering to what extent this type of support would be helpful and in which ways it could, instead, limit participants' performance or breach their personal space.

5.2.3 Abstract representations and imaginative exploration

As previously mentioned, participants had the free choice to interact with the interactive scenography. The technology permitted participants to immerse themselves in a mixed reality environment with abstract representations of their bodies. Participants' movement is a key factor for interaction in this context. However, the movement is expected to emerge from embodied imaging to elicit imagination, embodied fantasies and kinaesthetic metaphors.

Overall, participants' fantasies focused on actions (like playing football or visiting a shopping centre). However, two participants focused on *being* instead. P3 and P5 embodied images were a butterfly and a hummingbird, respectively. Nonetheless, only P5 enacted this fantasy in front of the interactive scenography. Her performance encompassed moving her arms as if they were wings and looking at her own reflection on the monitor next to a hummingbird stock picture. She pretended she was the hummingbird (or a second hummingbird) even if she could see her concrete reflection on the screen.

Overall, participants showed various degrees of imaginative interactions with the technology. P1, for instance, used his arms to stop the falling shapes in the *empowering silhouettes* scene. He did not enact metaphors or fantasies during this stage but experimented with his reflection and moved accordingly. Furthermore, he had participated in the Green Screening workshop with the chroma key settings; he demonstrated a more significant range of movement during this study, even when he used a walker to perform.

During the same scene, *empowering silhouettes*, another two participants presented a more dynamic range of movement. P4 used his upper body to play with the falling circular shapes and then made use of grabbing gestures, pretending that the shapes could be caught with his hands. As means of exploration, P2 proposed situations or characters to generate a storyline: he performed karate movements, included sounds like a *hiss*, pretended to be dancing, stretching after waking up, drinking a beer, and swimming.

In contrast, P5's and P6's interactions were subtle and more analytical. Both of them spent extended periods in front of the screen when performing. P5, for instance, did small movements and looked carefully at the feedback she was producing, and then experimented with similar possibilities. Apart from pretending to be a bird, she played with the circular shapes by stopping them with her arms and letting them roll down slowly. P6 was also attentive to the screen and moved various body parts; his performed contributions also tended to be rhythmical.

P3 performed more openly when she had the opportunity to team up with a partner. She experimented with different types of movements in the interactive scenography; although her actions were limited due to movement capabilities, the mixed reality environment motivated her to dance and *hum*. It should also be mentioned that, in her fantasy, the chair she used to sit down while performing also became an element of the fantasy: *sitting on a balcony*.

During the evaluation, each participant illustrated diverse embodied interactions based on their skills, movement possibilities and degree of engagement. Although all the participants were able to use their imagination to embody fantasies to some extent, many of them expressed that their main interest was to take the technology home to exercise more often, closely related to the way interactive rehabilitation systems are implemented for stroke rehabilitation (Baran et al. 2015, 2011, Lehrer & Olson 2009, Lehrer et al. 2011, Kim et al. 2011, Pastor et al. 2012, GestureTek 2001). Furthermore, imagining new life possibilities was not considered a meaningful aspect of the experience; only one participant (P3) talked about how she selected her fantasy based on looking forward to a positive life after the stroke.

It was also noted that the interactive scenography could both enhance or distract from the experience. The mixed reality scenes that displayed abstract silhouettes seemed to be more engaging for the participants; a richer repertoire of enacted ideas and performative movement was detected in these visualisations. However, the final scene displaying their concrete silhouette and falling shapes did not stimulate the same range of movements.

Although participants expressed that they enjoyed the scenes and did not find any issues (probably a biased response because the facilitator had asked this question and the rest of the team was listening), it was discovered that the falling shapes in the final scene were distracting. As a result, participants could not decide whether to interact with them or perform their fantasies.



Figure 5.3: Collaborative interactions.

5.2.4 Shared experience and participatory audience engagement

The interactive scenography aims to support participants in sharing their ideas and creating shared experiences during the session. In this study, laughter and joy expressions were perceived each time participants saw their reflection on the screen. Some of them were motivated to perform a dance or Karate exercises, expressing phrases like "*Karate! Huh!*".

As an audience, the participants were also enthusiastic about looking at other people while performing. They smiled, laughed and gave suggestions to other participants. For instance: "*That is a good job. Do it again!*" and "*Nice, yes nice!*". Furthermore, the new physical layout allowed participants to observe people's performance from all angles and the mixed reality environments on the screen.

P2 and P6 collaborated while performing in the *embodied movement* scene (see Figure 5.3); this hints at the potential of the interactive scenography to create shared experiences. In this example, P6 invited P2 to interact with him. At the start, P6 touched P2 in the back, mirroring another pair's movement (P3 and facilitator). By working together, one of them (who uses a walking stick) was helped by his partner to move his left leg. The performance closed with one of them hugging the other as if they were posing for a picture.

Unexpectedly, at the end of the workshop, during the *fantasy world* scene, participants requested to take a group picture immersed in one of the fantasy places. The participants held each other and moved their arms or heads to be detected by the system.

This last interaction was the session's closure, and the interactive scenography was able to detect the whole group, proving that there is potential to develop collective fantasies. Nevertheless, it was also technically unstable, and it

would randomly lose track of some people. Thus, they had to constantly move around to appear on the screen again.

5.3 Reflective summary

The findings from this first study motivate a more in-depth investigation of the potential of embodiment and imagination in social stroke support, particularly with stroke communities. The workshop format implemented in this study was built on three main pillars: physical space, digital environment and narrative framework.

The interactive scenography prototype supported the workshop narrative because participants could adapt their movements according to their individual abilities. The data analysis suggests that participants engaged in performative exploration more robustly than the original format, thanks to the physical space available.

The digital environment pillar consisted of the mixed reality scenes displayed on the monitor. This was conceived to promote participants' engagement by prompting the enactment of imaginative thinking. In combination with the redesigned narrative, participants were able to generate metaphors and fantasies faster, in contrast to the original format. Moreover, these metaphors and fantasies became more detailed when exploring them through the technological infrastructure.

The interactive scenography effectively allowed a broader range of movement and enabled participants to visualise their imaginative ideas on the screen. Observing their abstract and concrete silhouettes in the digital environment allowed them to match that virtual world with the real one. Their digital self experienced sensations inaccessible to them (like having wings or being a cloud of particles), but such sensations belonged to them through their silhouette on the screen. This hints that this approach enables the body to encounter that fantasy world through the embodied experience (Popat 2012).

The narrative framework (workshop structure under a performance outlook) pillar was designed to elicit and develop movements that build into the enactment of fantasy through the interactive scenography (Bailey et al. 2016), e.g., using a warm-up exercise at the start to smoothly introduce the technology and frame the improvisational character of the activity. The workshop's narrative framework was restructured to exploit embodied performance exercises to encourage self-expression and imagination for individual interactions while the peers observed as an audience. This was achieved to a certain level, as it is reflected in the number of participants engaging during each stage of the

session (see Table 5.2) as well as the ideas generated (see Table 5.3). However, it was expected that participants would be equally involved in all the stages, and it is unclear if this was not achieved due to the workshop's structure or the nature of the activities.

In contrast, evidence of imagination stimulus can be detected because half of the participants generated more than one metaphor or fantasy and added more details to each image. Weaver (2019) noted that, in the first instance, fantasy place was proposed as a starting point because *thinking of something they would like to do* entailed the next degree of difficulty. The designers focused only on a fantasy place during this iteration, not a fantasy action. However, two new participants directly proposed fantasies focused on action instead of place. The new format suggested support for stimulating imagination in this aspect.

To achieve participant's engagement, each stage was supported by mixed reality scenes in which participants were able to see these abstract representations of themselves moving in real-time (de Preester 2011). Based on the participants' performance and final feedback, abstract representations provided a depersonalised depiction of their movements while still providing dynamic feedback. It is considered that abstract representations boost active imagination, in contrast with concrete ones; this was further investigated in the following study (see Chapter 6).

Furthermore, the mixed reality feedback also motivated movement, reduced monotony and overcame the workshop's original static approach. It was discovered that, with this new workshop format, participants appreciated the technology as a support to avoid boredom and tiredness in repetitive physical activities such as physiotherapy rehabilitation (Baran et al. 2015, Duff et al. 2013, Lehrer et al. 2011). Some participants suggested that they would like to take the system home to exercise more creatively during the interview. Hence, the new technical infrastructure successfully promoted movement experimentation; however, imaginative exploration of people's inner world was not fully exploited in this format.

Overall, participants expressed they enjoyed the session as an activity that they had not tried before. Nonetheless, there was no substantial evidence of individual narratives' further exploration. Participants did not express any change of self-perception or about their stroke experience. Only one of them talked about the importance of having a positive attitude towards life and reflected these ideas on the metaphors and fantasies proposed (P3 - butterflies, flowers, rivers and canals).

Participants seemed more stimulated by creating metaphors about their stroke experience than talking about fantasies. The metaphor was a new con-

cept for them, and the facilitator was required to explain carefully and exemplify with Peggy Shaw's stroke metaphor (the *icy finger of death*). Most metaphors referred to adverse, dark images and participants seemed to struggle to immediately shift to positive ideas related to fantasy and desire. This was complicated because the rest of the workshop was focused on developing their fantasies further, and the section where they had to develop fantasies felt disconnected from the rest of the exercises.

Finally, one unanticipated finding was the collective aspect of the activity. At this stage, designers did not plan activities to be performed in pairs or as a group; however, the facilitators decided to encourage pair work during the session due to the time and movement restrictions. Performing together was successful either because participants felt safer moving with somebody else supporting them or because they had another person to get feedback on their actions and give them new ideas.

Overall, the interactive scenography prototype showed potential as a helpful tool for stroke social support. As a part of the Green Screening structure, it brought new perspectives of implementation that differed from the original approach: it provided a sophisticated, real-time adaptive tool for interactive performance. The new workshop format engaged the participants physically and mentally, enabling them to experience moments that are not regular to their daily life.

5.4 Green Screening workshop redesign (Phase 3)

After the first study, the Green Screening workshop underwent a new redesign iteration to complete the interactive scenography's development and provide a more functional structure. This process took place during the Design Lab stage of *Phase 3: Design for enactment and imagination*, and the design choices are described in the following section.

5.4.1 Opportunities and implications for design

Because findings showed that the current structure effectively stimulated playful body movement more than fantasy enactment, the workshop's narrative was remodelled under Lois Weaver's guidance, and the interactive scenography's software was revised and completed by Galindo Esparza. This process took a period of six months, in which the format was adapted to reinforce the successful elements and overcome limitations found during the study.

Participants expressed that they were new to this type of technology. With this in mind, the warm-up exercise was transformed to introduce participants

more smoothly to the type of interactions afforded by the interactive scenography. Instead, it was decided that the first mixed reality scene should be playing from the moment the room is available to the participants, expecting that, when moving to their chairs, the notice body silhouettes appearing on the screen and invites them to exploration.

The stroke metaphor was removed because it was found disconnected from the rest of the activities and, even though it is a valuable exercise that allows stroke survivors to reflect upon the stroke event creatively, its adverse effects delayed the transition to other exercises. Perhaps if the transition was smoother, participants could switch more easily.

However, the workshop's time is limited and removing the whole section was considered more practical. On the other hand, the fantasy was split into fantasy action and fantasy place to heighten the methodologies of desire; gestures and movements would be promoted more than vocal contributions. And the final section would be gradually constructed through the previous exercises.

Because this first study analysed the feasibility of motion capture technology for stroke support, essential changes to the technology involved alterations to the mixed reality environments.

As discovered in the study, when the participants interacted with the two first mixed reality scenes (*empowering silhouettes* and *embodied movement*), they produced a more extensive spectrum of actions in comparison to the last one (*fantasy world*). In this last scene, participants either focused on their fantasy or the virtual falling shapes. Both elements were disconnected because the arbitrary falling shapes were not related to their fantasies; thus, the digital environment promoted a limited range of movement compared to the other scenes.

Furthermore, the final mixed reality scene seemed to take the focus away from imagination because participants concentrated on looking at their actual reflection inside the virtual environment. An enhanced workshop narrative could overcome this issue by finding other ways to stimulate imagination without bringing distraction to the self-representation event.

The first mixed reality scene (*empowering silhouettes*) was an effective warm-up to introduce participants to the session. It allowed them to explore the technology without forcing interaction. Similarly, the abstract depiction in the second mixed reality scene (*embodied movement*) appeared attractive to participants, especially the level of response to small gestures, thanks to the trace effect.

Finally, the interactive scenography software could be further developed to avoid minor glitches, like people appearing randomly during other's fantasy performance. The participants accepted this as a co-creation element, but hav-



Figure 5.4: Mixed reality scenes developed for the second redesigned format.

ing complete control over who appears in the virtual environment during the interactions is ideal.

5.4.2 Interactive scenography

The finalised interactive scenography maintained previous functional objectives. However, the software was optimised by transferring all functionalities to the Processing language and eliminating the multiplatform configuration. The implementation of the P5.js library² allowed live control of the Kinect sensor: features such as depth, rescaling and mirroring can be altered during the workshop without the need to communicate with the Isadora software.

In addition to this, the same three mixed reality scenes were kept: *empowering silhouettes* (top left in Figure 5.4), *embodied movement* (top right in Figure 5.4) and *fantasy world* (bottom left in Figure 5.4). Nonetheless, the prototype elements that hindered participants' performance during the study were removed (e.g., the falling shapes in the *fantasy world* environment). For more information about the general Kinect sensor's functionality to generate these mixed reality scenes, please see section 4.4.1, *Interactive scenography prototype*.

Lastly, the workshop's physical setup remained the same because it had already proved full functionality (see Figure 4.3).

²<https://p5js.org/libraries>

5.4.3 Workshop structure

The structure of the workshop was redesigned in accordance with the findings previously discussed. The new format (*phase 3 workshop format*, see Figure 3.8) follows the next stages:

Opening. A performance warm-up technique (*Body hoo-ha*) is used to encourage people to move and interact as a group. One participant improvises a small movement or gesture, and the rest has to copy it one by one. The **empowering silhouettes** scene is running in the background, and people begin to catch glimpses of their own movements on the screen, but participants are not asked to interact with it directly.

Impulses work. Participants are invited to engage with the **empowering silhouettes** scene. This displays participants as abstract body silhouettes and falling circular shapes that they can stop from falling, pushing or moving around the two-dimensional space. The aim is to familiarise them with the movement-based interaction without requiring explicit instruction. The body silhouettes provide a simple representation that does not directly signal the identity of a participant; instead, they discover this by moving to control the shapes (Figure 5.4, top left).

Embodied fantasy. Participants are asked to imagine where they would like to be now and what they would like to do: their own fantasy. Then, their ideas are embodied by performing a signature gesture or body movement that represents their wish. The **embodied movement** scene consists of a point cloud silhouette that emphasises body motions by leaving a slight movement trace. This is designed to enhance awareness of movement possibilities and enables group interaction to create collective fantasies (Figure 5.4, top right).

Fantasy world. Participants see themselves immersed into their fantasy place by playing with the **fantasy world** scene, which uses a stock picture of the participant's fantasy environment (i.e. beach, football pitch) and places them in the picture using a now recognisable RGB representation with a slight movement trace as well. They are encouraged to perform the signature gesture or movement developed in the previous stage and to improvise further on it (Figure 5.4, bottom left).

Self-portrait. In the last stage, participants are offered the possibility of posing for their picture immersed in their **fantasy world** scene. The portraits are printed into postcards tagged with *Wish you were here*, and given to participants as a *take-away* (Figure 5.4, bottom right).

5.4.4 Technical specifications

Table 5.4 shows the technical specifications of the workshop when implementing the interactive scenography.

The stock offline photography library was still used. However, due to the imaginative nature of the participants, there is a need to access alternative internet sources to find pictures of fantasy places that might not be in the offline library.

Table 5.4: Technical specifications for the Interactive Scenography

Company Equipment	Required from Venue
* Kinect sensor * Mac Book Pro running Processing * Cables to connect and power the system * Printer, ink and photography paper	* Large monitor with either VGA or HDMI input (50+ inches) * 20 - 25 Chairs * x1 small table (1m x 1m ideal) * Mobile phone with internet access

Exploring imagination and embodied experience

Guided by the first study's findings and subsequent redesign of the Green Screening workshop's format, this chapter presents the second research study. This study explores participants' enactment, imagination and embodied experience during the workshop. The chapter discusses the project's design iteration corresponding to the *Phase 3: Design for enactment and imagination* (section 3.4.3).

The study took place with two Stroke Association support groups in North West England. Informed by the methods discussed in Chapter 3, the redesigned format was tested, and participants' experiences were captured through different data collection techniques. A detailed description of the methodological approach, data analysis and study findings is presented in the following sections.

6.1 Study methodology

This study seeks to answer the following research questions.

- What are the effects of embodying fantasies in front of a group of peers in a stroke community context?
- What are the effects of observing another participant enacting fantasy worlds in that same context?

The second format was examined through the participants' experience and feedback, as well as the group coordinators' observations. This allowed to

further understand embodiment processes kindled by the workshop's performance methodologies and technology, as well as how these shape the participants' experience.

Two Stroke Association support groups from North West England participated in this study. Each of them attended a Green Screening workshop session and a follow-up session delivered by an external evaluator. In addition, a written questionnaire was completed by both group coordinators.

Findings are presented as a set of category clusters: body movement while performing in front of the group; imagination and embodiment resources detected in each participant's performance; audience engagement during the session; and sense of community.

Workshop delivery

The study was conducted in the community centres where the stroke support groups usually meet. A two-hour session was delivered to each group on the 14th and 15th of June 2017, respectively. The sessions used the technical infrastructure and workshop narrative detailed in section 5.4 (see Appendix J for the workshop's setup).

Lois Weaver facilitated the sessions, and Galindo Esparza was the audiovisual technician in charge of the interactive system. The workshop's physical layout was maintained from the previous study (see Figure 4.3). Participant seating was placed in a horseshoe shape in front of the interactive scenography; enough space was cleared in the middle as the performance area. Carers and the group coordinators also attended the session to support participants with any communication or movement difficulty. At the end of the session, stroke survivors received their printed postcards.

Follow-up session

One week after the workshop, each group attended a follow-up session conducted by an external evaluator. The sessions took place on the 21st and 22nd of June 2017. Each session lasted up to 30 minutes; once again, carers and group coordinators were also present. Before the meeting, the interactive scenography was set in the space again. Once the interview concluded, the tech specialist joined the session and invited the participants to play freely with the scenography.

Questionnaire for group coordinators

To conclude the study, a questionnaire was applied to both stroke support group coordinators in June 2017. The rationale for this final step is that coordinators actively engage with each participant's circumstances and have seen the group collaborating in different environments and activities.

6.1.1 Role of the researcher

As in the previous study, Galindo Esparza was involved in this research study as the workshop audiovisual technician for this particular stage. Embedded as a participant/observer (Mack et al. 2005), she was able to become an active member of the group. At the same time, she gathered information about the workshop's process from an embodied approach. Her research prompts in this stage were guided by this study's research questions.

Other multidisciplinary team members involved in this study were Lois Weaver as the workshop facilitator ¹, Patrick Healey observed the sessions, and Hannah Maxwell acted as the external evaluator. They all provided observation notes in subsequent design meetings to inform future format redesigns.

6.1.2 Participants

A total of 21 adults participated in the study across two Green Screening workshops. All participants were members of the Stroke Association support groups; a breakdown of demographic data is given in Table 6.1. The contact with them was established through the Regional Director of the Stroke Association (North West section, UK).

Table 6.1: Participant demographics (second research study).

Workshop	Total	Women	Men	Mobility Support	Follow-up Total
W1	10	6	4	4 - walking stick 2 - wheelchair 1 - moving assistance	7
W2	11	5	6	3 - walking stick 1 - wheelchair	7

¹At the time this study was carried out, Peggy Shaw was not in the UK.

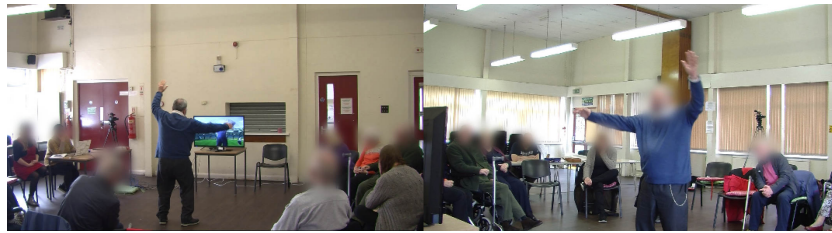


Figure 6.1: Footage of a workshop session.

6.1.3 Ethical considerations

The study gained clearance from the Queen Mary Ethics of Research Committee at Queen Mary University of London (reference number: QMERC2016/42). All participants provided signed informed consent; they were not paid for their involvement and did not receive another type of incentive (see Appendix C for the Ethical Approval). Data collection, from the first workshop to the final questionnaire application, ran from the 14th of March to the 26th of June 2017.

Overall, the stroke support group members were invited to the study a few weeks before the first session. On the day, participants were reminded that the meeting would be filmed for research purposes and signed the consent forms. Before the follow-up sessions started, participants were informed that the interview would be audio-recorded for research purposes. Please refer to section 3.5.2, *Ethical considerations* for more information about this thesis' ethical approach.

6.1.4 Data collection

The main data collection approach adopted in this research was participant observation and semi-structured group interviews. The methodology involved filming both workshops and a follow-up session with each group (led by an external evaluator) to gather qualitative data about the participants' experience. The four sessions were distributed in two weeks. Finally, a written questionnaire was applied to the stroke group coordinators.

The workshop sessions were filmed with two cameras, one at the back of the room and the other at the front. By matching the videos, it was possible to observe the participants' reactions when performing with the interactive scenography and the whole audience engaging in the workshop. Having two videos of each session enabled to grasp more information about each participant's embodied actions and engagement (Figure 6.1).

For the follow-up meeting, a series of questions were elaborated to scrutinise participants' feedback about their experience during the workshop (see Appendix E for the list of questions and potential follow-ups). The questions were applied as a semi-structured group interview; unfortunately, a few participants were not able to attend this session (see Follow-up total in Table 6.1).

The participants' answers during this second session complemented the first session's findings. The follow-up meetings were filmed using one camera at the back to avoid intimidating the participants when speaking with the external evaluator. For the data analysis, only the audio was collected.

Finally, a questionnaire for the group coordinators was designed to reflect upon the workshop results (see Appendix F for questionnaire). Post-workshop contact with the group coordinators was established via email. Questionnaires were sent to them, asking them to provide more information about the perceived effects of the workshop's interactive guided process. The answered questionnaires were returned a few days later via email.

Data analysis

Data analysis focused on four issues: use of embodied imagination, fantasy content, role of real-time visualisations, and audience involvement. Analysis followed three phases. Firstly, the workshop's footage was reviewed for responses to the performance methods applied during the workshop, both individually and as a group. Secondly, the audio recording of the follow-up sessions was transcribed using ELAN (Figure 6.2).

The participant's feedback was organised into categories of satisfaction to analyse positive and negative feedback, novelty, and achievement. Along with this information, the external evaluator's notes were used to cross-check the

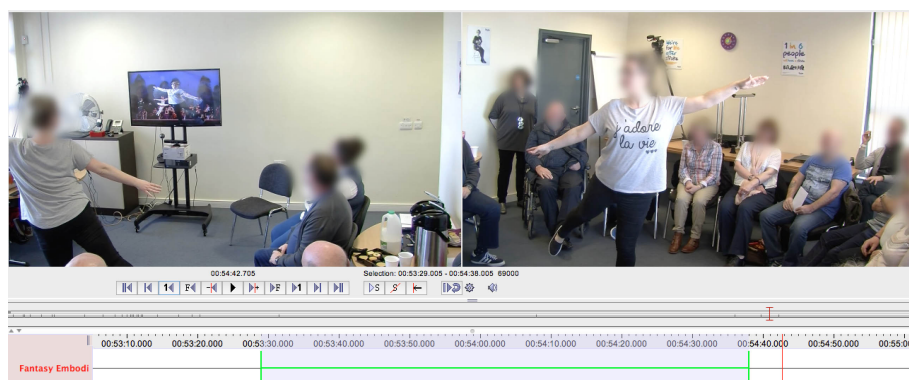


Figure 6.2: Video annotation in ELAN.

comments. Finally, the questionnaire answers were organised into the same categories of satisfaction, as well as comments from the group coordinators.

Documentation limitations

The follow-up session was filmed with a single camera at the back of the room. This allowed to gather the participant's verbal contributions and to observe their free interactions with the interactive scenography at the end of the session. However, due to technical difficulties, the audio of the second follow-up session was corrupted and could not be extracted for data analysis. In this case, only the external evaluator's report was used to integrate feedback about these participants' experiences.

6.2 Findings

The aim of the following discussion is to examine elements such as fantasy content, real-time visualisations and audience engagement to study how they shape the participants' experience.

The basic participant demographics are provided in Table 6.1. Both groups were of similar size and included a diverse range of stroke effects for each individual. Furthermore, there was a relatively large spread of ages, and both groups were mixed gender. The group that included a slightly older age range was the group with a larger number of people using walking aids (W1, Table 6.1).

In addition to individual therapy treatments, participants stated that they mainly attended small group activities focused on socialising (like stroke clubs) and artistic activities (e.g., choir) to support their recovery. These activities usually involve peer stroke survivors and, sometimes, spouses or carers.

A number of key categories emerged from the qualitative analysis:

6.2.1 Body movement

At the start of the workshop, participants approached the interactive scenography with diverse attitudes towards it. Most participants explored movement with their upper body, pushing and moving the digital falling shapes around the scene. Some participants performed quick interactions that were not too exploratory. In contrast, others focused on further exploration, like discovering they could kick the falling shapes or *pop the bubbles* when clapping.

One of the participants displayed a more experimental interaction with the mixed reality environment. He commented that pressing the falling circles felt

like *PacMan*. He then mentioned that he was trying only to get the purple circles, and realised that he was not able to keep the circles on his hands and asked *"Can you actually grab them?"* (referring to his abstract silhouette grabbing the virtual falling shapes) while trying to do it. He then moved his right arm in circles rapidly, and once he was done interacting with the shapes, he paid closer attention to his silhouette and commented *"Look how thin my arms look!"*.

Even though such attention was not a generalised approach at the start of the workshop, the participant's range of movement increased considerably from the first stage to the last one. By the time they interacted with the last scene (see Figure 5.4, bottom pictures), most participants had moved more around the space and employed their whole body to embody fantasies.

For instance, a participant in a wheelchair (P18) showed minimal movement and appeared not to understand what was going on during the first stage. However, during the last stage, she abstractly embodied her fantasy: she was a figure ice skater spinning, but since she could not turn due to her wheelchair, she raised her right arm with a finger pointing to the ceiling and spun it. This simple embodied movement that she repeated for a long time was compelling enough for her to enact her fantasy storyline.

The workshop encouraged people to move beyond their limits because they were focused on animating real-time visualisations, which interacted with the storyline they developed. One of the participants stated:

The only thing that I realised back sitting, watching the stuff from the screen - which I found beneficial - is that when you've got a side of your body that does not work properly, which is often the case with stroke, that by trying to move it to the reaction: touch the bubbles and the balls, you could actually see quite clearly that you can do things with the stiff side [...] The realisation that if you keep trying, it can get a little bit better.

The fact that the communication was body movement-driven also appeared to help participants with speech limitations express their ideas. For instance, one of the participants with aphasia produced a robust set of gestures to enact her fantasy (P4); this sets the storyline for the audience, who then helped to narrate the actions, and it was one of the more striking performances during the *fantasy world* stage.

A group coordinator commented on the strength of these responses:

I saw people very animated and moving out of their usual restricted area of movement, throwing away aids and standing unaided and overreaching.

However, participants did not like the fact that it was only a session and were expecting more opportunities to interact with the system, which suggests that they did not fully explore their ideas and embodied resources during the sessions.

Furthermore, the technology had some glitches that caused unexpected digital effects. Most participants integrated such glitches into their performance. However, participants using walking aids felt frustrated because they did not understand if it was their own mistake or felt they could not move as much for the system to detect them. Such technology issues could be fixed for future iterations.

6.2.2 Imagination and embodiment

Once the participants had warmed up to the performance methods and the interactive technology, the following stages of the workshop focused on generating fantasy actions and places. Table 6.2 summarises the fantasies and places that participants generated during the workshop.

Table 6.2: Participants' fantasies.

	Fantasy Action	Fantasy Place
P1	Ballerina	Big theatre
P2	Singer	Wembley Stadium
P3	Chief constable	Goodison Park
P4	Punk dancer	70's club
P5	Swimmer with dolphins	Caribbean sea
P6	Footballer	Liverpool Football field
P7	Guitar player/singer	Big arena
P8	Parachute jumper	Airplane
P9	Shark diver	Sea
P10	Train driver	Old locomotive
P11	Drummer player	Wembley Stadium
P12	Races spectator	Velodrome
P13	Cyclist	Cycling arena
P14	Prima ballerina	Covent Garden
P15	Drummer	Concert hall
P16	Footballer	Manchester football field
P17	Singer and song writer	Concert hall
P18	Figure ice skater	Frozen river
P19	Singer	Concert hall
P20	Horse rider	Sandy beach
P21	Skiing	Snow

Before interacting with the *embodied movement* mixed reality scene (see Figure 6.3), participants shared their fantasy action and fantasy place with the rest



Figure 6.3: Participant exploring gestures to embody her fantasy.

of the group. Once confronted with the interactive scenography, the visual effects promoted a more in-depth exploration of these ideas. At this point, participants had a clearer idea of the movements they could use and engaged their whole body in action or as much as their movement possibilities allowed them. For instance, one of the participants (P19) performed an arm gesture imitating an orchestra director while she sang, and then she took a bow with her head.

The scenes in the *embodied movement* scene display the participants as a white point-cloud figure on a black background with a visual lag that leaves movement traces on the screen, designed to emphasise movement dynamics. The repetition of gestures during this stage stimulated body movement and, with it, an embodiment of their imagination. During the follow-up session, some of them recounted having moved more than usual when concentrating on the storyline they were creating. For instance, one participant composed a whole story about swimming and communicating with dolphins (P5). She added a gesture to each part of the story and explained that she connected her fantasy with previous life memories.

Participants also employed sound resources to express the storyline they were crafting, like the neigh of a horse or a *swish* while skiing. When one of them fantasised about being a figure skater (P18) and entered the performing area humming a song, the rest of the participants joined in the humming. As previously mentioned, because she was in a wheelchair and with limited movement possibilities, she lifted her right arm with the index finger pointed to the ceiling and spun it around, explaining that it represented her doing a full-body spinning; she then increased the speed of the movement while saying:

I'm spinning around... I'm spinning around... and now I'm dizzy.

While some participants repeated the same gestures and movements in the *fantasy world* stage, others tried new options. However, those who employed the same movements did make changes by repeating more times or adding some explanation of what was going on in their fantasy storyline. Participants who tried new movements were often motivated by the audience, who provided some direction of what was going on. For example, when one participant was performing skiing (P21), another appeared in his virtual environment (P16). Although this was unintentional, it prompted an improvisation in the storyline, suggesting he ski faster because the intruding head was following him on a train.

For the group coordinators, the participant's most enjoyable aspect of the workshop was the prompt to elaborate on fantasy experiences:

They really enjoyed the aspect of being screenshot into experiences they would never have the opportunity to try out, e.g. pop star.

And fantasy places:

Using their imagination to put themselves in a place they would probably not be able to be in 'real life'.

6.2.3 Audience engagement

As an audience, the participants were engaged with each performance and the more complex it was, the more they clapped and cheered. Because they know each other from previous meetings, they would cheer participants when they knew that they were taking risks with their movements; one participant started with small movements to embody a *prima ballerina* (P14), but eventually tried a complete turn to obtain more claps from the group. The participants were an engaged audience when observing the fantasy performances. They were surprised every time somebody discovered a new gesture or an interactive effect.

Engagement and co-creation of meaning were especially evident when one audience member suggested a movement idea and the performer enacted it (see Figure 6.4). The first evidence of collective storyline development potential was found when one participant (P9) included another peer in his interaction when trying to collect all of the falling shapes with one arm and then pretend to throw them at someone else (P5) sitting close to him. She played along and commented to him "*You missed!*".

Laughter and cheers also were used to demonstrate approval. When participants liked somebody's idea, they provided clear overt responses. Furthermore, when the audience demonstrated engagement with a performer, this



Figure 6.4: Collaborative interactions during the performance.

tended to extend the performance. Findings suggest that enacting fantasies in front of a group was the most enjoyable aspect for the participants. One participant (P19) mentioned that this had been the most enjoyable aspect for her because she takes singing and dance lessons during the week. She declared that moving in front of the interactive scenography was similar to her dancing lessons. Furthermore, performing in front of the audience permitted her to show her artistic skills. Overall, participants expressed their enjoyment in seeing each other perform and succeed in their interactions with the technology:

I think that one of the nicest things is the ability to stop your inhibitions from stopping you from doing something. [...] each of us was willing to stand up in front of other people. And risk feeling embarrassment, ridicule [...] And I think in a group session that'd be better than on your own at home, to be honest with you.

6.2.4 Sense of community

The workshop is a group activity, and peer presence, perhaps surprisingly, appears reassuring and stimulating (rather than inhibiting) to performance in this context. After the follow-up session, the external evaluator also reported that the project successfully tapped into existing group dynamics and the encouragement and empathy shared between members in this kind of support group. Participants expressed their enjoyment in seeing each other perform and succeed in their interactions with the technology. As they see each other fortnightly, they are well-placed to notice positive responses and improvements in motility.

You do it then, but you don't do things on your own. It gives you that sort of discipline, you know, it gives you a reason.

Participants liked to perform their fantasies. They were happy to share it with their peers and to create a collaborative storyline. One participant recalls:

I enjoyed it because it was something that no one had asked you before: would you like to have done this if you could?.

Others used the activity as a jumping-off point to discuss an aspect of their personal history, dreams or ambitions. The groups agreed that the communal aspect of the experience was paramount; it made them realise how connected they felt as a group already, given this opportunity to support each other as they performed and to trust everyone to support them when it was their turn.

Overall, socialisation seemed core to people's activities. Across the two groups, participants mentioned similar support groups, lunches with friends, visiting family, going to the pub and football games, and joining choirs and art clubs as crucial parts of their weekly recovery activity, all social events. When a carer suggested how the technology could be used to encourage exercise and physiotherapy at home, several participants quickly argued that doing the activities alone would not be the same. Furthermore, one of the groups (W1) agreed that the workshop would have been very different if they had been a group of strangers, they would have been much more reticent about getting up and engaging in the activities.

6.2.5 Interactive technology potential

Stroke group coordinators noted that this was the first digital activity participants had done during the group meetings and attributed at least some of the experience's enjoyment due to its novelty. Participants that were not familiar with the technology asked how the system works when confronted with it.

From the semi-structured group discussion, it is clear that this approach is not for everybody. Some participants stated that they preferred *conversation* over performing in front of their peers.

One participant stated: "*Not too much for me,*" when asked if he had enjoyed watching his peers perform. He added that he would have liked to talk more instead. For most participants, it was challenging to interact with a virtual representation on the screen, but after practising, they became familiar with it. Coordinators agreed on this by stating that the most challenging part of the workshop was to stand up in the front and perform.

Asking them to come out of their comfort zone to 'perform' in front of others. I think they were pleased they did though.

However, due to the facilitator and the workshop format, they overcame their fear and were gradually guided to open up more.

The group enjoyed remembering each of their personalised *desire portraits*. There was a consensus that at the beginning of the session, everyone was unsure if they would want to participate but were surprised at how comfortable they felt once they got going. Another participant spoke specifically about being nervous initially, but after spending time engaging in the activities, she felt less self-conscious by the end of the session. This feeling lasted after the group had finished for the day.

6.3 Reflective summary

Although the data cannot support strong causal conclusions, the qualitative analysis provides three convergent lines of evidence that the workshop process had a marked and generally positive effect on participants. It succeeded in creating a stimulating and permissive environment for participants to delve into desire and imaginative creativity and express these in a diverse range of novel verbal and non-verbal performances. Overall, the responses of the participants, group coordinators, and external evaluator were strongly positive. There seem to be several key factors in this.

The experience of articulating personal ambitions and desires in a performative context appears to be successful in opening imaginative possibilities for self-expression (Boal 2008, Harvie & Weaver 2015, Light 2011). These fantasies are produced *for* performance, often collaboratively, and do not represent straightforward expressions of individual desires. However, there is a clear sense of disinhibition and playfulness among the workshop participants.

This desire-led aspect contributed to the distinctiveness of the workshops as a group activity. Participants commented that it was unusual to be given the opportunity to talk about the things they had always wanted to be. This reflects one of the central precepts of this form of participatory performance, which is to engage with people's own experience, an important contrast with more conventional therapeutic interventions.

The critical element was stimulating movement experimentation without making people feel overly self-conscious and without inadvertently foregrounding physical movement problems. The visualisations appear to have contributed to the increased and atypical levels of movement observed in the workshops. This may be due to the novelty of the technology as much as the specifics of the design. However, there are some indications that the abstract, anonymised representations were more successful at encouraging playful movements than the more concrete ones. By engaging with the technological tool, participants' self-perception recalibrated to understand the objective of such instrument (as

suggested by Kirsh 2013): affecting their encounter, engagement and interaction during the session. The freedom to experiment and perform with the interactive system also boosted participants' imagination.

Perhaps the most salient theme emerging from the analysis is the importance of the audience. From the start, people engaged as a group, filling out each other's narratives, jointly producing them and providing supportive feedback through applause and laughter. This is underlined by participants' comments that they would not really be interested in doing it independently. The implication is that it is not the interactive scenography itself that enhances the experience but the way in which it facilitates sharing.

Setting the workshop format into the peer support is a critical element in participants' motivation, confidence and feeling of belonging (Dorning et al. 2016, Sadler et al. 2017, Kessler et al. 2014). This is evident in participants' declarations that they used their postcards as a jumping-off point to discuss an aspect of their personal history, dreams or ambitions with peers, family, and friends.

6.4 Green Screening workshop redesign (Phase 4)

Once the second research study was concluded, the Green Screening workshop went through a new redesign iteration to expand the format into three sessions, with the aim to assess how the interaction affordances would develop over time. This process took place during the Design Lab stage of *Phase 4: Design for peer collaboration*.

6.4.1 Opportunities and implications for design

The findings discussed above led to a number of practical recommendations about the workshop process. Setup and introduction are especially critical. People are understandably nervous about *technology* and *performance*, and the more these elements are talked up, the less comfortable people are participating. Presenting the workshop as *trying out a group video game* would be much more effective and arguably just as accurate. Rooms organised into rows like in a lecture theatre instantly create the wrong expectations about participation. The workshop's optimal seating arrangement is a horseshoe positioned so that people are already in the capture space before the workshop starts. Instead of explicitly introducing the technology, it is much more effective if they discover it for themselves as they come in and sit down.

Although the importance of the process and the technology are emphasised, it was discovered that the facilitator plays an especially critical role.

Facilitators are key to making people feel comfortable, driving and helping with improvisation, managing the transitions between stages and managing the group dynamics (i.e. allowing everyone to contribute). This has implications for how easily this format can be used elsewhere.

This is especially important given that, at least initially, some participants are ambivalent about taking part, and some are anxious about self-expression and sharing personal concerns, or that have had previous experience in the arts, which gives them preconceived ideas about what is expected and whether they are skilled enough to take part.

Overall, the workshop's structure successfully guided fantasy development and enactment and promoted a more comprehensive range of movement linked to the embodiment of complex fantasies. The participatory performance techniques supported by a motion capture system (interactive scenography) stimulate imagination embodiment, movement-based performance, and individual self-awareness. In this matter, the workshop facilitators play a fundamental role in the process. They must guide the narrative and improvise if something changes or the participants are not responding adequately.

In this study, the facilitator was able to craft a workshop structure that bolstered the embodiment potential in the mixed reality scene. However, further research on the impact of particular structures during the Green Screening workshop is necessary. In this regard, another key question is whether the process can be repeated across multiple sessions. This would help to disentangle the effects of novelty, but it seems likely that straight repetition of the fantasy narratives would not be engaging. This is further explored in a third and final study.

As a result, the interactive scenography was further developed to include new mixed reality scenes and updated functions, such as screen and audio recording and a visual photography countdown. The narrative of each session focused on a particular aim:

1. Creating individual fantasies to explore the notions of fantasy and place.
2. Sharing fantasies with their peers to enhance action and interaction with partners and audience. The session fosters group interaction.
3. Expressing outside of the peer group to share ideas and concerns in public. The session analyses the effect of sharing ideas and concerns in public, aiming to impact broader social groups.

Each session is built upon the previous one, repeating key elements of previous sessions and increasing the task's complexity.

6.4.2 Interactive scenography

The interactive scenography kept the functional objectives developed for the second research study. The physical setup was also maintained (see Figure 4.3). Nonetheless, new mixed reality scenes were created for the new sessions; the objective was to avoid repeating the same scenes for all the sessions and fix some of the technical glitches detected during the study.

Gideon Raeburn developed the interactive scenography updates during this phase. The Processing-based software was optimised by updating the Kinect's infrared (IR) and RGB data management to control the sensor's depth in real-time. This allows to adjust the Kinect's performance for different room sizes with more facility; it also permits increasing or decreasing the depth in case participants sit closer or farther from the interactive scenography.

Besides the development of new interactive scenes, the revised interactive scenography also includes a *photography countdown*, so that participants can see an on-screen alert ("3, 2, 1") and have time to pose for the photography. Furthermore, video and sound recording were enabled to preserve more evidence of the performance outputs. Processing libraries used in the code update include OpenKinect, Hamoid and Minim.

6.4.3 Workshop structure

Session No. 1

The first session remains very similar to the workshop structure created for the second study. The main objective is to create a *fantasy postcard* at the end and focus on individual performances. The stages are summarised as follows (a full account of each stage can be found in section 5.4.3):

Opening. Performance warm-up technique (*body hoo-ha*) implemented to start the session.

Impulses work. Participants are invited to engage with the **empowering silhouettes** scene, both individually and as pairs or small groups (Figure 6.5, left picture).

Embodied fantasy. Participants are asked to imagine where they would like to be now and what they would like to do. Then, they embody this fantasy by performing a signature gesture or body movement (Figure 6.5, middle picture).

Fantasy world. Participants see themselves immersed in their fantasy place and further develop storylines (Figure 6.5, right picture).

Self-portrait. In the last stage, participants pose for a picture of themselves in their **fantasy world** scene. The portraits are printed into postcards and given to participants as a *memento* of the experience.

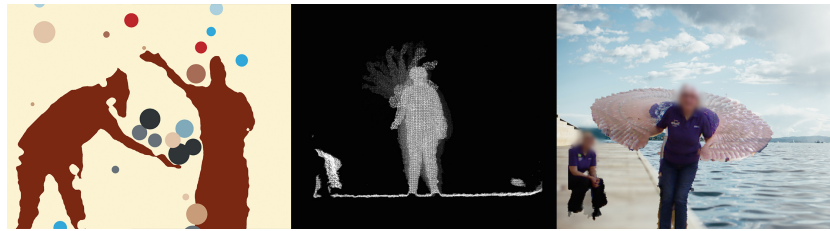


Figure 6.5: Session No. 1 - mixed reality scenes.

Session No. 2

The second session's objective is to share fantasies with peers by creating short performance sketches. Exercises from the first session are repeated and expanded to stimulate further collaboration while performing in front of the interactive scenography.

Participants received their postcards. The facilitator asked them to write them for somebody special in their lives. In this session, the stroke metaphor implemented in the original workshop was implemented. The following stages took place during the workshop:

The icy finger of death. To open the session, the workshop facilitator asks participants to mention something about their stroke (i.e. where it happened, how long ago it happened or what was going on when it took place). Once all the participants have contributed, the concept of a stroke metaphor is introduced. This can be supported by showing the *icy finger of death* video (Peggy's stroke metaphor). Participants then are invited to create their own stroke metaphor and share it with the group (Figure 6.6, left).

Beach ball collaboration. Expanding on the first session's *impulses work* stage, participants are invited to engage with the **empowering silhouettes** scene once more, but this time fostering collective interactions. Subsequently, the **beach ball** scene is presented. Technology displays a big, bouncy circular shape that represents a colourful beach ball. Participants can stop it from falling and throw it at each other in the two-dimensional space. Each time the ball touches the ground, it disappears, and a new one falls from above. The aim is to advance movement-based interactions and encourage play and collaboration (Figure 6.6, middle).

Sharing my fantasy world. Participants are asked to recall their previous session's fantasy. Then they are invited to play with the **fantasy world** scene, with the task to create short sketches with a peer representing someone special in their life, someone with whom they would like to share that experience. The technology displays a stock picture of the participant's fantasy environment



Figure 6.6: Session No. 2 - mixed reality scenes.

(i.e. beach, football pitch). It places them in the picture using the recognisable RGB representation with a slight movement trace as well. The sketches can be recorded for next sessions (Figure 6.6, right).

Postcard writing. To close the session, participants receive a new copy of their postcard and write it for *somebody special* outside of their peer support group (i.e. a family member or a best friend). They hand these postcards back to the workshop facilitator, who will build on the topics for the final session.

Session No. 3

The third session focuses on talking about stroke experiences. The closing objective is to create *public service announcements* inspired by everything the stroke survivors shared during the three sessions. The following stages took place during the workshop:

Warming up. Participants can play with either the **empowering silhouettes** scene (Figure 6.5, left) or the **beach ball** scene (Figure 6.6, middle) to open the session.

Flow. Participants are presented with a new mixed reality scene: the **positive space**; fostering movement experimentation, play and collaboration with other peers. The facilitator will not provide instructions, allowing participants to use diverse movement contributions. The **positive space** scene consists of a dynamic particle silhouette that emphasises body motions by tracing particle flow in different directions. Similar to the **embodied movement** scene from the first session, this scene is designed to enhance awareness of movement possibilities and bolster further experimentation (Figure 6.7, left).

F.A.S.T. Peggy Shaw's public service announcement, *F.A.S.T.* (created for her performance Ruff) is shown to the participants (Figure 6.7, middle). This is an introduction to the final stage.

Public service announcements To close the workshop, participants are invited to create their own public service announcements immersed in their fantasy place using the **fantasy world** scene. They are asked to share messages about



Figure 6.7: Session No. 3 - mixed reality scenes.

what they have overcome, learnt and left behind after their stroke from a positive perspective (Figure 6.7, right).

6.4.4 Technical specifications

The technical specifications were maintained from previous design iterations. These specifications can be found in section 5.4.4, *Technical specifications*.

Exploring personal narratives and audience participation

This chapter presents the third and final research study, which further investigates the potential of imagination, embodied narratives and collective enactment to aid social support in the Green Screening workshop. Accordingly, the project's design iteration corresponding to *Phase 4: Design for peer collaboration* (section 3.4.4) is discussed here.

An extended workshop format (consisting of three sessions) was proposed to investigate participants' performance and interactions over time. Findings from the second research study informed the redesign. Consequently, new performance tasks and an updated version of the interactive scenography were implemented (see section 6.4).

Like previous studies, the process was informed by the methods discussed in chapter 3, *Methodology*. A Stroke Association's support group from South East England participated in the workshop. Their experiences were gathered through different data collection techniques. The following sections will discuss the methodological approach, data analysis and findings.

7.1 Study methodology

This final study aims to explore communication as a means for stroke recovery, as well as the third (extended) format's potential to foster social collaboration in a stroke context. Thus, it aims to answer the following research questions:

- How does collaboration in the Green Screening workshop impact each participant's performance when sharing enacted stories with their peers?

- How do participants' performance and engagement resources evolve over an extended version of the Green Screening workshop?

Accordingly, the format was scrutinised through the participants' experience during each session, the workshop's performance outputs, and feedback gathered by the external evaluator.

The workshop was delivered in the group's community centre from the 18th of April to the 30th of May 2019. The Green Screening format implemented for this study is described in section 6.4, *Green Screening workshop re-design (Phase 4)* (see Appendix K for the workshop's setup).

Lois Weaver facilitated the three sessions, and Peggy Shaw joined as a guest during the last one. Galindo Esparza, as the technician, was in charge of the interactive system and assisted the facilitators when directing participants. The group coordinator, some carers, friends and family members also attended the sessions, a regular practice in their weekly group meetings.

Overall, the workshop's physical layout followed previous studies' guidelines. However, this was impacted by the room's shape and the number of attendants. In addition, some people preferred to become a passive audience sitting at tables behind the participants (see Figure 7.2). At the end of the first and second sessions, stroke survivors received printed postcards, and at the end of the third session, they recorded *public service announcements* for the general stroke community.

Findings are presented as a set of key categories: performance experience and method adaptability; embodied narratives: self-presentation and imagination; engagement, participation and collective enactment; communication as a means for recovery; sense of community; and methodological tensions.

7.1.1 Role of the researcher

The author of this thesis continued her involvement in this final research study as a participant/observer. During this stage, she was the workshop's audio-visual technician and supported the facilitators as a participant. The prompts that guided her information collection were based on the study's research questions and the suitability of the interactive scenography to provide a wider variety of mixed reality scenes. Description of other people involved in this research study can be found in section 3.4.4.

7.1.2 Participants

Gaining access to a new group from the Stroke Association was more complicated for this final study. Multiple factors played a role in this. For in-

stance, the workshop's length suggested a more serious commitment from the group. Coordinating the group's schedule (planned six months in advance) with Split Britches' available time in the UK was also challenging. Moreover, the Stroke Association had set in place a bigger number of gatekeepers for research projects. It was found that a more engaging narrative was required to communicate the project's principles; academic and scientific language seemed to discourage stroke survivors and their gatekeepers (group coordinators and managers from the Stroke Association).

For this reason, the project was first pitched to local officers and group coordinators (also stroke survivors). Weaver, Galindo Esparza and Healey presented the project and an interactive scenography demo at the Association's headquarters in Kent. During the conversation, it was found that the most favourable project's description in this context was a *video game* (instead of drama or performance workshop) that encourages gentle, fun movement and community play during group sessions. The demo also helped stakeholders confirm accessibility requirements. Officers, in particular, confirmed that the workshop would not involve dangerous practices and that the stroke survivors would benefit from getting involved. Group coordinators also confirmed that they did not require a sophisticated space to carry out the workshop and that no fees were involved.

A stroke support group from the Stroke Association (South East England) decided to join the study from this pitching session. A total of 26 adults attended at least one of the three workshop sessions. From this number, only 4 participants were fully involved in the three sessions; a breakdown of demographic data is given in Tables 7.1 and 7.2.

Table 7.1: Participant demographics (third research study).

	Total	Women	Men	Mobility Support
Workshop (all sessions)	26	11	15	3 - walking stick 1 - movement assistance 1 - wheelchair
Session 1	17	6	11	3 - walking stick 1 - movement assistance
Session 2	14	7	7	1 - walking stick 1 - wheelchair
Session 3	15	6	9	2 - walking stick 1 - wheelchair

In addition to group's meetings, the group coordinator mentioned that several members used to be physically active before their stroke (i.e. cycling), and he considered the workshop's approach would be a good fit for them.

Table 7.2: Demographic data of participants that attended the three sessions (full workshop).

No. Sessions	Total	Women	Men	Mobility Support
3 sessions	4	1	3	1 - walking stick

7.1.3 Ethical considerations

Approval for this study was provided by the Queen Mary Ethics of Research Committee at Queen Mary University of London (date of approval: 09.10.2018; reference QMERC2018/53). The ethics clearance was effective before conducting the second research study (presented in chapter 6), and it accounted for all the corresponding studies carried out until the 9th of October 2020.

Members of the stroke support group were invited to participate in this study by the group coordinator in advance. As previously mentioned, communication with the group coordinator was established a few months before, when the Green Screening workshop was pitched.

The study participants signed informed consent; they were not paid for their involvement and did not receive another type of incentive (see Appendix C for the Ethical Approval). Data collection was carried out during the workshop sessions. More information about this project's ethical guidelines is available in section 3.5.2, *Ethical considerations*.

7.1.4 Data collection and analysis

Data collection consisted of participant observation during the workshop, filming their performative contributions and recording of performance outputs (*wish you were here* postcards and *public service announcements*). The three sessions were filmed with two cameras: one at the front and the other at the back of the room (see Figure 7.1). Having two videos of each session permitted to gather more information about general engagement and each participant's embodied actions.



Figure 7.1: Front camera footage.

A follow-up approach at the end of the third session was also implemented. The external evaluator conducted semi-structured individual interviews with six volunteering participants (four men and two women), collecting qualitative data about their experience (see Appendix G for the feedback session guidelines).

The video data and interviews were transcribed and coded into categories that emerged from the data exploration, seeking to answer the research questions under a double scope: the participatory performance guidelines for community support and the design rationale. The process was informed by conventional qualitative content analysis (Hsieh & Shannon 2005) and audience research methodology (Breel 2015).

7.2 Findings

The following categories are discussed below: performance experience and method adaptability; embodied narratives: self-presentation and imagination; engagement, participation and collective enactment; communication as a means for recovery; resistance; sense of community; and methodological tensions. It was particularly interesting to examine how these elements shape social collaboration and communication in a stroke context.

The stroke support group participating in this study generally has many weekly attendants (twenty-five on average). Their meetings are informal social gatherings for stroke survivors; friends, family and carers are also welcome.

The community centre hosting the group allocated a long rectangle-shaped room with multiple tables and chairs. As one participant explained, attendants mostly sit around the tables to drink tea, play board games and chat with their peers, similar to Lois Weaver's *care cafés* (see 3.3.3).

We just sit at a table and have tea, and I do a crossword every week with a couple of people in the table. It has that sharing side, talking a bit.

During the study, it was also noted that a few made arts and crafts, read the newspaper or dropped in and out of the room at their discretion.

When carrying out the study, the workshop sessions were flexible, and group members did not have to commit to attending the three sessions. They were also free to participate in the activities or stay at the tables chatting with other peers (becoming a passive audience). The group's coordinator suggested that a flexible format was more likely to succeed. For this reason, only a few tables at one end of the room were replaced by the workshop's layout (see Figure 7.2).

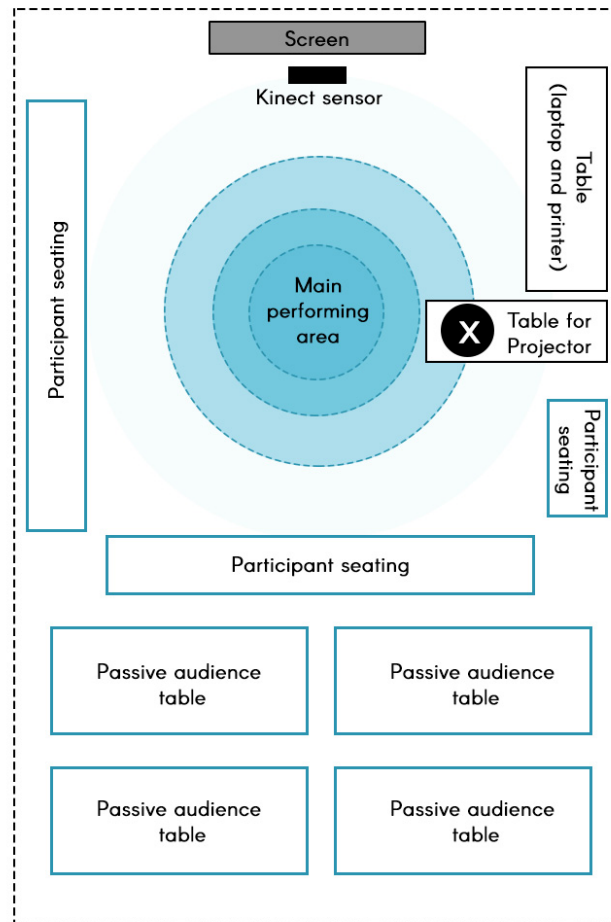


Figure 7.2: Green screening workshop setup for the third study. Tables were included at the back for passive audience.

Each workshop session had a different number of participants, ranging from fourteen to seventeen. The participant demographics are provided in Table 7.1. They presented a diverse range and degree of stroke effects, such as speech and movement issues. The group was mixed gender and mostly integrated by older adults. Only three participants attended the entire workshop (Table 7.2). It is worth noting that other five participants could not attend the first session but committed to the rest of the workshop (second and third sessions). Furthermore, four participants attended the first session and returned for the third and last session.

7.2.1 Performance experience and method adaptability

This workshop format was redesigned to implement performance techniques consistently throughout the sessions. Like previous versions, body movement and imagination elements are keystones to constructing self-presentation and social positioning pathways. Section 6.4 describes the planned structure for an expanded format in detail. In summary, each session focused on a particular aim and produced a specific performance output:

1. *Session 1*: Creating individual fantasies imprinted on a *wish you were here* postcard.
2. *Session 2*: Sharing fantasies with peers to foster social collaboration by performing fantasy sketches in pairs.
3. *Session 3*: Expressing ideas and concerns outside of the peer group by creating individual *public service announcements*.

Despite different aims, each session followed a similar structure: warm-up, main activities and closure. However, the structure planned during the design meetings with the multidisciplinary team (see section 6.4) transformed as a response to the participant's attitudes, level of engagement and available resources.

Table 7.3 shows the resulting workshop structure; it highlights which activities were conversational (*Talking*) or movement-based (*Moving*) and which ones were supported by a specific mixed reality scene (*Tech support* and *XR scene*). As can be perceived, sessions seem strongly focused on warming-up activities, which are usually movement-based and supported by the interactive scenography. However, these were short in contrast to the main integrative activities, which lasted longer. Furthermore, some planned activities were not implemented due to time restrictions (such as *fantasy world* in session one),

Table 7.3: Extended workshop's structure during the third study.

Session No.	Stage	Talking	Moving	Tech support	XR scene
1	Warm-up				
	Introductions	x			
	Body hoo-ha		x		
	Impulses work		x	x	Empowering silhouettes
	Main				
	Embodied fantasy	x	x	x	Embodied movement
	Closure				
	Self-portrait		x	x	Fantasy world
2	Warm-up				
	Stroke metaphors	x			
	Impulses work		x	x	Empowering silhouettes
	Beach ball collaboration		x	x	Beach ball
	Main				
	Sharing my fantasy world	x	x	x	Fantasy world
	Closure				
	Postcard writing	x			
3	Warm-up				
	Introducing PSA	x			
	Body hoo-ha		x		
	Impulses work		x	x	Empowering silhouettes
	Beach ball collaboration		x	x	Beach ball
	Flow		x	x	Positive space
	Main				
	F.A.S.T.	x		x	Peggy's public service announcement
	Closure				
	Public service announcement	x	x	x	Fantasy world

and others were adjusted (such as introducing the *public service announcements* at the start of session three and then retaking them for the closure).

Another example of these alterations relates to the space's configuration, which was planned as the usual horseshoe-shaped row of chairs with the interactive scenography placed at the front of the room (see Figure 4.3). How-

ever, before the first session, the group coordinator suggested that forcing a different room structure could discourage participation. The setup plan was then adapted, and the café-like tables were maintained in the room. Once the session started, it was quickly noticed that asking stroke survivors to stand up from the tables and move to the front of the room each time would not be practical and entailed potential hazards (i.e. tripping or losing balance). Before introducing the next activity, a horseshoe-shaped row of chairs was placed at the front for people interested in participating; this shape allowed them to see each other's emotions and reactions (Van der Kolk 2014). From the second session, this new layout (mixing tables and front row chairs) was kept as the most effective space configuration (see Figure 7.2).

Adaptation of performance methodologies was also detected through the sessions. In contrast to previous redesigned formats, this study's *warm-up* activities combined a conversational approach with movement-based activities to engage participants and focus their attention. This was not planned during the design meetings; instead, it was proposed by the facilitator as the sessions developed. In the first session, for instance, Lois moved towards the participants and asked them to talk about themselves instead of suggesting to sit at the front of the room straightway:

I know that [the group coordinator] said that you will be coming to me. Now, I'm having a good look at all of you, and I'm thinking that you're not gonna do that. So I'm gonna come to you. And we'll start by me coming to you, and then maybe some of you'll get up and do something with me.

Thus, the opening included conversations about participants' self-presentation (first session), their stroke metaphors (second session) and public service announcements (third session). This strategy allowed to encounter participants in a familiar environment and move forward from that starting point.

Body movement is necessary to enact and embody ideas during the workshop. In previous studies, some mixed reality scenes were used to warm-up participants directly using the technology. Nonetheless, this study gradually introduced movement-based activities during the first session.

The first exercise was *body hoo-ha*, defined as "*simple movement that comes from you, not drama exercises*"; Lois explained that one person at a time should propose a gesture and a sound, and the rest of the group would copy it. Participants first played while sitting down, without using the interactive scenography; then, the facilitator asked them to stand up in their place for a second round. Finally, she transformed the activity into passing an imaginary ball around the room, subsequently introducing them to the first mixed reality scene (*empowering silhouettes*).



Figure 7.3: Workshop facilitator inviting participants to join in the *body hoo-ha* activity.

Many participants joined this series of exercises, although some others did not. One participant, for instance, repeated the sounds but firmly held his walking stick (which Lois had kicked to the floor by mistake five minutes before). He and the rest of the people at his table repeated the gestures only when the facilitator approached the table. Another participant was sitting backwards and did not join any activity (Figure 7.3).

This gradual introduction of movement was inconsistent throughout the sessions. In the second session, participants were directly asked to sit in the front row after the conversational opening (stroke metaphors), perhaps because the room's layout was set up from the beginning. In contrast, the third session intended to start directly with a movement-based exercise, but it was somebody's birthday and participants were eating cake at the tables. The facilitator adapted the structure and, instead, asked them to talk about advice and lessons learned through their stroke while finishing the cake.

The workshop's main activities centred around fantasy performance supported by the interactive scenography. The aim was to generate fantasies, metaphors or storylines while embodying ideas through gestures or movement. However, the facilitator reassured participants that this was not a drama workshop and they would not be asked to do things that were not available to them:

And now what I wanna do is just a little bit of movement because most of what we are doing today involves some movement, but not much. And it is based on drama workshops, drama classes, but we are not literally gonna be doing drama, so don't worry, don't be scared. It's going to be simple movement, and it's going to be movement that just comes from you.



Figure 7.4: Participants interacting with the mixed reality scenes, warming-up to the technology.

Although all movement was outlined as performative when designing this format, the activities were split into two streams during the study: creative physical activity and performative movement. Creative physical activity does not have a specific narrative intention; instead, it refers to the free movement experimentation responding to the workshop's digital environment; for instance, exploring how to stop the shapes from falling in the *empowering silhouettes* scene or how to pass the ball to each other in the *beach ball* scene.

When playing with the falling shapes in the first session, most participants used their upper body: one or two arms. Some of them used the opposite arm to hold mobility items. Some others used only one arm because they were imitating a peer performing by their side. Full-body experimentation was rare, but it happened in a participant that joined all the session's activities.

During the second and third sessions, more movement experimentation was perceived in returning participants and newcomers. For instance, a returning participant stood alone in front of the interactive scenography, holding her walking stick. She only used one hand to interact with the virtual beach ball; compared to her performance in the previous session, she added small body bounces and rotated her torso to push the ball. In the same session, another participant was new to the workshop. At first, he thought he could not perform because he was in a wheelchair; the facilitator explained that this was possible. He then used his upper body to interact with the digital environment and seemed to enjoy his first experience. His partner stood behind him, helping him raise his left arm so he could experience new movements (Figure 7.4).

By the final session, physical movement was more progressive. For example, the participant using a wheelchair returned to this session intending to perform while standing up (with the help of a walker). Another participant who was insecure during the first session now approached the performance area confidently; he attended the three sessions. At this stage, he understood *the rules of the game* and performed more openly in front of his peers.

The observations of evolution in levels of physical movement are suggestive but cannot support a broader generalisation. Few participants engaged in multiple sessions. In general, most participants had few opportunities to explore and follow up with the activities. More people were present but did not want to perform in front of the group; hence, this creative physical movement development account is limited. Furthermore, it is essential to indicate that the evolution is not solely focused on free, grand body movement in stroke survivors, which often was limited. Instead, it is based on how participants performed before others and visualised themselves in the mixed reality environment.

In summary, three important factors altered the session's structure and participation opportunities: participants' number, willingness to engage in an out-of-the-ordinary activity, and room layout. The facilitator implemented different strategies to engage participants and motivate them to move around the space. As previously described, the workshop was initiated with participants seated around the tables, and they seemed comfortable doing this. One of the key challenges detected in this study was motivating them to stand up (or engage), move, and perform.

7.2.2 Embodied narratives: self-presentation and imagination

As previously proposed, body movement and imagination are key elements in the workshop's ethos. They guide the construction of creative physical activity, discussed above, and performative movement.

Performative movement refers to movement guided by fantasy enactment; Weaver's techniques foster the transformation of self-perception through desire and fantasy. Participants think ahead in their lives while creating associations from stroke challenges and disruptions. This type of movement was first detected when participants were asked to perform a gesture or small movement inspired by a fantasy (i.e. swinging an imaginary golf club, pretending to type in a computer or singing enthusiastically like a soprano) or a stroke metaphor (i.e. a very sharp knife or panic in an aeroplane). Table 7.4 shows the imagery shared during the sessions; it includes only the participants that engaged in the related activities and produced metaphors or fantasies.

Overall, through the three sessions, it was noted that participants' performance and audience engagement transformed when body movement was used to perform imagery and ideas. In contrast to creative physical movement contributions, many participants focused on exploring body movement based on the action they wanted to perform beyond their usual range of movement.

Table 7.4: Participants' imagery: fantasies and metaphors.

	Fantasy Action	Fantasy Place	Stroke Metaphor
P1	Sing in the choir	Church	<i>no participation</i>
P2	Pamela Anderson's husband	California	<i>no participation</i>
P3	Playing the keyboard	n/a	Empty day in the calendar
P5	Swimming	Pool	Being lifeless
P6	Fly glider	Sky	<i>no participation</i>
P7	Jump out of a plane	Plane	A very sharp knife
P8	Car driver	Race car	Being drunk
P9	Cat keeper	n/a	<i>no participation</i>
P10	Golfer	Golf course in Florida	<i>no participation</i>
P11	Play the piano	Home	<i>no participation</i>
P12	Run a marathon	London marathon	<i>no participation</i>
P13	Play the piano	Home	<i>no participation</i>
P14	Air hostess	Airplane	<i>no participation</i>
P15	NASA scientist	NASA office	<i>no participation</i>
P16	Potter	n/a	<i>no participation</i>
P17	Actor	On stage	<i>no participation</i>
P18	no participation	<i>no participation</i>	Cold wet day
P19	n/a	Hot air balloon	Something very heavy and sad
P20	n/a	Pier	The question Why?
P21	Looking at the boats	Edge of the river	Panic on an aeroplane

In some participants, this was perceived as a physical act; for instance, one participant enacted different swimming types despite holding a walking stick on the other hand. For others, it was displayed as an internal process, like a participant stroking an imaginary cat with tenderness and care. Another participant approached the activity playfully and was interested in connecting with his peers; he seemed motivated by having an audience and shared what song he was pretending to play. As a response, some peers asked if they could sing along (Figure 7.5).

The *embodied movement* (session one) mixed reality scene introduced participants to performative actions based on their fantasies. As an illustration, participants that interacted with the point cloud effect seemed more open to exploring their fantasy, both physically and imaginatively. Some of them used a set of movements that had not been previously produced; they would see their abstract reflection in the mixed reality environment and play with it. At



Figure 7.5: Participant bowing in front of his peers after performing as a musician.

the same time, the rest of the participants became an audience and sometimes included some performative cues like copying other participant's movements in a more sophisticated way.

Fantasy and desire

Imagination to produce embodied narratives was mainly exploited when participants generated individual or collective storylines about their fantasies. This is distinguished in the *embodied fantasy* and *sharing my fantasy world* stages: participants were asked about something they have always wanted to do and a place where they would like to do it.

The activities seek to connect body movement, performative cues and the individual's inner desires. There were multiple inputs (see Table 7.4), most of them unexpected and personal: a golfer and a singer, for instance, refer to things that participants used to do in the past and that they long for; other people thought about things they have never done such as playing the piano at home, jumping from an aeroplane in a parachute or driving a racing car (see Figure 7.6). Most of them focused on actions, apart from one person that wished to be in California with Pamela Anderson and another participant that wanted to be a cat keeper.

While the warming-up activities motivated participants to openly explore their creativity and body movement, during the fantasy activities, they were given specific instructions to perform small gestures representing aspects of their fantasy. At the same time, the interactive scenography displayed them immersed in their fantasy place. Unfortunately, the *fantasy world* stage during session one was not implemented because there was insufficient time. Thus, participants could not explore their fantasy storylines; instead, they only had the opportunity to see themselves immersed in the fantasy place, briefly perform and pose for a picture (similar to the original workshop format). In con-

trast to the second study's findings, in which the *fantasy world* stage delivered the richest performative contributions, here participants maintained the same movement level as in the previous exercise (*embodied fantasy*), and some of them reduced it because the workshop was ending soon.

On the other hand, *sharing my fantasy world* during session two permitted participants to explore body movement and dramatic ideas more profoundly. Furthermore, collaboration allowed a deeper exploration of storylines and personal embodied narratives. During the exercise, fantasies were retaken to include another peer in an individual fantasy. The facilitator suggested that the guest peer play a different person (e.g., a boyfriend, a best friend) in the fantasy. However, most participants preferred to include the actual peer in their fantasy storylines instead of asking them to play a different role (see Figure 7.7). For instance, a participant chose another peer because she knew he was a good swimmer and would enjoy performing with her. Similarly, two other participants asked their spouses to join the fantasy as a way to experience something new together:

Stroke survivor: "It's an experience like nothing before"

Partner: "I love you dear"

Group reaction: "Awwwww!"

Imagery representation is a fundamental aspect of participants' experience. In one case, the wrong picture was used to display a participant's fantasy: he wanted to be in a NASA office and was placed, instead, on the moon. There was no time to change the picture, and he was forced to adapt his fantasy performance. The participant expressed his discontent about the wrong picture but decided to stay in the front and finish his contribution. He attended the following two sessions but did not participate in the workshop anymore, choosing to sit at the back of the room to play board games.



Figure 7.6: Participant performing his fantasy and corresponding mixed reality environment.



Figure 7.7: Participants performing together.

Stroke metaphors

Stroke metaphors were a key element of the original workshop format; but the first study hinted at the potentially negative outcome of working with stroke metaphors when there are not enough narrative resources to transition to a contrasting viewpoint (fantasy). Thus, subsequent redesigned versions removed the exercise. However, it was reintroduced in the expanded format to help participants express the stroke experience in an out-of-the-ordinary way.

My friend Peggy tried to find an image that helped her express what her experience of the stroke was. And she found this video [Lois points at the video on the screen]. This is under the ocean, and this is the surface of the sea. And for some reason, the cold air caused this icicle to form. And this icicle came all the way down to the very bottom of the sea the little crabs at the bottom died. They all just froze. And she thought "That is what happened in my brain when I had a stroke. It's like this icicle came into my brain and just froze little bits of my brain." I wonder, if you think about your experience of having a stroke, what was it like? Could you just come up with a picture? Or an image? Or a kind of weather? Or an atmosphere of what it was like to have a stroke?

Overall it took longer for participants to form these metaphors than it took them to talk about their fantasies. However, the facilitator and other peers helped them shape the idea. Only a few people produced the metaphors quickly. For instance, one of the participants attended the session for the first time; she eagerly narrated how and where she had her stroke, which helped her produce her metaphor (panic on an aeroplane).

It is also worth noting that, when discussing stroke metaphors, nobody talked about well-being, social support or positive aftermaths. Although each participant had a different stroke experience and recovery times, they all talked about loss, confusion or lack of memory about the event.

The smaller number of participants that contributed to this exercise were also attentive to their peers' stories. As a result, the metaphors were an imaginary element that congregated imagination and personal narratives. The exercise elicited conversations about loss, confusion or lack of memory (see the metaphors generated in Table 7.4). The participants that decided to engage in the activity shared their stroke experience willingly. Most of them provided detailed context about their metaphors, describing how and when the incident happened. Other participants could not remember and focused on the loss or confusion they felt when in acute recovery. However, Table 7.4 shows a smaller number of people engaged in this exercise than in fantasy-related activities.

7.2.3 Engagement, participation and collective enactment

Split Britches' participatory performance methodologies deliver a collaborative and participatory approach through inclusive dynamics of conversation. The project's feminist components add a socially engaged approach to exploring social identities and conditions that inform and often constrain people's lived experience. One key element of this performance system is the audience becoming participants and collaborators of the work.

The first evidence of collective enactment happened when a pair was playing with the falling shapes in the *empowering silhouettes* scene. One of the participants reacted to his silhouette touching the other's. Even though their bodies were not touching in reality, he realised he could touch her head in the digital projection and played along, apologising to her jokingly. From that point, both were more conscious of each other's performance; they shaped each other contributions.

Other instances of collaboration took place with the *beach ball collaboration* scene. The pair was attentive to their physical presence and their abstract silhouettes on screen. They worked together the whole time, passing the virtual ball to each other, dancing, and shaking hands and legs. Observing peers were excited: two of them took out their phone cameras to take pictures or film the performance.

Conversely, single-participant interactions in the same scene appeared less compelling. For instance, another participant was unsure what to do and only stood up, watching his silhouette and the beach ball constantly bouncing on his head. Only when his peers cheered him and Lois opened his arms could he play with the ball for a couple of minutes. Peers provided more cheers as a reaction: "Ahhh!" and "Yes!".

Nonetheless, it is essential to point out that each person used their resources differently and performing alone was not an intrinsic limitation. Notably, one



Figure 7.8: Solo performance with active and passive audience fully engaged.

participant also playing with the beach ball was able to experiment and follow some of the facilitator's directions (such as moving around the space to gain more interaction space with the ball). Overall, he was able to go solo. Kicked the ball, frontal and backwards, and danced around, showing off while the audience got excited. His performance stimulated the audience: they "wooded", clapped and laughed. In response, he was motivated to explore his ideas further (Figure 7.8).

Co-direction elements enriched the participant's performances and provided direction. Generally, the facilitator would provide these cues, but other participants also got involved in these directions as the workshop sessions progressed. To name a few spontaneous co-direction moments: when a participant performed as a keyboard player, another person asked him "*Can we sing along?*", which they did, or when another person was unsure of what to do once at the front, his peers gave him a cap that he used as an imaginary cat and stroked it.

Co-direction and collective enactment were fostered in the *sharing my fantasy world* stage. In this exercise, participants created storylines together while their peers provided new ideas to introduce in the performance. Overall, people in the room (participants and passive audience) alternated between participation and collaboration, as could be seen when two participants built a sketch together (Figure 7.9). Both facilitator and audience were eager to provide suggestions for the storyline, and even the passive audience at the back of the room observed these interactions. Performers displayed imagination and adaptability when the digital environment placed them on top of the pool's water, which in reality, did not make sense.

One member of the audience played along by saying "*It's not very deep*", and the rest laughed at the comment. One of the performers responded to this with "*We are going down*" (as if sinking in the pool). The facilitator then suggested bringing some chairs; the performers were confused at first ("*Sat in*



Figure 7.9: Sketch in pairs: participants swimming in the pool while the rest of the audience is engaged.

chairs?” asked one of them outraged), but Lois explained this could help them pretend to swim. Once both sat down, she said *“I hope we won’t drown”* while moving her arms, and he responded *“Don’t worry, I’ll save you my dear. I’m a lifeguard”*, the audience laughed. *“Are you sure?”*, *“I’m positive, I’ve only drowned three people”*. The audience clapped at the end.

An unexpected moment of group collaboration happened when the computer overheated during the third session, and it was not possible to carry on with the next stage. The facilitator improvised some conversational elements; however, the audience also joined in crafting the narrative. Lois, as a joke, asked Peggy if she wanted to sing a song while the computer cooled down. She did not; instead, a participant offered to sing, and the rest of the group sang along.

7.2.4 Communication as a means for recovery

The last workshop session was particularly focused on communicating ideas and concerns outside of the peer group. The *public service announcements* created by participants were the culmination of the work carried out during the three sessions.

This exercise allowed participants to articulate their personal narratives directly. After experiencing the different activities throughout three sessions, the public service announcements allowed participants to share a narrative of who they are now after the stroke. The facilitator introduced this exercise as follows:

How you would like to communicate to the public about the experience of your stroke? What would you like to say to people? What kind of advice might you want to give to people about the stroke, so that might not happen to them? Or, if it is happening to them, they might have an idea? What would you want to say to the public if you had that opportunity?

Personal narratives encompass both the marginalised and muted experiences, as well as everyday communication practices (Langellier 1999). The personal narrative is reconstructed by integrating the session's experiences and topics discussed in this Green Screening workshop format. Stroke survivors' narratives are shared through conversation and embodiment at different stages of the workshop.

During the *introduction* stage (session one), participants introduced themselves by telling their names and sharing one thing about themselves. This is the first glimpse of people's personal narratives; it provides a rich account of who they were before the stroke ("I was in the army", "I was a combat engineer in the army", "I was also in the army"), how stroke has defined them ("I had a stroke six years ago", "Can't walk", "Can't speak very well", "I had a stroke six years ago and I'm still here"), where they are now (i.e. where they live, when is their birthday) and their emotions ("I love cats", "I love you" - referring to the facilitator).

Participants were able to embody who they were during different exercises. In the beginning, their performative contributions reflected their ordinary self-presentation to the world; however, through the performance exercises and with the support of the technological infrastructure, they were able to embody personality traits that are not often perceived during their regular meetings.

Some stroke survivors moved differently than they usually do, such as the participant that stood up from his wheelchair to perform in his fantasy place and a participant that was able to stand up on her own while swinging an imaginary golf club (Figure 7.10). In that regard, the group coordinator mentioned:

I can see our members themselves who have been on bicycles. Used to do. Haven't done that for years, and I won't say the names, but they would say "I'm actually exercising", physically doing things. And I think that's exactly what this was about.

Other participants used unexpected resources such as singing and dancing in pairs, bowing to the audience and implementing props during their performance (Figure 7.10). When reflecting on it at the follow-up interview, one of them mentioned:

I never thought I would be able to stand up because I get very embarrassed and, you know. But I just did! And I felt well!

And a few people participated in activities that their peers did not anticipate (Figure 7.10), as it is described in the following statement:

[Participant x], for instance, to get up and join in. He's never ever done that.



Figure 7.10: Participants sharing unanticipated performative resources (left picture). Participant swinging an imaginary golf club on her own (middle picture). Participants dancing together (right picture).

The stroke metaphors also present different dimensions of the personal narratives: loss and pain, confusion, what they could do and now they cannot, and how other people reacted. Although the topics focused on issues and challenges, they were integrated into a broader scope of each individual experience.

These announcements had diverse content: grief for what used to be and how to accept it:

I had to give up driving and things that give me independence and be dependent on a lot of other people, which I found very difficult. But coming to the stroke club and meeting other people who are in the same position, now I have a different outlook on life and I can take every day as it comes. I still have up days, down days but, luckily, I'm where I want to be now.

Feeling better than before the stroke:

[...] and then I went to the army and I lost my glasses. And I didn't use them for a while, so I didn't see very well, but now I can see perfectly! So I really feel well. And thank you everyone [looks at his peers around the room] for what you've done for me, because they've done everything for me and I'm better now than I ever was because my eye is perfect, but is more than that. It's the fact that I'm actually feeling good for it.

Looking forward in life and having new goals:

My ambition is to walk a bit more, try to walk a bit more so I can get on a bus and go to town and walk around. I was driver, now I've given up my license. I miss that. But I hope one day things will improve for me [...] And I am telling all you people here who've had a stroke, never you give up, keep going, keep peddling on, never give up, you know? Because hope is there, ok?

As well as gratitude for the people that have helped them along the way:

My husband tells me an ambulance man, fortunately, spotted it and I was able to go to the hospital as soon as the plane landed. And I'm sure that saved my life because it was so quick. And I thank all the people that have helped me [...] They've made my life worth again and I'm so happy. My family have been absolutely marvellous and stood by me all the time.

In general, this final exercise allowed participants to discuss their stroke experience from a positive outlook. By reframing the contribution as a piece of advice they would give to their stroke community and the general public, their reflection transformed into a mainly positive account of how stroke impacted their lives and who they are now. The exercise seemed separated from the previous sessions' main activities: fantasy worlds and storylines. There was only one participant who was able to connect his fantasy of driving a racing car when crafting his public service announcement:

I'm [x] and I had my stroke at 4 o'clock in the morning, and it was the only time that I've travelled on the motorway doing a hundred miles an hour backwards [he laughs]. That's my only experience. Hopefully, it will be the only experience of travelling like that. I'd rather be in the driving seat.

Another participant, who had more communication limitations than the average, provided a short public service announcement that was very similar to the contribution he provided on the very first activity of the workshop:

My name is [x]. I've had two heart attacks and a stroke, and I love cats.

However, his embodied contributions evolved over the three sessions. He approached the performance area confidently during the last session. He understood *the rules of the game* and had a clear idea of how to perform, in contrast to his first performative contribution in session one, when he did not know what to do, and his movement was more limited.

7.2.5 Resistance

Different levels of audience engagement and participation were detected throughout the sessions. In addition to the performance techniques implemented and the facilitation process, aspects such as the room layout and the number of participants impacted these elements and determined the course of the workshop's narrative.



Figure 7.11: Participants sitting at the front row and passive audience sitting at the tables.

Participation expectations were delineated early in the first session, during the introduction of the first two activities: *introductions* and *body hoo-ha*. At this point, the room's layout had not been reconfigured, people were sitting around the tables, and there was no front row of chairs. Instead, the facilitator moved around the room to approach people and listen to their contributions. It was detected that people could not see what was happening at other tables; some of them turned their heads around to remain attentive, while others stayed in the same position, listening but not engaging in the activity.

For this reason, a row of chairs was placed at the front of the room after the warming-up stage (session one). This layout remained for the rest of the workshop. Participants that sat in the front seats each day were willing to engage; the ones who decided to sit at the tables became a passive audience (Figure 7.11). Like in the previous two studies, it was confirmed that a horse-shoe shaped-row was effective in engaging participants; however, the passive audience created a new engagement layer, which will be discussed by the end of this section.

The attendants' mix of attitudes at the beginning of the first session set the tone for the facilitator's level of command, which one participant considered overbearing but also needed.

I think it's a brilliant idea. Lois comes off as a little bit overbearing possibly. Some people aren't able to get up and take part. But other than that, it's a brilliant idea [...] So if this sort of activity can help in any way, doesn't matter whether everybody likes it or not. If it helps even just a little bit, it's worth it, you know?

The facilitator was key in directing participants' contributions; although feminist participatory performance approaches seek participants' free and open

engagement, she insisted on more intent at some points of the session. For instance, during the *embodied fantasy* stage, a participant did not want to perform his gesture. Lois had to insist; he performed a small typing gesture. She then insisted more, and he stood up to perform the gesture in front of the audience. Nonetheless, the participant did not seem entirely comfortable while doing it. In contrast, most participants were able to perform movements and gestures when invited to do it.

In general, front-row participants were happy to stand up or move to the performance area when Lois offered the opportunity. Some people were unsure what to do, but once the facilitator or peers offered ideas, they were more confident performing for the audience. By the end of the first session, participants seemed more comfortable standing in the front and playing with the interactive scenography while enacting fantasies and ideas. Some of them took more significant risks at this stage of the session. Only one participant refused to participate in any activity that required her to stand up at the front of the room on day one.

Passive audiences also played an important role in the sessions. Frequently, Lois would go back to the tables and ask some people if they would like to join a specific exercise; some participants willingly moved to the front to participate and returned to their table after a while, creating a fluid democratised spectatorship. Furthermore, passive audiences were also engaged in many exercises, especially during the main and closure activities. When participants were performing at the front, the passive audience would regularly stop chatting, playing games or reading and then turn their heads around to observe the performances. Sometimes, some also provided performative suggestions or clapped and laughed alone. At the same time, it allowed performers to enact for, with and supported by a larger audience.

Beyond individual participation, collective enactment and co-direction were salient in these findings. Because there were many attendants, many exercises were run in groups or pairs; this way, more people had the chance to participate. Collective enactment was productive because people were more willing to participate, and they could get inspiration from the other person; as an example, the participant that refused to stand up in the front on day one accepted to do it during the second session when offered the opportunity to do it with one of her peers (playing Pamela Anderson and her husband).

7.2.6 Sense of community

As previously mentioned, this group already had an established sense of community and peer support. This was evident through peer interactions before,



Figure 7.12: Stroke community interacting during the workshop session.

during, and after the session and expressed by a couple of participants in the follow-up interview.

It is very very good to come to groups like this where everybody is in the same boat. Because we've all had a stroke, we've all survived. And you realise that it affects everybody differently. There are a lot of similarities but everybody is individually completely different.

In the group we've learnt to laugh at each other and laugh with each other. That's different. That's what I find beneficial about this group.

When each person introduced themselves, the rest seemed to know each other well (i.e. some people worked together in the army before their stroke). Moreover, by the end of each session, people stayed in the room drinking tea or talking to other peers. Nonetheless, this sense of belonging might differ from person to person, particularly based on how long they had been attending the group meetings.

It was noticeable that, while participants transitioned from the tables to the front row of chairs, they also engaged in different conversations and greetings. For instance, a stroke survivor and another stroke survivor's spouse greeted each other with a kiss on the cheek; other stroke pair were chatting about personal topics while waiting for the rest of the people to sit in the front rows. A stroke survivor in a wheelchair waved to another peer passing by, and overall, conversations all around the room are audible (Figure 7.12).

Collectivity seemed to be a driving factor for participation, as more than one participant expresses it: *"You probably say different things up there en masse than you would with just one person, in a conversation between two people. You can open up."* The sense of familiarity when sharing personal narratives was paramount in this regard: *"In the group we've learnt to laugh with each other. We're*

all the same, we've been through the same things", "It helps us to encourage each other and love each other even more".

This sense of community is also evident in the people that decided to stay at the tables instead of joining the front row. Most people who sat at the tables were already engaged in a group board game or conversation with their peers. The freedom to participate in the workshop or not was a salient aspect, providing flexibility for people who were willing to experience the workshop and those who did not want to disrupt their usual group routine.

Furthermore, it was discovered that some attendants were not stroke survivors but friends or family members. During the workshop, the facilitator included everybody in the activities, *giving a voice* to each person in the room as part of her feminist participatory performance approach. For instance, a stroke survivor's friend attended the first and second sessions. His friend was missing on the second day, but he stayed in the session and engaged in the workshop; it was noticeable that he was familiar and friendly with other attendants.

Peggy Shaw attended the third and last session as a guest facilitator. When the group coordinator introduced her as a stroke survivor, most people in the group cheered and clapped, welcoming her. From this interaction, it can be argued that the group seems to enjoy welcoming new members due to their sense of community and, more importantly, that meeting the person who inspired this workshop provided a more meaningful outlook on the workshop activities. One participant expressed the positive aspect of interacting with people that had gone through similar experiences, referring to his peers and about Peggy in particular.

The thing is you are talking to someone that had a stroke and can relate to you, you know? And say: "Well this is, that's exactly how I felt, that's how I was!"

As was established in the second study, communal experiences are paramount in the Green Screening workshop. In this third study, peers were keen on supporting and caring for each other during the sessions. The group coordinator (also a stroke survivor) was attentive to any potential hazard; he helped people with movement limitations to get up and supported them while performing. However, this attitude was also present in other participants who tried to protect other people from losing balance or tripping when performing or moving around the room.

Overall, peers seemed more engaged when a participant shared personal moments or when a performance or story was risky, revealing or unexpected. Moreover, the group members felt free to joke during the activities. For in-



Figure 7.13: Participants' physical interaction while performing in the fantasy place.

stance, when one of the participants was looking for a sketch partner, another person raised his arm eagerly as a joke, conveying that he really liked her. Somebody else also offered to be her partner; even though he was not a stroke survivor, he felt comfortable doing activities with the group members.

This sense of camaraderie was distinctive during the workshop stages that stimulated collaboration while performing. One participant was asked to perform with his peer because she already knew he was a good swimmer. Once at the front, he held her and grabbed her shoulders jokingly while the audience and the peer were laughing. Furthermore, she felt comfortable enough to get rid of the walking stick while standing in the front with her performing partner, enacting a shared fantasy. Similarly, during a sketch, a participant knelt and asked his partner not to make fun of him; however, the other peer pushed his head playfully, which the audience found funny. It was noticeable that many attendants were very physical with each other when performing (Figure 7.13).

7.2.7 Methodological tensions

As previously indicated, the workshop format implemented for this study was adapted based on available resources and attitudes. Accordingly, a set of methodological tensions were detected throughout the sessions. In contrast to the two previous studies, the plan devised during this phase's design meetings presented a more flexible approach. The following describes the methodological adjustments that effectively addressed the study aims and the ones that were not.

Framing the Green Screening workshop as a project conceived through a personal stroke experience was the first key to gaining the participants' attention. Establishing rapport was central to the encounter between the facilitator and stroke survivors. Lois Weaver used the first session's opening to describe the type of support this project offers. Furthermore, this was reiterated both by the facilitator and the group coordinator at the beginning of the following sessions, although with slight differences. While Lois highlighted the perfor-



Figure 7.14: Group performing together.

mance methods used as a stroke recovery tool, the group coordinator focused on the technology's novelty and its potential to foster physical activity.

When Peggy Shaw joined the last session, she was welcomed eagerly; many participants knew she had been involved in the project's conception. The account of her personal narrative, emphasising performance as her own stroke therapy, seemed to impact the participants positively.

Concerning the workshop's structure, brief design meetings took place after each session to discuss facilitation strategies aligned with the current context. The space's layout was addressed in the first meeting. As described in a previous section, the seating arrangement was key for engagement and collaboration. Thus a mix of tables and chairs was maintained. However, the performance area was more restricted, which impacted the Kinect's performance (i.e. difficulty tracking taller people). A strategy proposed in the meeting was to mark the action area with tape. Unfortunately, participants were not aware of the tape. Most of the time, the facilitator had to reposition them in front of the sensor to be tracked effectively by the interactive scenography.

A large number of attendants was another considerable challenge. Two strategies were implemented in this regard. Firstly, exercises were encouraged in pairs or triads, boosting collaboration and community engagement (Figure 7.14). Secondly, instead of asking each participant to contribute to each activity, attention was paid to participants who had not tried a particular exercise beforehand or were very eager to contribute. Such strategies allowed to manage time effectively and maintain the audience's attention. However, it also limited participants from experiencing all the activities fully.

The *fantasy world* and *self-portrait* activities' potential to generate a robust set of embodied narratives, collaborative storylines and audience co-direction was explored in the second study. The final study aimed to explore this potential in the same activities further. However, the *fantasy world* activity was removed in the first session due to lack of time, and only the *self-portrait* ex-

ercise was implemented. Participants immersed in their fantasy place posed for a picture, but there was no opportunity to delve into individual storylines or contribute to others' performances. It was noted that without the fantasy's performative development, participants lacked the resources to meaningfully contribute when creating their postcards (*self-portrait* exercise).

The participants received their *wish you were here* postcards until the second session. During the *postcard writing activity*, they were asked to write a message at the back for somebody special. Due to flexible attendance, not everybody had a personalised postcard; newcomers received a neutral landscape postcard instead. The written postcards were collected because the facilitator planned to use the content in the final session, but this did not happen. Participants were returned the postcard on the final day without any extra input in the workshop. However, they were keen on sending it to family members or keeping it as a memory of the experience (i.e. bookmark).

I wanna be writing the postcard and putting a lovely message on. And telling the children about how that felt and how much we enjoyed it ourselves.

There were some challenges in the data collection approach. Some participants disliked the cameras in the room (only needed for research purposes but not part of the workshop itself). At the start of the second session, one of them joked with a couple of peers, saying it felt like the FBI was there. Similarly, the follow-up approach was implemented during the third session, mainly because no other dates were available to interview the group. The external evaluator described that twenty-five people were present in the room that day, with fifteen participating in the workshop. She was able to approach eight participants, but only six agreed to talk about the experience.

Interactive scenography troubleshooting

The interactive scenography presented unexpected issues during the workshop. Particularly, the room's layout and natural light sources (skylights with no blinds) impacted the Kinect sensor's performance: it did not track people accurately. In addition, the room had a projector and a white screen instead of a monitor. The equipment was not powerful enough, and the picture quality had low resolution.

Furthermore, the projector was placed in the corner of the performing area to avoid tripping hazards, affecting the picture's perspective on the white screen. In general, this did not seem to interfere with the activities, although watching Peggy's public service announcement was difficult. One participant, in particular, was taller than the average. As a result, she had to bend down every

time she performed in front of the Kinect; otherwise, it would not track her silhouette. This resulted in awkward body movements in her performance.

Finding all the fantasy place pictures in the pre-set library was impossible because some were very specific; it was time-consuming to search for these online. Similarly, the process of switching between Processing codes (each running a different mixed reality scene) was slow and evident for participants. Generally, the software runs on a separate screen, and the code cannot be seen during the sessions. Unfortunately, the projector did not allow to un-mirror the screens and participants could see the Processing environment. This was distracting for attendants, as a participant expressed: *"I love the way the technology works, even though I think it could be better"*.

However, not every issue comprised ineffective practice. An interesting glitch detected was that the Kinect sensor stopped tracking participants if they did not move too much. Although unreliable and sometimes confusing for the participant, it also helped manage the performance's length or motivate participants to move. The quirk and abstract silhouettes were not a replica of the participant's body, which seemed to focus their attention on the idea and action more than on their body's representation.

7.3 Reflective summary

Findings from the final study provide a rich account of the significance of an extended workshop process. The qualitative analysis reveals that task repetition and expansion through each session motivated a broader range of movement experimentation, collective fantasy development and social integration. The communal aspect of the process was still found especially important in achieving these results.

The articulation of personal narratives in a performative context successfully questioned and remodelled participants' self-presentation and social positioning to some extent. In contrast to a purely conversational approach, the workshop format combined communication, performance, and movement-based strategies to generate a framework that allowed participants to explore desire, fantasy, and loss equally. Furthermore, the collective approach permitted them to mutually exchange information without feeling overwhelmed or ashamed. In this regard, peers from an already established community were noticeably essential for them to open up playfully and creatively when sharing enacted stories.

The two previous studies generated design insights to conform an operational workshop structure. This final study was able to advance this knowl-

edge. Beyond establishing yet another fixed structure, the extended version was constituted of diverse performance activities and mixed reality scenes that could be flexibly combined to respond to the context's requirements. In addition, this expands the opportunity to implement the Green Screening process to a more diverse set of stakeholders in the future.

The flexible structure also impacted the transformation of performance and engagement resources. In contrast to the second study's findings, participants did not explore collective storylines or personal fantasies as much. There are a couple of reasons why this could have been the case. In the first place, the number of participants was bigger in this study, and not everybody took place in all the activities, which made it difficult to establish a unified performative progression. Moreover, the flexible structure permitted some exercises to be altered or totally removed from the session, as it happened with the *fantasy world* exercise.

Despite the previous limitation, it was evident that participants that engaged as much as possible in all the workshop activities displayed a more considerable progression in their performative resources: the way they enacted their imaginative ideas, how they collaborated with peers to expand their fantasies and how they portrayed themselves through the stroke metaphors and public service announcement exercises. It is fundamental to note that, although participants mostly praised the stimulation of physical activity, performance progression was not only visible in their movement-based contributions, but also in the information they shared in conversation, and their compliance with standing in front of the group to enact fantasy worlds of their own making.

Personal narratives were also supported through the implementation of public service announcements (closing activity). In this case, the workshop explored the potential of communication between peers and people outside this community. In general, the activity presented unified topics leaning towards the positive lessons learned as stroke survivors. The activity allowed participants to voice subjects that they are not usually able to share with the public. Loss caused by the stroke and gratitude towards family members, friends and present peers were general themes.

The presence of a passive audience was a newfound discovery. Although these attendants were not directly contributing to the workshop, there were constant situations when they provided audience engagement responses (i.e. cheering, clapping, laughing). This was mainly detected when one or more participants were performing at the front. The more unexpected or surprising the movement or the idea was, the more attention it attracted from the passive audience. Furthermore, this structure was not fixed; at specific points, people from the passive audience moved to the front row to observe closely or to par-

ticipate in a specific exercise. This revealed a dynamic interaction model that had not occurred in previous studies.

The *wish you were here* postcard was not the workshop narrative's climax, unlike the rest of the formats, including the original one. Although meaningful, this performance output was equally prominent as the public service announcements and the sketches in pairs. More importantly, the highlight was the experience itself: the opportunity to try new things in the company of people they see each week and who knows their *stroke identity*.

Previous findings sustained the importance of the facilitator. This study also highlights the multifaceted role they play. Lois managed different objectives and strategies simultaneously. Many of the exercise adaptations took place on the spot. This expertise comes with experience, and whether a different facilitator would have obtained the same group results remains unclear. Nonetheless, a necessity for established facilitation guidelines would enrich socially engaged performance practice and research replicability.

The technical infrastructure was further developed to provide a richer set of mixed reality environments. However, the new scenes were closely aligned with existing resources: falling shapes and abstract silhouettes conformed by particles. Nevertheless, this expansion provided more alternatives for the participants, supporting their engagement through the sessions. It also allowed exploring movement and enactment from different perspectives without heavily shifting to a different type of activity. For instance, the falling shapes in the *empowering silhouettes* scene and the beach ball behaved slightly different and were distinctively approached by each participant.

The functionality of the interactive scenography was less efficient than in previous studies. It was salient how different layouts and light sources could impact the technological infrastructure. Another challenging aspect was the use of the projector. During the design meetings, it was envisioned that a projector could provide a more immersive experience due to the possibility of scaling the image to a bigger size. While carrying out the study, it was apparent that this was not the case. A projector brought unexpected issues to the set-up, such as positioning the equipment to avoid trip hazards, low image resolution and lack of picture features to adjust the size and scale of the projection.

Despite the problems encountered with the technology, it was still evident that the interactive scenography provides a powerful resource for participants to envision and share ideas, desires and fantasies with peers. The technological tool allowed people to embody the process and exploit diverse communication assets fully. Furthermore, it permitted stroke survivors with movement or speech difficulty to integrate into the activities and contribute as much as anybody else. Generally, it was noted in this study that participants that en-

dured more significant movement or speech limitations were the most willing to go beyond their day-to-day presentation and explore in more depth how to embody their imagination.

In summary, implementing this extended format presented new design challenges for the multidisciplinary team. It has built knowledge and practice upon previous studies' findings. The updated interactive scenography facilitated an expanded mixed reality framework to adapt a broader number of performance exercises. Interactions observed during the workshop continue to indicate the importance of working with abstract and fantasy figures and promoting community collaboration. The resulting structure has not been established as the ultimate Green Screening workshop format. However, it has provided new resources to disseminate the technology-supported participatory performance methodologies with stroke survivor communities and other contexts.

In conclusion, a number of insights about effective communication were gained during the third study and informed this final phase. For instance, while academic language might receive the attention of a charity's *research department*, it could be perceived as inaccessible and costly for stakeholders hosting the workshop. The project's presentation should also clarify that this is not a commercial project seeking financial gain and focus on what the stroke survivors will gain from participating instead of concentrating on the research's gains. Finally, a live technology demo and accessible online resources (i.e. video or website about the project's history) catering for these stakeholders can further communication and kindle interest.

7.4 A public engagement strategy for the Green Screening workshop

After concluding this research project, a public engagement strategy was delineated to engage a wider community of stroke survivors and establish a two-way conversation with creative practitioners to disseminate the methodologies and technology developed for the Green Screening workshop.

This activity was supported by a *Large Grant* (2019-2020) from the Centre for Public Engagement (Queen Mary University of London). Building on the project presented in this thesis, the goals were:

- To engage five new stroke support groups around England to experience an interactive session.
- To reconnect with a stroke support group that had already experienced the workshop, for an extended workshop format.

- To introduce the project's methodology to community arts practitioners (London-based) seeking to explore format possibilities and future applications for vulnerable communities.

The project's proposed outputs included presenting a conference talk and running a workshop session at the UK Stroke Assembly (2020) to promote the intersection of arts and technology as a practical methodology for social stroke recovery in the health and well-being community. Furthermore, the project was expected to be disseminated through an audiovisual product and online materials to reach a wider stroke community.

7.4.1 Opportunities and implications for design

During the first stage of the public engagement project, the multidisciplinary team successfully built on the workshop iterations resulting from this project. Furthermore, a local community of creative practitioners was invited to a training workshop session (see Appendix H for the call out). The session was delivered to people interested in working at the intersection of arts and well-being to support stroke survivors and people with disabilities.

Sixteen participants responded to the open call. Unfortunately, due to the weather (storm Jorge disruptions), only six were able to attend.

Feedback showed that participants were enthusiastic about the portability of the technology, especially in comparison to conventional green screen techniques. Many creative practitioners reflected on ways to inform their artistic practice with this methodology and were interested in extending the Green Screening workshop to other domains, such as working with children in exclusion, teenagers, and older people. There was a positive response to how the exercises gave them a sense of play and freedom outside their comfort zone.

COVID-19 impact and disruptions

Due to the COVID-19 pandemic, it was impossible to deliver the Green Screening workshop sessions to stroke support groups. From March 2020 onwards, the Stroke Association cancelled all in-person activities to protect stroke survivors, a population at higher risk of complications like pneumonia.

The core members of the project's multidisciplinary team (Weaver, Healey and this thesis' author) scrutinised whether transferring the activities to remote delivery was possible. However, engaging communities remotely fell out of the general project and would have required an updated research through design project to create workshop methodologies, interactive scenography and formats for remote delivery.

Instead, an online portal to disseminate the project in stroke communities was created. Along with the resources for stroke survivors, open-source access to the green screening technology was created. This was important to reach the goal of determining future applications for other vulnerable communities. Nonetheless, this outcome fell very short of the original public engagement strategy.

Discussion

This thesis aimed to widen the research landscape of performance within human-computer interaction (HCI) by investigating the potential of Split Britches' feminist participatory performance as a design tool within community contexts. It also explores how motion capture and visualisation technology can be usefully integrated into this format.

This endeavour encompassed both the redesign of the Green Screening workshop, a stroke support intervention coupling participatory performance methods and real-time motion capture technology, and the study of the value that people's lived experience, embodied enactment and imagination provide to the realms of HCI and community stroke support. The work included diverse stakeholders and positioned stroke survivors' voices as a driving factor in the discussion.

To address the research aim, the following research questions were asked:

- How can the implementation of participatory performance methods in a stroke community context advance the understanding of technology-mediated interactions among its peers?
- How can this approach inform the design of interactive digital tools to exploit the potential of embodiment, enactment and intersubjectivity in the same context?

These research questions brought up subsidiary research questions:

- How can theories and applied practices of participatory performance aid social stroke support through performative interpersonal relationships?
- How can digital avatars, storytelling, and imagination contribute to understanding participants' embodied experience in such participatory performance approaches?

- How does the intersection of both scopes contribute to an understanding of enacted embodiment and imagination?

The aim and questions have been addressed through four years of research conducted with stroke support groups from the Stroke Association and the performance company Split Britches. The project's methodology is based on a *research through design* approach coupled with a feminist approach to participatory performance that emphasises desire and radical inclusion. The Green Screening workshop format was iteratively redesigned across four phases, combining design meetings with a shifting, dynamic multidisciplinary team and community sessions delivering the workshop to stroke support groups. From this process, three new workshop formats resulted and were consecutively scrutinised. A summary of each study and its corresponding workshop format can be found in Table 8.1.

Table 8.1: Summary of each study's objectives and workshop format.

Study No.	Format	No. sessions	Object of study
1st	Phase 2 workshop format	1 day * session	Overall workshop's feasibility for social support.
2nd	Phase 3 workshop format	2 days * session * follow-up	Enactment, imagination and embodied experience.
3rd	Phase 4 workshop format	3 days * sessions	Embodied narratives and collective enactment.

The project's first step was to explore the workshop (Chapter 4) to identify the original Green Screening guidelines. Subsequently, an exploratory study was conducted to analyse the workshop's potential to contribute to social support and how interactive motion capture-based technology can become a relevant tool (Chapter 5). This was followed by two research studies that further explored the findings and new workshop format's design iterations. The first of these studies investigated participants' individual and group enactment, imagination and embodied experience during the workshop (Chapter 6). The second study investigated communication as a means for stroke recovery, embodied narrative and collective enactment and how they can aid social stroke support in the Green Screening workshop (Chapter 7).

As described in Chapter 3, Split Britches' participatory performance methodologies provide a range of techniques to explore social identities and situations while imagining new ways of being, which is particularly suitable for under-

served communities (Boal 2008, Harvie & Weaver 2015, Light et al. 2009). On the other hand, digital technologies expand scenographic possibilities, providing new ways to support people envisioning, enacting and sharing their ideas with others. The approach proposed in this thesis focuses on participatory performance in the context of stroke recovery but engages with a broader argument about this approach's value both as a social support intervention and as a design tool.

Findings gathered from the three studies, design strategies implemented during the whole process, and the review of relevant literature have produced a set of final reflections about the implementation of this methodology.

The discussion centres around the main elements that consolidated the new approaches developed through this PhD: participatory performance (under Split Britches' feminist approach) supported by interactive mixed reality technology as a design tool and the importance of the lived experience when engaging under-served communities.

The following sections integrate the project findings by exploring embodied imagination's contributions to the fields of HCI and performance studies. Finally, a set of guidelines to carry out similar work with a broader range of communities is offered.

8.1 Green Screening workshop: a social support intervention

The Green Screening workshop methodology works with fantasy and desire, inviting participants to explore their personal narratives and construct collaborative storylines; thus, exploring their lived experience. This project's approach is supported by participatory performance methods and an interactive scenography that permits people to visualise imaginary worlds and share them with their peers.

Current socially engaged practices offer little work coupling participatory performance and interactive technology to aid marginalised communities. Thus, the methodology described here seeks novel means to engage stroke communities, particularly by providing social support. It is based on the premise that approximately one-third of the stroke community members experience a reduction in the quality of their life after reintegrating into society (Oyewole et al. 2016, Pompili et al. 2015, Robinson 2003, Salter et al. 2010, Ploderer et al. 2017, Obembe & Eng 2016, Rittman et al. 2007).

Social support is any support provided outside of clinical and formal settings, like the Green Screening workshop embedded into a peer support con-

text (Kruithof et al. 2013). The challenges to integrating an intervention into this domain are to a) approach the community with a clear set of objectives, an understanding of the stroke context and flexibility to learn from and with them, and b) to offer an intervention that meets their needs and captures their interest (Salter et al. 2010).

8.1.1 The Green Screening workshop strategies

The Green Screening workshop seeks to help stroke communities explore physical and social identities, imagining new ways of being. Workshop participants imagine *things they have always wanted to do* (like swimming with dolphins or racing cars), in *places they have always wanted to visit* and *people with whom they most want to communicate*.

The format employs two primary strategies. First, a gradual and playful transition from simple performative movements through to mini-narratives enacted with and for other workshop participants. These fantasies are progressively built and enacted for other participants using real-time movement visualisations supported by motion capture.

Second, performance exercises encourage self-expression and imagination, stimulating movement experimentation that does not foreground physical problems. Participants play and improvise ideas, metaphors or storylines supported by the interactive visualisations, and other participants have the opportunity to direct and perform together. The interactions do not revolve around the technology; instead, the technology mediates the interactions.

The workshop is particularly suitable for any under-served or marginalised community, but anybody who wishes to *have a seat at the table* would benefit from the methodology (Heddon 2015). The framework facilitates discussions about people's fantasies and desires, providing insights into their lived experience and personal narratives. Furthermore, such narratives have the potential to transform through the exercise of motivating participants to complement the negative connotations of their social constraints with other (new) possibilities (Armstrong 2005, Langellier 1999). The session integrates peers and exploits the commonality aspects to produce collaborative performative elements that empower participants by performing actions and seeing others doing the same.

The methods were designed in collaboration with stroke communities around England but are applicable to other communities that are not usually involved in design discussions. The workshop method defamiliarises the everyday and promotes out-of-the-ordinary activities in conjunction with peers (Heitlinger n.d., Bell et al. 2005). Furthermore, it draws on each participant's lived experience to embody metaphors and fantasies related to their daily life and inner

world. Moreover, it provides a rich environment for peers and facilitators, in which everybody is free to explore new performative ideas, desires, memories or fantasies about what life could be.

The sessions take the form of movement-based exercises under a fantasy performance narrative. The process comprises: getting participants to pay attention, getting them to do an action, placing them in an imaginary place, and layering on these ideas.

All members of the community are equally welcomed and included in the exercises. Participation is flexible; people can engage as much as they desire or become a passive audience spectating the session. The facilitator should seek to generate a comfortable environment where everybody feels safe and confident to perform, respond to others' performances or play with the interactive scenography.

As previously mentioned, participants use the interactive scenography to envision ideas of things they would like to do and places they would like to visit. The abstract representations support people not restricting their ideas to only current possibilities but exploring fantasy scenarios (Iacucci et al. 2002). During the sessions, participants perform and interact. Information about their interactions, behaviours and fantasies can be gathered in this process. After this, there is an argument to suggest that the facilitation team has gained an understanding of the lived experience and can use this information for future design strategies.

8.2 Embodied Imagination in the Green Screening workshop: reflections and challenges

Based on the project's outcomes, it is possible to draw a series of reflections on different aspects of the process and how the social behaviours and interactions fostered through the workshop inform an understanding of *embodied imagination*. This section's objective is not to formalise such a concept but to provide an in-depth account of how it was implemented in this particular project, so future work can position it in context and expand upon it.

8.2.1 Imagination and embodiment

The Green Screening workshop's core aspect is the embodiment of fantasy and desire. Following other projects (Boal 2008, Harvie & Weaver 2015, Light 2011), findings across the three studies suggest that the experience of articulating personal ambitions and desires in a performative context is successful in opening

imaginative possibilities for self-expression. This can be particularly empowering for communities that struggle to find spaces for communication and dialogue, such as stroke survivors.

In this case, the meaning-generation process is established through the participant's agency in two ways: through their own experience when engaging in participation, but also through the observation of others' experience when doing it (Breel 2017).

In the Green Screening workshop, the embodied experience was perceived as engaged with the work through physical or verbal activity. In this matter, the workshop is not purely grounded in conversation because, according to Weaver, stroke survivors (that do not have speech disabilities) are already required to *talk a lot* in other systematic activities put in place to support their recovery, such as talking to their GP, a counsellor, or with a family member. However, this strategy also hints that, when developing relationships, making and sharing an image (e.g., enacting the image in front of the group) is perceived as less threatening than talking about it (Van Lith et al. 2011). This coincides with workshop participants from the second and third studies, whose attention deviated from their disabilities or stroke-related limitations when producing and sharing creative images as part of the group.

Imagination, thus, is a mediation between perception and thought, a kind of experiential thinking that can be sensibly embodied (Bertinetto 2013, Hansen & Kozel 2007). Beyond building and simultaneously impacting experience (Hatt & Graham 2018), creative imagination allows visualising counterfactual models of reality such as imaginary social alternatives (Bertinetto 2013). This project's methodology exploits imagination's capacity to access the unreal as a cornerstone, allowing it to organise the experience of reality and manifest different realities through embodiment.

The participatory performance methods promote the use of movement to build enacted narratives. What is perceived on the outside as a *play-pretend* is, in reality, the embodiment of semantic and cognitional attributes informed by affect; in other words, the emotions are embodied in the movement as suggested by Sheets-Johnstone (2010). Returning to Weaver's strategy to work with creative movement-based activities, it is worth adding that narratives generated through performance are concerned with an affective and kinaesthetic experience. Therefore, narrating the experience might not possess more complex embodiment resources to enact the same experience with further layers of meaning.

In this case, embodied imagination through enactment permitted stroke survivors to experience and explore non-existent worlds. In turn, this allowed them to understand their reality better by comparing it with imaginary ones.

Furthermore, due to the collectivity aspect, imagination transformed into an interactive practice. When enacting collaborative storylines or responding to peers' performative suggestions, a negotiation of private imagination took place: 'because the creative outcomes of the performers' imagination affect the imaginative creativity of their fellow performers' (Bertinetto 2013, p. 92).

8.2.2 Imagery representation and personal narratives

Up to this point, the argument generalises enactment possibilities. However, stroke survivors are a community with a broad diversity of movement and communication possibilities.

Findings across the three studies suggest that the embodiment of imagination through movement does not necessarily highlight movement limitations, nor does it restrict participants from engaging in the activities.

One key example is the participant in a wheelchair enacting a figure ice skater spinning; she did not have mobility in the legs and one arm; instead, she raised her right arm with a finger pointing to the ceiling and turned it. The simple movement she repeated for a long time was compelling enough to enact her fantasy storyline. Once her peers negotiated her ideas, they hummed a song along while she was metaphorically spinning.

The fact that the communication was body movement-driven also appeared to help participants with speech limitations express their ideas. For instance, one of the participants with aphasia produced a robust set of gestures to enact her fantasy; this sets the storyline for the audience, who then helped to narrate the actions. It was one of the more striking performances produced during that study.

The articulation of personal narratives in a performative context succeeded in questioning and remodelling participants' self-presentation and social positioning to some extent, supporting the suggestion that such narrative encompassed both muted experiences and everyday communication practices (Langellier 1999).

In contrast to the conversation-based approach, this workshop combined communication, performance, and movement-based strategies to generate a framework that allowed participants to explore their reality and alternative options.

Imagery and personal narratives are evidence of how participants' self-perception and self-representation were shared over time. For instance, stroke metaphors seemed to focus on the experience's trauma and loss. In contrast, fantasies presented aspects of themselves that are not often shared with others. At first sight combining both elements might seem counterintuitive, and

it proved complicated during the first study when participants struggled to switch from stroke metaphors to fantasy places.

However, participants can investigate both elements further when the workshop provides more exploration time. For example, when presenting the *public service announcements* during the third study, they were able to address their stroke experience from a resilient perspective, acknowledging the issues brought by stroke but also how far they have come, the support from their family and friends, and their plans.

The desire-led aspect was also perceived as positive by the participants. They commented that it was unusual to be given the opportunity to talk about the things they had always wanted to be. This reflects one of the central precepts of Lois Weaver's feminist approach to participatory performance: engaging with people's own experience through radical inclusion, an important contrast with more conventional therapeutic interventions.

Moreover, imagery representation is a fundamental aspect of participants' experience. The example of a disappointed participant placed in the wrong digital fantasy place points at the technological mediation as an important aspect of the embodiment process. Once the fantasy is depicted on the screen, it becomes a more concrete element that requires a certain degree of overlap with their imagination.

8.2.3 Digital mediation as a tool for imagination

Digital technologies in performance convey interaction possibilities that amplify or entirely transform everyday experiences. They are particularly well suited to enable performance's risky, insightful and potentially transformative experiences (Spence 2015, Benford & Giannachi 2012, Bailey et al. 2016). These interfaces can elicit emotional contagion, leadership, entrainment, and co-creation in shared experiences (Fan & Sciotto 2013).

Recalling Weaver's description of the green screening technical approach, she mentioned that the *screen* is like a clown mask that allows people to present themselves in a different, non-ordinary way (Weaver & Shaw 2016). From a performance perspective, this could enable participants to take more risks. In this case, the technology provides the performative tools that stroke survivors lack.

The Green Screening's interactive scenography seeks to provide an infrastructure for participants to envision their fantasies and share them with the rest of the group simultaneously (Delbridge & McGowan 2015, Rostami et al. 2017). Furthermore, the mixed reality environments permit people to distance themselves from their ordinary self-perception and bend their sense of body

reality (Weaver 2019). The specially designed interactive visualisations, driven by real-time motion capture, progress from 2D silhouettes through 3D point clouds to more concrete, recognisable images of each participant.

When observing the workshop sessions, it was detected that participants preferred abstract representations of themselves instead of a mirror-like image. Participants were able to map their body schema onto the abstract silhouettes (the digital body). These abstract representations are then considered an extension of the self and create an embodiment illusion (Popat 2016). The interactive scenography complements the fantasy performance by providing a fragmented, mixed reality environment that is impossible in the physical world. Furthermore, studies suggest that physical interactions with the environment shape thinking. As a result, when interacting with abstract or distorted body silhouettes, people can create a mental model of their bodies based on the digital body's affordances.

Bailey et al. (2016) suggests that 'humans also have the unique ability to claim ownership over bodies drastically different than their own, or bodies that are impossible in the physical world'. This suggestion supports that workshop participants can recognise themselves in the mixed reality scenes, concentrating on the uncanny experience instead of looking at their everyday reflections. This provides performative prompts for their embodied imagination. Once participants were confronted with the interactive scenography during a session, it was noted that the visual effects promoted a more in-depth exploration of their ideas.

In summary, the interactive technology is a tool to reproduce and share embodied imagination. Furthermore, the technology changed the green screening process in this context, which simultaneously impacted the technology. The technological tool allowed people to embody their insights and exploit diverse communication assets. It also permitted stroke survivors with movement or speech difficulty to integrate into the activities and contribute as much as anybody else.

8.2.4 From audiences to communities

The fantasy performance contributions are often collaboratively and display a clear sense of disinhibition and playfulness among the workshop participants. The workshop is a group activity, and peer presence, perhaps surprisingly, appears reassuring and stimulating (rather than inhibiting) to performance in this context. Similarly, some participants with movement limitations accepted a partner to perform with them while being supported to move.

It has already been discussed that the level of engagement was varied, and participants were not forced to engage in the activities. The first and second studies revealed a dynamic between participant-performer and participant-codirector or participant-co-performer. In other words, the audience engaged with the person performing while providing direction and performative ideas or pairing with others to perform together.

However, the third study brought passive audiences into the dynamic. These participants were not engaged in the activities. However, whenever their peers were at the front performing, they would pay attention to the interactions. Claps and laughter were some of their responses, hinting that engagement dynamics are, in fact, transient, and some participants were able to experience different degrees of engagement during the session.

The social aspect of the group remained a significant part of the participants' experience. This was highlighted in the three studies, particularly the second and third. Participants argued that it would not be the same if the technology was brought to their houses to do the activities alone.

The participants' social bond was already established for the stroke support groups engaged in this project. It is important to highlight that the workshop did not create it, but it allowed them to access their peers' personal narratives and aspects that had not been shared beforehand within the groups. The second and third studies revealed that being part of a group and forming friendships were of extreme value for stroke survivors. Thus the workshop motivated new kinds of conversations, like thanking the rest of the peers for their help, highlighting how far they have come since they joined the group, or how their perception of stroke has transformed over time.

Setting the workshop format into the peer support is a critical element in participants' motivation, confidence and feeling of belonging (Dorning et al. 2016, Sadler et al. 2017, Kessler et al. 2014). During the second study, it was suggested by a carer to deploy the system at home to encourage physiotherapy activities; however, stroke survivors argued against it, considering it would not provide the same type of experience.

8.2.5 Lived experience and creative insights

Allowing stroke survivors to share their ideas through the embodiment of storylines driven by fantasy and desire permitted them, their peers and the workshop facilitators to understand some of their fears, challenges and expectations after the stroke, as well as how they are coping and adapting to their current and transforming reality.

The former suggests that embodied imagination paired with creative expression is a route with the potential to uncover people's opinions, mental models, fears and expectations of social systems, products, services and personal experiences.

It is worth noting that the imagination shown by every group of stroke survivors in this project produced resourceful ideas about what they would like to do. Although their fantasies could not be perceived as *out of the ordinary* for other communities, each of their proposals focused on things they could not do in their current circumstances, such as playing football, diving with sharks, driving a train or cycling. None of these fantasies was practical for them, nor were they intended to be.

On the other hand, the metaphors produced were overall ingenious and more explorative, loaded with emotion, enriched with detailed descriptions and generally accompanied by an account of how the stroke took place for most participants. Some examples include the world collapsing, a violent shout, a beautiful field with flowers, an empty day on the calendar and a very sharp knife.

The workshop's strategies invite participants to conceive such ideas through desire. This imaginative engagement emerged from a process that builds on their daily experiences and social constraints related to being a stroke survivor. This ambivalent approach aspires to engage and empower people from marginalised communities by assuming them as whole persons (beyond constraints such as disabilities or other disadvantages), but that requires to depart from such constraints to begin the process.

Findings suggest that thanks to this ambivalent approach during the workshop, it was possible to access people's lived experience. Participants were not only able to uncover personal narratives about who they are and their stroke story, but also to push such boundaries through playful fantasy embodiment and reconfigure how they perceive themselves, their peers and the people surrounding them.

Through the workshop's strategies, lived experiences were ultimately revealed through, for example, the discussion of future goals, family or peers as a supportive network, how they have overcome challenges encountered after the stroke and the experiences that produce enjoyment in their current life.

It is impossible to determine to what extent and how the same discussions and reformulation of personal narratives would have been generated through more conventional approaches to stroke support. And such a question falls outside of the current research scope. However, it is worth highlighting how participants were challenged during the exercises, and many allowed themselves to push their limits. In contrast, others were surprised by how their

peers could move, communicate or collaborate in ways that were not perceived before. Along with the specific feminist approach implemented in the process, it was this encounter that allowed people to initiate a reconstruction (however broad or brief) of the way they think about themselves: their personal narrative.

8.3 Embodied Imagination's contributions to HCI

The themes discussed in the previous section emerged through the Green Screening workshop's studies. They demonstrate a different way of looking at the social encounter between peers, particularly within the stroke context. In this matter, the design for stroke and vulnerable communities within HCI is often understood as disconnected from the social aspect (Vines, McNaney, Lindsay, Wallace & McCarthy 2014).

By designing for a contextualised, collective and participatory performance-based encounter, this project contributes by expanding the understanding of performance methods within design in HCI. It also aims to promote a holistic understanding of individuals that have experienced a stroke and are affected by its consequences.

This multidimensional methodology seeks to embrace subjectivity and mutuality by acknowledging people's lived experience. Under this approach, participatory performance mediated by interactive technology can be implemented as a design tool in the context of community-based HCI, particularly for under-served or vulnerable people (Vines, McNaney, Lindsay, Wallace & McCarthy 2014).

The project also contributes by establishing creative, reflective, and out-of-the-ordinary social encounters grounded in the community's needs, interests and practices. As a result, the methodology shows potential to support inclusive participation and communication, specifically creating spaces for and with the community instead of fitting them into already existing ones that do not cater to their needs. This can be an effective tool to build community and explore identity as well as individual and collective empowerment. Furthermore, it hints at the potential to uncover people's desires, needs, hopes, aspirations, self-perception, and co-location.

8.3.1 Design with marginalised communities

The feminist participatory performance approach implemented in the Green Screening workshop provides a range of techniques that foster explorations of social identities and situations while imagining new ways of being. The radical

inclusion embraced by Split Britches advocates for spaces that include people from various communities, including marginalised ones.

This thesis argues that such techniques are prospective and contextualised, thus allowing people to explore the implications of new ideas departing from their own lived experience lens. Although the current approach is grounded in the context of stroke recovery, it engages with a broader argument about the value of Split Britches' participatory approach as a design tool.

This feminist participatory performance tradition was adopted here as an approach to iteratively design the experience by integrating participants' needs and interests into each phase of the process (at the last stage of each iteration). In this sense, it allows community integration into the process and seeks to improve people's lives instead of solely developing a commercial product. Furthermore, the practices proposed under this methodology are more diverse and staggered than traditional user-centred design and participatory design.

Examples of valid forms of participation under this methodology range from participants enacting metaphors of action (i.e. stroke survivor in a wheelchair swirling a finger around to represent a full-body spin) to group coordinators providing access to the group and establishing how to manage the space (i.e. participants' usual seating arrangements should be maintained) and families and carers attending the sessions and working with their personal narratives through performative contributions (i.e. creating a sketch about how the stroke transformed their relationship).

Embodied Imagination here implemented a process that further elaborated on people's creative exploration ignited by desire, combined with simple gestures or movements and embedded into mixed-reality fantasy worlds. Imagination is for this project 'the most malleable fabric we possess, is the best substance from which to construct new possibilities for society' (Light et al. 2009, p. 47).

Nonetheless, despite the radical inclusion practice embedded within the feminist participatory performance methods, it is arguable that there was a waste of potential by engaging with the stroke community only during each phase's evaluation stage, and not being able to return to the same group to explore the following workshop iterations.

In this project, the design choices were initiated by the multidisciplinary team at the beginning of each phase and then evaluated by the community (i.e. stroke survivors and creative practitioners). In retrospect, this allowed to build the relationship and stimulate participation without compulsorily committing stroke groups to the project, generating sources of tension (Heitlinger n.d., Kruithof et al. 2013). Despite not being the initiators of design constructions, stroke survivors were glad to be asked what they would like to do (in

general with their life and about the Green Screening workshop) and if the activities worked for them.

There is, thus, merit in providing a creative space for stroke survivors to explore, define and reveal issues around social inclusion, redefinition of the self, and the evolving role that health and wellbeing play when a person becomes part of the stroke community.

Based on this discussion, it is feasible to suggest the potential for this methodology to be implemented as a co-design method for HCI. Co-design, here, is understood as a social process focused on challenging inequitable power structures, just as Weaver's feminist approach does. It embraces designing with people, not for people, by equitably including the community as initiators of change and decision-makers throughout the process.

Particularly within the Green Screening workshop, stroke survivors should have a substantive say in what a workshop created to provide social support for them should be. Moreover, to offer expert perspectives and preferences regarding the design.

Under this collaborative framework, this methodology could support the development of technologies by exploring people's prospective needs and desires by opening conversations that are rarely available for people at the margins of society. Although this thesis did not explore this avenue, it is worth discussing such further potential contribution to HCI.

8.4 Embodied Imagination's contributions to Performance

The project described here uses a specific socially engaged, feminist performance tradition that involves participants in exploring the social identities and social conditions that inform and often constrain their experience. This tradition has been developed by Split Britches (Lois Weaver and Peggy Shaw) through thirty years of performance practice.

This project contributes by redesigning and expanding the Green Screening workshop. This workshop allows participants to draw on desire and self-reflection to tell stories and give meaning to a series of fantasy worlds envisioned through mixed-reality scenarios.

As suggested in previous studies (Light et al. 2009, Harvie 2015, Weaver et al. 2008), the feminist participatory approach that Weaver implements succeeded in translating the focus from the self to embodying other possibilities suggested by their imagination and collective story building.

During the workshop, participants worked with a set of ideas embodied through simple gestures and permeated them with a meaning that bridged reality with potential. The deliberate intention was to *seed ideas* rather than providing fully formed scenarios (Light, Briggs & Martin 2008), which could hinder the participant's agency and inclusive exploration of a set of experiences connected through similar events, yet unique in essence.

In particular, Weaver's (2019) feminist practice acknowledges that everyone *has a place at the table*, everyone deserves to be heard and to tell their stories in order to make sense of their reality.

In contrast to the Theatre of the Oppressed's narrative and uniform political framework, Lois' feminist participatory methodologies are radical, multidimensional and embrace diversity. They create accessible, coalition spaces that recognise every participant's individuality while providing room for growth and imagination.

In this sense, this thesis also contributes by seeking to offer practical value for practitioners working with under-served or marginalised communities.

8.4.1 Implications for participatory performance

Framing the methodology under a performing arts scope provides compelling methods to express identities and foster community in non-ordinary ways (Schechner 2002, Macaulay et al. 2006). The participatory factor emphasises experience over performance and delivers the creative reward of a collective activity (Bishop 2012).

Furthermore, the feminist tradition implemented in this project advocates for a radical, multidimensional and diversity-embracing practice. When coupled with digital tools, these methods expand the individual's performative possibilities by making intangible elements visible, transforming and sharing the individual self-perception, and supporting its transformation into collective narratives.

This methodology allows to construct a meaningful social encounter mediated by technology. Simultaneously it bridges the gap between the lived experience and design using participatory performance methods. Through this project's exploration, a number of performance principles have been adopted, such as desire and fantasy (Light, Weaver, Healey & Simpson 2008, Armstrong 2005, McAvinchey 2006). These facilitate the embodiment of personal narratives reflecting past, present or potential scenarios (Langellier 1999).

This approach can promote embodied actions and enactive movement without the expectation to bear professional performance skills. It seeks to include people with diverse skills, movement and communication possibilities. It con-

tributes to community-building and individual self-perception by providing novel ways to participate in an inclusive environment. Under this methodology, stroke communities have found a space for interaction that upholds identity exploration, shared experiences and community development.

Split Britches' participatory performance as a tool for design in HCI draws from socially engaged performance practices and design principles. However, in order to work effectively with vulnerable communities in the HCI context, they do not rigidly adhere to either. Instead, both scopes are adapted to fit the purposes of community support.

Socially engaged performance is applied here as an approach that engages participants independently of their performance skills. In contrast to the traditional staged approach, interaction and contributions are created collaboratively inside a well-known peer community context.

This addresses the access gap highlighted by McAvinchey (2013), for people that still wish to take part in participatory performance-based activities without the need to perform in front of a public audience (Rosetta Life 2019, Clover 2011) due to physical, health or personal reasons, or to craft narratives with more complex structures (i.e. a monologue) to be staged inside their community circle (Rosetta Life 2019, Boal 2008).

8.4.2 Radical inclusion in the Green Screening workshop

One of this project's most significant themes is the radical inclusion ignited by the feminist participatory approach embedded into the process. How to engage communities placed at the margins of society? Vulnerable or isolated groups and individuals that *do not get a seat at the table* and for whom services and systems lack an understanding of their lived experience, needs and opportunities.

The implementation of feminist participatory performance methods in this project seeks to challenge the imbalance of power held by individuals who make important decisions about others' lives, livelihoods and bodies. Marginalised communities with little to no involvement in the decisions that impact them. This approach seeks to change that by prioritising peer relationships, using creative performance tools, building capability, and radical inclusion.

Unlike co-design and participatory design projects, the changes here are fostered within people's way of thinking, communicating and interacting with others and not in creating or reformulating a specific system, tool or process. Instead, the objective is to provide a sense of agency and confidence in participants as a means for social support that did not exist beforehand. Consequently, the possibility of delving into individuals' lived experience of stroke

and recovery generates an understanding that can underpin any other project seeking to make a difference in this context.

As implemented in this doctoral project, the Green Screening workshop does not seek to directly transform the way peer support is delivered within the Stroke Association, nor it provides stroke survivors with direct access to healthcare or policy organisms to collaborate with.

Although participatory in essence, this workshop does not touch on the realm of participatory design either. Very much like the work of Light et al. (2009), it is an exploration of imagination coupled with creative expression and movement as a way to motivate new ways of thinking. Moreover, it proposes a process to involve people within peer support contexts, on the one hand, and design environments, on the other, with participation barriers.

In this sense, the project offered an open space for people with participation barriers to become creative about personal experiences underpinned by desire as a way to offer new possibilities for people whose life has transformed after having a stroke. The project succeeded in consolidating ideas to some degree through the performative outputs generated during each session. Nonetheless, a more transcendent process would be needed to consolidate the ideas generated during the workshops and disseminate them outside of the group as a way to share the generated knowledge and for relevant institutions and individuals to act upon it.

8.5 Recommendations

This research contributes to the performance and HCI design fields by providing a detailed account of the work with diverse stroke communities experiencing various iterations of the Green Screening workshop. Such an account might help others who wish to work with under-served communities by implementing similar performance methodologies.

After carrying out the project, a number of recommendations for design researchers and performance practitioners are drawn here to provide a well-rounded perspective of the process (its challenges, successes and the unexpected) and practical guidelines for implementation.

8.5.1 Embodied Imagination in practice

It is important to consider that the effects of stroke are multidimensional and, in many cases, longstanding. Particularly for this research project, the focus was placed on the stroke survivors' self-perception and their need for a more inclusive and adaptive societal infrastructure. Sharing experiences and related

issues under a participatory performance approach supported by mixed reality scenarios seeks to empower participants and acknowledge their life changes more positively.

Projects following this approach would benefit from being informed by the same core concepts: self-expression, imagination, active participation, and mind-body connection. Under this framework, participants can reflect on new possibilities while gaining a sense of belonging and empowerment when collaborating with others.

Imaginative possibilities for self-expression

Offering participants the possibility to articulate personal desires and ambitions under a performative framework allows them to explore themselves. Participants can consider aspects that are usually ignored by themselves or others, have never been considered before, or have been neglected on purpose because they were not accessible in real life.

The methodologies proposed in this work permit a prospective and contextualised approach that can access people's social identities and circumstances, particularly around constraining aspects. Furthermore, beyond accessing them, it permits people to play with such elements under a *what if* approach pushing the boundaries of current reality.

This can be useful when generating a space for exploring identities and communities as a means of social support. It is also an approach with potential for design-led initiatives in HCI that seek to explore design futures informed by the lived experience of communities that sit at the margins of society (e.g. a stroke survivor with aphasia that could not engage in a focus group or an interview due to speaking limitations).

Meaning-making through performance and digital worlds

The workshop promotes a physicalisation of desire. This is supported by the technical infrastructure attached to the workshop's narrative. Thanks to this, participants can embody desire through metaphors, enacted imagination and guided imagery.

Meaning generation is established through participants' agency in two ways: by enacting personal storylines based on fantasy and desire (as discussed in the previous section) and by observing others doing it. Hence, the process requires to be rooted in community interactions through performance-driven exchanges.

Furthermore, the digital worlds created by the interactive scenography assist in the creation of a hospitable and open space within the workshop session.

Split Britches' methodologies, and particularly Lois, seek to guide participants through the modelling of alternatives and the stage of questions about their own experience within these spaces.

The methodology explored here also provides the technical infrastructure to enhance such purpose by generating unconventional fantasy worlds that, otherwise, would only be available to the rest of the participants through discourse and the use of physical prompts. Thus, interactive technology speeds up and strengthens the sharing of fantasy imaginaries and, consequently, the collective meaning-making.

Embodied imagination through this process should permit participants to explore non-existent worlds, fantasy storylines or alternative circumstances. As a result, this will allow them to understand their reality better by comparing it with such imaginary suggestions.

Discourse and enactment

Articulating personal narratives in a performative context is carried out through physical and verbal activity. This strategy encompasses different complexity layers. Firstly, it concedes participants to go through an out-of-the-ordinary experience, considering that in social support contexts they are mainly required to engage in conversation.

Secondly, creating and performing desire-led fantasies encourages using different resources besides talking. There is potential for participants to pay attention to the action more than to the subcontext, thus focusing attention beyond their constraining circumstances. For example, a participant that wishes to become more playful with the mixed reality world and, within their possibilities, attempts to move and interact in novel ways, like leaving aside their walking aids or singing in front of their peers for the first time.

Thirdly, by opening room for a diverse set of skills when performing (such as talking about it but also performing about it), it is also ensured that people can make use of their preferred means of communication. More importantly, it ensures that people with disabilities or other constraining circumstances can be included in the process through their own means, skills and possibilities. This responds both to Split Britches' feminist approach to radical inclusion and to the importance of HCI expanding its design space to involve under-served communities.

Performance outputs as memory work

Besides the in-session experience, the importance for participants to transform their personal narratives and how they envision themselves within society has

been highlighted. This type of sessions will benefit from creating performance outputs such as the *wish you were here* postcard or the *public service announcements* during the activities.

The outputs are generated through the interactive scenography and enable people to share their fantasies with the rest of their peers. Furthermore, they are also a *take-home* memory about the alternative possibilities and their updated personal narrative. This element can then be shared with others outside their peers, such as family, friends, carers and other community members.

This project could not fully explore the workshop's long-term effects, for instance, by studying how having a single session compares to having three or more sessions. Nonetheless, the performance outputs showed potential for a viable route to preserve the memory of the experience and communicate it with people outside of the peer circle.

8.5.2 Workshop practical guidelines

This project aimed to explore ways to engage stroke survivors in a performance-based workshop supported by interactive technology as a way to facilitate peer social support. The work paid attention both to the workshop's design and the delivery skills and strategies required when implementing the participatory performance methods discussed in this thesis. Guidelines on the second one are provided next.

Role of the facilitator

The workshop facilitators play an especially critical role. They are crucial to making people feel comfortable, driving and helping with improvisation and managing the transitions between stages. This has implications for how easily this format can be used elsewhere.

Facilitators manage the group dynamics (e.g., allowing everyone to contribute) and participants' engagement (e.g., how often they contribute). Some participants are ambivalent about taking part in the sessions, and some are anxious about self-expression and sharing personal concerns. In other cases, participants have had previous experience in the arts, which gives them pre-conceived ideas about what is expected and whether they are skilled enough to participate.

Overall, findings from the studies reveal that facilitators should understand the feminist participatory performance ethos to promote inclusion and diversity during the exercises. The facilitator plays a multifaceted role. Community contexts demand that objectives and strategies are instantly adjusted. In this area, the need to establish facilitation guidelines is still undeveloped. This

endeavour would enrich socially engaged performance practice and research replicability.

For instance, during the third study (see Chapter 7), the workshop format was extended, and there were many participants. Lois was quick to *read the room* to determine the best way to build rapport with the group. Some participants were reluctant to engage, and she had to balance the dynamics between engaging the ones who wanted to participate and not forcing the passive audience to join.

In summary, the facilitator's role is an essential element of the workshop. Activities require structure and adequate guidance. During some of the workshops, the idea of deploying the interactive scenography to the groups was discussed. Stroke communities liked this idea because they considered they could use it more often. However, the performance practitioners had concerns about embedding the feminist participatory principles into the technical interface. This question remains unexplored but perhaps suggests that a facilitator is essential to running the workshop.

Group dynamics

Setting the workshop format into a peer support context is critical for the process. The activities are enriched by collaboration and the construction of collective storylines. Nonetheless, the group dynamics are in constant transformation. It is possible to detect a diverse range of engagement, including the participant as either part of the audience or as a performer, but also the participant as co-director giving prompts and suggestions to the person performing, or as co-performer building a story together with other performers.

Furthermore, passive audiences can also coexist and impact group dynamics. Although they do not directly engage in the activity, their presence affects the performance environment by capturing their attention at specific moments or disengaging at others, similar to a more traditional performance context.

It is critical to acknowledge both the potential of these dynamics and the challenges they might convey. Group dynamics can be transient, and participants might experience different degrees of engagement during the session. As previously discussed, the facilitator's role is key to guiding these dynamics and ensuring concordant interactions. Although challenging for following a pre-defined format, by permitting people to engage as desired and change their level of engagement throughout the session, the workshop establishes a fluid democratised spectatorship characteristic of Split Britches' radical approach to inclusion.

Workshop formats

At the end of this research through design exploration, the Green Screening workshop resulted in a set of complementary activities that can be selected and organised by the workshop facilitator(s) based on the session's objective, the group dynamics and the available resources (see each fourth section in Chapters 4, 5, 6 and 7 for more information).

Nonetheless, the findings suggest that the best approach is to open up the sessions with a warm-up activity that gradually integrates the technology and the performance exercises. The main activities can be implemented and expanded upon each person's methods and facilitation skills, but they should primarily be crafted for the specific participants engaging during the session. The key focus here is to generate fantasies, metaphors or stories through gestures and body movement that permits to enact and embody them.

Finally, closure activities must conclude the performance exercises. During this time, performance outputs are generally produced as a takeaway of the experience. This is also an opportunity to debrief participants, gather final reflections about the experience and answer any questions they might have. Ultimately, it is the facilitator's job to ensure all participants (whether directly or indirectly engaged with the activities) are warm down and leave this inclusive and creative space with a new understanding of the potential for fantasy and desire exploration and how it supports understanding their current reality.

The interactive scenography

The interactive scenography is a low-cost, portable technological infrastructure. It is built on three pillars: physical space, digital environment and workshop's narrative framework.

The physical space is targeted with the implementation of Kinect infrared motion sensing, which facilitates a broader performance area subject to the constraints of the room available. Furthermore, the space for the workshop should be respected; thus, the technology requires adaptability of setup (i.e. room layout, sitting, tables or light sources). This also discards the need for a physical green screen and ambient light, as was the case for the original Green Screening workshop format (see Chapter 4).

The digital environment must be adequate for people with diverse communication and movement problems. It requires visual simplicity to avoid disorientation (i.e. removing falling shapes in the last scene to prioritise fantasy enactment) and responsiveness to small gestures like finger movement. Moreover, the technical equipment requires a good quality level; particularly, the screen's size and resolution are critical to providing an engaging experience.

The narrative framework and the session's structure need to elicit and develop movements that build into the enactment of fantasy through the interactive scenography, e.g. using a warm-up exercise to introduce the technology smoothly and frame the improvisational character of the activity.

This open-source project is available for creative practitioners wishing to implement the technology (see Appendix A).

Immersive experience facilitated by technology

Throughout the project, the interactive scenography was deployed in multiple spaces. This generated discussions within the multidisciplinary team about the ideal setup for the workshop. Halfway through the project, there was enthusiasm for replacing the screen with a wall-size projection. The intention was to provide a more immersive experience during the workshop (e.g. participants could interact with their life-size abstract silhouettes).

Although this hinted to be aesthetically powerful, as observed in the Media & Arts Technology's performance lab (QMUL) when developing the technology, it was discovered that a community context was much more diverse. The third and final workshop format was carried out using a projector. However, this was provided by the community centre, and it did not have a powerful resolution. Furthermore, the room assigned for the sessions had a rectangle-shaped layout and multiple windows in the ceiling.

As a result, the projector was challenging to place in the room to avoid trip hazards. Due to the shape, it was also impossible to position it very far from the wall, projecting in a bigger size than the usual screen, but not as big as initially envisioned. Due to the resolution and the multiple windows (on a very sunny day), the projection's colours were pale and slightly blurry. This did not directly affect participants' engagement during the session but also did not create the expected immersive effect.

8.5.3 Community roles

Research reported that community-based interventions available for stroke tend to focus on individual outpatient communication to monitor health, ignoring the communal aspect (Hamilton Health Sciences 2018, Vloothuis et al. 2019, Chumbler et al. 2012). The ones that acknowledge the power of community are at risk of limiting the face-to-face interaction reach due to practicality factors (i.e. it might be more accessible for the person to connect to an online forum than to weekly travel to a community centre) (Newell et al. 2009, Kelly et al. 2017, Ostwald et al. 2014).

The fewer number of interventions that congregate people tend to be firmly focused on physical activity (Obembe & Eng 2016); these highlighted the importance of peers encouraging each other, having a facilitator to provide support, and the possibility to try and learn new things. These elements need to be integrated into the methodology's ethos to offer a stroke-focused intervention that meets participants' needs (Salter et al. 2010). This research project also blends self-expression, creativity and fantasy sharing.

Peers for community support

Studies in this context highlight the importance of community programmes explicitly created to provide emotional, practical and informational assistance (Salter et al. 2010). Social support is mainly based on the positive influence of significant relationships with family and friends, as well as peers going through the same experiences. The latter can be a valuable asset in reintegrating stroke survivors into society while promoting trust and familiarity.

Diversity within the community

In the realm of HCI, stroke communities can be classed as a socially excluded population typically seen as vulnerable (Aldridge 2014, Mechanic & Tanner 2007, Larkin 2009). However, a design that engages stroke and other underserved communities must advocate for a more inclusive framework. Findings from the present project highlighted the need for a multidimensional conception. Stroke survivors can present themselves as vulnerable people but also as resilient, visionary or isolated, to mention a few. There is no single conception that can encapsulate their identity. Furthermore, framing the community as vulnerable has raised concern about focusing on inaccessible elements instead of exploring alternatives for doing activities and integrating others (Vines, McNaney, Lindsay, Wallace & McCarthy 2014).

Gatekeepers to the community

Working with communities classed as vulnerable encompasses the existence of gatekeepers caring for and protecting them. These gatekeepers regulate access to the community and are the first point of encounter with them. To establish a successful relationship, it is fundamental to understand the community's characteristics, context and language so that effective communication can be established first with the gatekeepers and ultimately with the community.

Planning, narrative and timelines must account for the gatekeepers when conducting design-led or socially-engaged artistic projects under this thesis'

framework. This could hinder or block the process if not done carefully. As reported in the findings, in this case, the stroke group coordinators were initially apprehensive about a technology-based workshop. They were worried whether they had the proper infrastructure in the community centres to accommodate the technology and thought that this technology-based approach could cost them money.

As a final reflection, the language is especially critical when introducing the workshop. People can be nervous about *technology* and *performance*, so the more these elements are discussed using specialised terminology and descriptions, the less comfortable people can feel participating. Transforming the narrative into informal language is beneficial; for instance, presenting the workshop as *trying out a group video game* would be much more effective and arguably just as accurate.

8.6 Directions for future work

As discussed in Chapter 3, this project is multidisciplinary. Although this enriched the methodological approach, it also came with certain limitations. A narrow scope had to be established between the creative freedom of performing arts and the systematic design structures. Furthermore, the methodological rigour of research had to be paired with the subjective qualities of the lived experience; thus, the data collection methods were outlined under a qualitative framework. During the early stages of the work, this raised concerns about the need for a more systematic approach that could effectively measure the workshop's therapeutic effects (i.e. having a controlled group experiment instead of a community-based study).

Although questions were addressed and the experiment structure was discarded because this is not a clinical intervention, the need for a more systematic approach persists. A key question is if it can be objectively determined whether participants' range of movement increases from the first stage of the workshop to the last, and how this impacts their performance, self-perception and collaboration with others. One option could be to use computer vision techniques to measure *optic flow* as an index of body movement during each section of the workshop. Future work is required in this area, exploring how to implement effective computer vision techniques to measure movement and detect participants' emotion recognition, body postures, and gaze. When paired with a qualitative assessment, these quantitative elements can be used to provide a richer account of the experience.

Another primary challenge in this collaborative project was meeting the constraints of each stakeholder's agenda. Gatekeepers limited access to the stroke support groups and, at times, it took longer than expected to find groups willing to participate in the project, particularly with the three-day format. Gatekeepers (usually Stroke Association officers) were worried that the project's technology could be overly demanding for stroke survivors.

On a similar line, stroke group coordinators were initially apprehensive about a technology-based workshop; overall, they wondered whether they had the proper infrastructure in the community centres to accommodate the technology. They also tend to think that a technology-based approach could cost them money.

Split Britches, in contrast, was willing to engage with diverse groups around England. However, they divided their time between the UK and New York City; hence, finding dates that matched their schedule with the groups' available times meant that sessions had to be booked six months in advance. In turn, this caused a delay in the research milestones.

Future work requires a more consistent public engagement strategy: building rapport with potential participants and their gatekeepers and transforming science-based narratives into inclusive ones that invite participation instead of hindering the process.

Regarding the technology development, it was discovered that the current interactive scenography still requires to be controlled by a technician during the sessions. Following design iteration should focus on redesigning the system by replacing the Kinect sensor with a webcam or mobile camera and implementing updated motion tracking alternatives, such as computer vision techniques for face detection, segmentation and localisation (Kumar et al. 2019). Workshop facilitators and stroke groups would benefit from a user-friendly interface that they can operate instead of requiring a technician during the session.

Due to the project's scope, this thesis did not include other equally important and relevant topics. However, it is worth noting that there are thought-provoking projects studying other feminist approaches to the HCI realm, impacting design practices and overall technology philosophies. Similarly, this project did not explore participatory feminist research approaches such as Feminist Participatory Action Research, neither it discussed the potential of Split Britches' methods as social research tools.

After the conclusion of this doctoral project, there is an opportunity to continue exploring Embodied Imagination as a multidimensional concept that touches on socially engaged performance practice and design (both in HCI and as a social factor). Further work would benefit from creating a fully co-design

project where the community is engaged at all stages of the project to delineate how peer support could benefit from interactive technology and participatory performance methods.

Due to the COVID-19 pandemic, a broader public engagement strategy could not occur. The objective is to disseminate the performance methodologies and technology developed for the Green Screening workshop by engaging a wider community of stroke survivors and establishing a two-way conversation with creative practitioners.

However, there was an opportunity to capture some insights from socially engaged creative practitioners working in similar areas. In the future, this methodology can continue working with stroke survivors and people with brain injury. However, it could also be implemented as a social support intervention for a diversity of under-served communities, such as refugees and immigrants, socially isolated older adults, and people living with disabilities.

It is also a personal interest of the author to create a toolbox for facilitation inspired in the Green Screening method but opening up the opportunity to engage other type of communities.

Of equal interest is to study how Split Briche's and other creative's participatory performance methods can be digitalised to enable remote community collaboration, performance and creative exploration, as well as co-design approaches.

In summary, future work recommendations suggest that delivering the workshop to more stroke support groups, training facilitators and furthering the methodologies should continue to be a future ambition of Split Britches and the author of this thesis. Further evaluation and research should continue exploring the workshop's benefits and values, particularly with a more systematic approach.

8.7 Concluding remarks

While informed by Split Britches' feminist participatory performance methods, conducting research through design brought a rich and prospective understanding of stroke survivors' lived experience to the HCI realm.

Accordingly, the project's multidisciplinary nature welcomed collaborations from diverse stakeholders, placing community stroke support at the core.

This project used the experience of peer stroke support groups to re-design the Green Screening workshop: a participatory performance and interactive technology workshop to explore fantasy and desire. Through looking at their performance and achievements through the sessions, it was possible to reflect

on elements needed to stimulate the generation, exploration and sharing of personal narratives with peers and others.

This thesis proposed a framework that couples participatory performance methods and interactive technology to contribute to social stroke support. Simultaneously, it argued that such a combination could bring a rich, prospective and political understanding of people's lived experience to the HCI realm. The approach integrated artistic and community principles found in performance practice that can inform design through lived experience.

The methodology produced for the Green Screening workshop brought rich opportunities for community support and design altogether. The narrative process and visualisations implemented during the sessions successfully encouraged a rich repertoire of improvised movements. Furthermore, the multidisciplinary design process permitted the selection and development of strategies and techniques that resonated with the stroke community as co-producers of both the creative experience and the workshop formats. Equally important, the communal aspect was paramount in achieving these results.

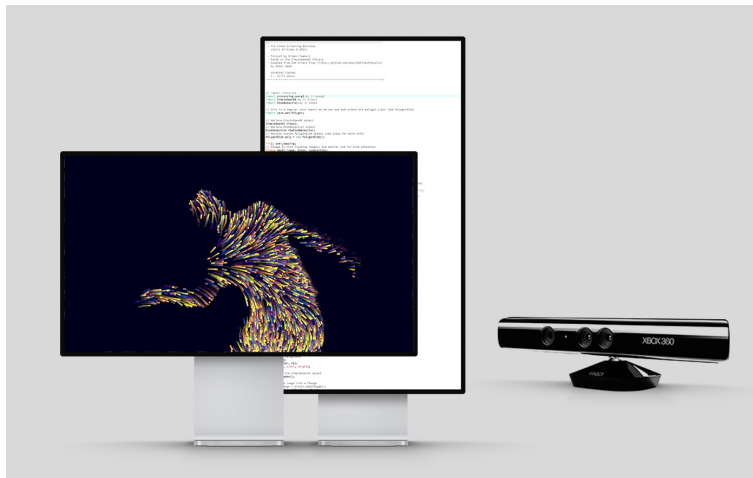
Appendices

Appendix A

Interactive Scenography: open-source software

The Interactive Scenography system is described in section 4.4.1. The open-source software with code files is available at —

<https://github.com/RosellaGalindo/GreenScreening>



A light and portable system based on Kinect's **infrared motion capture**. Digitally records movement and translates it onto abstract scenes. Includes custom-built software written in **Processing language**.

Appendix B

Ethical approval I



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Queen Mary Ethics of Research Committee
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c/o Professor Pat Healey
CS410 – Department of Computer Science
Queen Mary University of London
Mile End Road
LONDON

24th August 2016

To Whom It May Concern:

Re: QMERC2016/42 – Performing Embodiment: developing interactive Mixed Reality Technology for Stroke Survivors.

The above study was conditionally approved by The Queen Mary Ethics of Research Committee on the 19th August 2016; full approval was ratified via Administrator's Action (on receipt of revised materials) on the 23rd August 2016.

This approval is valid for a period of two years, (if the study is not started before this date then the applicant will have to reapply to the Committee).

Yours faithfully

Ms Elizabeth Hall – QMERC Chair.

Patron: Her Majesty the Queen
Incorporated by Royal Charter as Queen Mary
and Westfield College, University of London

Appendix C

Ethical approval II



Queen Mary, University of London
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Queen Mary Ethics of Research Committee
Hazel Covill
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c/o. Professor Pat Healey
CS410 – Department of Computer Science
Queen Mary University of London
Mile End Campus
Mile End Road
London E1 4NS

10th October 2018

To Whom It May Concern:

Re: QMERC2018/53 – Augmented Embodiment: Interactive Technology in a Performing Arts-based Intervention for Stroke Survivors.

The above study was conditionally approved by The Queen Mary Ethics of Research Committee (Review Panel B) on the 19th September 2018; full approval was ratified by Delegated Member's Action on the 9th October 2018.

This approval is valid for a period of two years, (if the study is not started before this date then the applicant will have to reapply to the Committee).

Yours faithfully

Dr Helen Jenner – QMERC Chair.

Patron: Her Majesty the Queen
Incorporated by Royal Charter as Queen Mary
and Westfield College, University of London

Appendix D

Study 1: Field notes instrument

Stroke Survivors Workshop with Split Britches / In Company Collective

Venue:
Finish time:
Women:
Men:
Age range:
Participants using walking aids (type and quantity):
Description of the space:
General description of the group:
Description of each stage of the workshop:
Describe each participant's behavior during his or her interaction with the Green Screen system:
PARTICIPANT NO. X
PARTICIPANT NO. X
Other notes:

Appendix E

Study 2: Semi-structured interview with participants

Green Screening Workshops Follow-up session

Rationale:

We can't do a systematic assessment because the movements are too varied and a controlled comparison makes no sense. So, we will use a semi-structured group discussion to ask the participants to make direct, comparative assessments from their own experience. We want Hannah to do this, without us in the room (and definitely without Lois), so that people feel able to appraise what happened with as little social pressure from us as possible. Hannah should emphasise that she is equally interested in what worked and what didn't in order to make it better. Format is open ended questions with follow-ups as seems appropriate. We want to avoid leading questions. This should take up a maximum of 40 minutes. Preferably 30. After the group discussion we give them another chance to play with the equipment and ask them what they would like to do with it.

Draft Questions for Evaluator:

For each of these you'll need to be sensitive to whether they have a language impairment and you'll need to allow time for them to formulate their responses.

1. Please tell me about 2 or 3 activities you normally do to help with your recovery

[Notes: Ask everyone individually. Could be anything really both organised and individual.]

Possible follow-ups:

- Where do you do it?
- Who with (if anyone)?
- Is it more for exercise or companionship or something else?

2. Thinking back to the workshop last week how would you say it compares to the other activities you mentioned.

Possible follow-ups:

- Did you do anything in the workshop that you wouldn't normally do?
- What were the most enjoyable aspects? Which were the least?
- Did it feel different from normal? If so, in what way?
- How would you describe the workshop to another group like this one?

3. Do you think the others enjoyed the workshop?

Possible follow-ups:

- How do you think they found the experience?
- Did you talk about it afterwards?

4. Did you talk about this experience to other people afterwards?

Possible follow-ups:

- Who with?
- What did you tell them?
- What did you do with the postcards?

[Note: some of them did not take them away so won't have an answer].

5. Do you play any computer or video games at home? (e.g. Wii, Kinect, anything).

- Do you think you might like to use the workshop setup at home? Or somewhere else?

Then we re-start the Kinect and let them play with it - probing for which aspects they like most / least and what other things they might do with it.

Appendix F

Study 2: Follow-up questionnaire for group coordinators



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Media & Arts Technology

School of Electronic Engineering
and Computer Science

Green Screening Workshops *Follow-up questionnaire*

Life After Stroke Coordinators
(Stroke Association)

Rationale:

After conducting the Green Screening Workshop and a Follow-up session with the Life After Stroke group that you coordinate, we would like to collect some more information about the perceived effects of our interactive guided process with the participants.

Bearing in mind that the Group Coordinators are actively engaged with each group member's circumstances and that they have seen the group collaborating in different environments and activities, we have designed a questionnaire to reflect upon the results of our workshop.

Background information about the project:

The 'Green Screening Workshop' is a workshop for stroke survivors supported by mixed reality technology. We use a special motion capture system that allows us to capture and enhance body movements. Our objective is to evaluate how well the system works and to gather your suggestions on what we should change.

We aim to answer the next questions:

- How well does the workshop process engage your imagination?
- Does the technology help you imagine new possibilities?

Questionnaire:

1. Do you know of any activity that the group members normally do to help with their recovery apart from the Life After Stroke group?
 - a. If yes, where do they do it?
 - b. If yes, do they do it individually or in a group? Who is with them?
2. Thinking back to the 'Green Screening Workshop', how would you say it compares to other activities the group has done previously?

3. When observing the workshop, did you notice anything that the participants wouldn't normally do?
4. What do you consider were the most enjoyable aspects of them? Which do you consider were the least for them?
5. How would you describe the workshop to another Group Coordinator?
6. Do you consider that the participants enjoyed the workshop?
 - a. How do you think they found the experience?
 - b. Did you talk about it afterwards with the group or some of the members?
7. Would you like to use the workshop set up (Interactive Screen) as a regular prop in the Life After Stroke meetings?
8. Do you think the participants would like to use the workshop setup at home?
9. Any other comments you would like to include.

Study 3: Feedback session guidelines

Split Britches – Interactive Workshop Feedback Session

Draft Questions

For each of these you'll need to be sensitive to whether they have a language impairment and you'll need to allow time for them to formulate their responses.

1. Did you attend the previous workshop sessions?

Possible follow-ups (if answer is yes):

- Which sessions?
- Did you participate in the activities? Why?

2. Do you think the others enjoyed the workshop?

Possible follow-ups:

- How do you think they found the experience?
- Did you talk about it afterwards?
- What were the most notorious activities during the workshop?

3. Did you talk about this experience to other people afterwards?

Possible follow-ups:

- Who with?
 - What did you tell them?
 - What did you do with the postcards?
- [Note: some of them did not take them away so won't have an answer].

4. Are 3 sessions enough? Would you have liked to have less sessions or more sessions?

- Why?

5. Do you play any computer or video games at home? (e.g. Wii, Kinect, anything).

- Do you think you might like to use the workshop setup at home? Or somewhere else?

If there is time, you could also include these questions:

1. Please tell me about 2 or 3 activities you normally do to help with your recovery

Possible follow-ups:

- Where do you do it?
- Who with (if anyone)?
- Is it more for exercise or companionship or something else?

2. Thinking back to the workshop sessions, how would you say it compares to the other activities you mentioned.

Possible follow-ups:

- Did you do anything in the workshop that you wouldn't normally do?
- What were the most enjoyable aspects? Which were the least?
- Did it feel different from normal? If so, in what way?
- How would you describe the workshop to another group like this one?

Appendix H

Green Screening workshop call out



Green Screening Workshop Call Out

Lois Weaver and Peggy Shaw of Split Britches are offering an opportunity to take part in a workshop coupling interactive technology with performance methodology.

In this one-day session, participants will explore a workshop format designed as a rehabilitative strategy for people with disabilities and stroke survivors. Through performance techniques like fantasy, place, action, and impulse, participants are asked to imagine "things they always wanted to do", constructing storylines. We implement simple interactive technology to provide them with real-time visualisations of their own body movements.

The session suits those interested in working at the intersection of arts and wellbeing. Participants will also have the opportunity to take part in a workshop with stroke survivors in the future.

Cost: Free of charge.

Date: Saturday 29 February, 11.00 – 15.00 hrs.

Venue: Queen Mary University of London, Mile End Rd, Bethnal Green, London E1 4NS

How to Register? Please register for the session at greenscreeningw@gmail.com

This workshop has been devised using the feminist participatory performance methods employed by Split Britches, using performance to face life challenges and build community.

For more information please visit www.split-britches.com/greenscreening

Appendix I

Study 1: Workshop logistics

4th August testing workshop

Length: 1hr 30 mins

Time	Order	Digital Iterations
9.30am-10.30 am	Arrive and set up space need to create a more open space if possible	
PART 1: 10.30 am-11.30 am	Participants arrive, get a coffee interact with empowering silhouettes, 1 / 2 people at a time, in an informal way encouraged by Hannah and Adele	empowering silhouettes
11.30 am	Start workshop	
PART 2	Introductions: workshop team The team: CBG short intro why we are here explain what it's all about. Rosella, Patrick, Holly etc introduce themselves	
PART 3	Introductions: participants CBG ask participants to introduce themselves and describe their experience of their stroke as an image if they can. Rationalise why we are asking participants this. Commuante that we have been thinking about i.e. how this could help people who don't know what it's like to understand your experience a little better. Sometimes pictures or metaphors help others to understand etc. Give example: show icy finger of death video . If need give more examples from last session to help people. Like	Icy finger of death video

	being in a dark cave, like being in a mist or deep fog.	
PART 4	Fantasy CBG will ask participants to imagine a place they have always wanted to go to. This could be a real place or a fictional one. CBG will give some different examples to help people. Go around the whole group.	Record and find the places they would like to go to
PART 5	While we wait for Rosella to find "Fantasy" images, participants play with instinctive movement responses to the embodied movement iteration. 1 or 2 people at a time only.	Embodied movement
PART 6	Photo Moment Individually or in pairs step into someone's fantasy souvenir photo. Let participants play with and interact with moving elements. Then take a photo and print it.	Skeleton and virtual elements Printing of images

Appendix J

Study 2: Workshop setup

Green Screening Workshop Stockport & Liverpool

Tech, set up space

	SETTINGS	TO CHECK	CONNECTIONS	EQUIPMENT
1	Set Space	Detect available electricity sockets around the room.		
		Arrange chairs in a semi-circle around the Screen.		
3	Set Screen		Energy → Kinect	• Kinect
			Energy → Screen	• Monitor or Projector
4	Set Control Table		Energy → MacBook Pro	• Table and chair
			Kinect → MacBook Pro	• Multiconector
			MacBook Pro → Screen	• MacBook Pro
				• Kinect's USB
				• USB extension
				• HDMI extension (or)
				• VGA cable + VGA adaptor
5	Set Printer	Empty SD Card.	Energy → Printer	• Multiconector
				• Printer's cable

			SD Card → Printer	• SD Card (2 gb)
				• Photography paper
6	Set Green Screening System	Open 3 processing codes.	Calibrate codes	• Tape floor - movement area
		Open Personal hotspot.	Hotspot → MacBook	• Mobile
		Check how to send a blank screen while changing codes / loading pictures.	Test connection with screen	
7	Set Video cameras	Tripods in Front and Back of the room.	Video cameras → energy.	• 2 video cameras
				• 2 tripods
				• 2 SD cards
				• Energy cables
		Double check recording settings:		
		- Format.		
		- Empty SD cards.		
		- Available time.		
		Run record test.		
		Start recording 10 minutes before the workshop begins.		

Appendix K

Study 3: Workshop setup

Green Screening Workshop

Mobile Technology Workshop

Date: 17 April, 2019
Venue: [Redacted]
Set Up time: 10.30 to 11.00 hrs.
Workshop time: 11.00 – 12.00 hrs.
Packing equipment: 12.00 hrs.

Tech - Set up space

SETTINGS	TO CHECK	CONNECTIONS	EQUIPMENT
1 Set Space	Detect available electricity sockets around the room. Arrange chairs in a horse-shoe shape/semi-circle around the Screen.		
2 Set Screen		Power → Kinect Power → Screen	• Kinect • Monitor or Projector
3 Set Control Table		Power → MacBook Kinect → MacBook MacBook Pro → Screen	• Table and Chair • Master plug • MacBook Pro • Kinect's USB • USB Extension • HDMI extension (OR) • VGA cable + VGA adaptor
4 Set Printer	Empty SD Card (for Printing).	Power → Printer SD Card → Printer	• Master plug • Printer's power cable • SD Card (2 GB) • Photography paper
5 Set Interactive Scenography	Open 3 Processing codes. Open Personal hotspot. Mirror screen to avoid showing Codes & Loading pictures.	Calibrate scenes Personal hotspot → MacBook Test connection with screen	• Tape floor – mark movement area • Mobile
6 Set Video cameras	Tripods in front and back of the room. Double check recording settings: - Format - Empty SD cards - Available time Run record test. Start recording 10 minutes before the workshop begins.	Video cameras → Power	• 2 video cameras • 2 tripods • 4 SD cards • Power cables

List of Equipment

- Kinect camera (model: 1414)
- Kinect camera USB extension and power supply
- MacBook
- Computer (long) charger
- Photography printer
- Photography printer power supply
- Photography paper
- USB extension (4 m)
- HDMI cable (4 m)
- VGA cable
- HDMI dongle
- VGA dongle
- Master plug(s) & Extensions
- Video cameras (2)
- Video cameras Power supply (2)
- Tripods (2)
- SD cards (6 – 32 GB each)
- SD card (1 – 2 GB)

On site:

- White screen
- Projector
- Projector's power supply
- Table (1m x 1m)
- Electric extensions (2 – 5 m and 6 m)

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