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Dancing Together Apart

Carol Brown, Victoria, AU, carol.brown@unimelb.edu.au

Monica Lim, University of Melbourne, AU, monicamylim@gmail.com

At a time when the Choreographic takes on a renewed sense of possibility as we adapt to the rhythms of an epidemiological model of society, dances of remediation, that collapse the distinction between interpersonal and infrastructural modes of sensing the world, offer, we argue, possibilities for perceiving and making sense of our changing lifeworld's (Bratton 2022). In this writing, we reflect upon an artistic research project that composed choreographic relations between corporeal, perceptual, conceptual, and informational modes, bringing attention to the expressive possibilities of attuning to, and regulating each other, even at a distance. *Mental Dance* involved multiple agents shaping states of distributed attention across physical and digital networks. In choreographing the work, we drew upon current neuroscientific research into the Bayesian Brain and Predictive Coding. Whilst applying such an approach to consciousness may appear systematic, even mechanistic in providing a model of how the brain processes information, our interest as researchers and performing artists lay in creating the conditions whereby we could test the limits of corporeal freedom within the parameters of an experiment across disciplinary spaces during viral times. Embracing brain-based computational psychiatry eschewed more familiar pyscho-somatic approaches embedded in psycho-analytic methods, opening a new paradigm for mediated performance.

Mental Dance explored the intersection of dance, interactive sound design and psychiatry through a unique performance system that blended diverse 'mental spaces'. Hagendoorn (2019) describes 'mental spaces' as 'temporary thought assemblies that are constructed as one thinks and speaks' (756). In our project diverse languages of movement and music were remediated through AI and the flux of somatic attention expressed by two live performers. Realtime data generated by the dancers' movements and tracked by AI pose recognition software shaped a choreosonic environment for an online audience (Brown 2021). Our artistic research method drew upon dancers' intuitive kinesthetic and haptic sensory awareness and AI's capacity to learn, together with an appropriation of theories of the Bayesian Brain. Staging provocations from neuroscientific research and psychiatry, we mimicked the idea of the clinic as a site for soma-sci experimentation. In generating an empathic performance system that addressed relational intimacy and neural resonance at a distance, we navigated the uncertainty and unpredictability of repeated lockdowns in Melbourne, Australia, countering despair and ennui with the excitement and challenge of connecting through remote co-presence. In *Dancing Together Apart*, we probe the wiring of relations and the igniting of ideas

that sparked this collaborative performance and propose choreosonic improvisation as a method to bring current neuroscientific research into the virtual studio where it can inform and influence the direction of new work and cultivate an altered state of kinetic intensities held between agencies, human and non-human.

Disrupted Sense

How might a multi-sensory artistic research project exploring mental states have something to offer our evolving incorporeal lifeworlds (Grosz 2017)? With COVID19 we are in unprecedented terrain as it is the first trauma to be experienced simultaneously by all peoples on the planet (Cachopo 2022). For the performing arts this has had profound repercussions that are impossible to ignore. As Portuguese philosopher João Pedro Cachopo observed, 'there is despair in the air' (2021: 28). Whilst we fear infection by the virus, we also encounter particular risks given our art forms – dance and music – reliance upon collaboration and the assembling of performers and audience in a shared space and time. If as Cachopo describes it, the 'event' of the Pandemic is a disruption to the senses that bind us to the world, dance, and music in pivoting to digital modes of transmission, have shifted their relations with digital infrastructures and the incorporeal. In transforming the way we live, the Pandemic is also changing *how* we make performance and disseminate it. It has forced us to redefine how performance 'takes place' and embrace more fully new varieties of extended agency that combine the physical and the digital through a technological milieu. Cachopo describes this reorientation as a process of metamorphosis and mutation for, as the virus mutates so are we mutating, changing our practices, re-situating performance and expanding the sense of agency and presence (2022). This work of metamorphosis may also have benefits, he argues, for our mental wellbeing if we resist technophobia, nostalgia for a pre-digital world and apocalyptic thinking.

In this writing we call for transmedia collaborative approaches that expand corporeality and embrace digital remediation as tools, not just for making new modes of performance, but also for creating the conditions for health and wellbeing. In redrawing meridians of the distant and the close, the inside and the outside, brain and body, we seek to make available species of performance that can sustain a vital relational nexus in touchless collaboration.

Transcending dichotomies of presence and absence, our choreosonic event, generated an ecology of practice that went beyond our individual histories as performing artists and researchers. Dancers Luigi Vescio and Jordine Cornish, vocal improviser Austin Haynes, Interactive Sound Designer Monica Lim and Choreographer Carol Brown collaborated through online Zoom workshops across eight months during Naarm (Melbourne) lockdowns in 2021 and Neuroscientist Marta Garrido (who leads the Cognitive Neuroscience and Computational Psychiatry Laboratory at the Melbourne School of Psychological Sciences, University of Melbourne) engaged in research meetings, witnessed rehearsals and provided resources in the form of readings and interviews online and in situ during this time. Unable to rely on a shared

site for performance, or a singular place, we generated a non-place, a virtual studio that blended distance and proximity through an interactive system. In this way, we moved beyond seeing the Pandemic as a threat to our livelihoods and capacity to work together, as it posed a new opportunity to experiment, improvise and make discoveries about how to work together without touching or sensing in situ. Taking a position in relation to the digital, our integrated approach eased a sense of isolation and empowered us to experiment within a techno-habitat.

Choreosonic Improvisation

Provocation #1: How to dance with the music of the 'madness' inside?

Mental Dance was initiated through the question: how might music and dance in relation affect a sense of wellbeing through digital performance? Little attention has been given to the nature of the interface between dance and music, and the brain-body matrix that is particular to the auditory and kinesthetic senses working together and how this impacts upon our sense of wellbeing (Sánchez-Colberg and Karalis 2019). Yet dance and music have a deep history of entangled relation in fostering health and wellbeing including through ritual, therapeutic, cultural, and experimental performance. Recent developments in tools like EEG (electroencephalogram) and MRI / fMRI (functional magnetic resonance imaging) have enabled neuroscientists to shed light on how the brain responds to musical stimuli and how the mind dances through the firing of neurons in a 'dance of attention' (Manning 2013).

Interactive performances that employ gesture to activate sound and combine human and non-human agency in driving compositional choices – choreosonics (Wijnans 2010) – offer an evolving paradigm for experiencing and understanding these underexplored synergies between music and dance. Building on the work of Wijnans, we sought to expand the potential for the synergetic cross modal mapping of sound and gesture, at a distance. Through AI Pose Recognition software, the live mapping of sound by dancers working in different spaces created a shared context where improvisation, as a constant state of surprise, could be cultivated. Centered around online weekly workshops in Zoom during COVID-19 lockdowns, we introduced the performers to neuroscientific concepts – Bayesian Brain; Oddball Paradigm; Neural Network; and Spectral Hearing – using illustrations and hands on experiential anatomy tasks during warmups. In applying this new knowledge, we developed a lexicon of neuroscientific terms through four choreomusical scores: Noisy Voices, In My Head, Lucia and Neural Network.

The theory of Bayesian Brain, introduced to us by Garrido provided an analogy for this choreosonic scoring method as we incorporated somatic generated and externally triggered, word and sonic prompts (Harris et al 2018). Antonio Damasio (2017) has

described how living systems act in the world to minimize surprise and persist in a future shaped by uncertainty. The Bayesian Brain hypothesis argues there is a deep underlying structure behind our actions that relates to the laws of living systems. Brains predict the future and enforce a desired one. Trained in somatic informed contemporary dance and interactive composition methods with their emphasis on wholistic approaches to mindbody awareness and sensing, feeling and action, our focus on the architecture of the brain through recent neuroscience theories, offered new tools for us to explore the choreographic and question our understandings of what happens in music-dance improvisation.

Our title *Mental Dance* is intentionally provocative, suggesting a paradoxical body subject to what dance artist Brooke Stampe (2022) terms '(dis)orders of the kinesthetic'[1]. Such disorganisations of mental and physical states that occur through interdisciplinary performance improvisations might, we contend, bear uncanny resemblance to some of the DSM-5 definitions of mental health conditions (American Psychiatric Association 2022). Impulsiveness for example is listed as a characteristic quality in someone suffering from a Mood Disorder. Impulse and impulsive movement are valuable in a dance improvisation as ways of allowing for shifts in corporeal state and opening up surprise and the unexpected yet might be considered atypical and disinhibited behaviour when seen out of context. For us as collaborators, moving away from a paradigm of consciousness as existing at the threshold between the internal unconscious and external stimuli, opened new methods for not only engaging with contemporary neuroscience but also working with the distributed attention of performance taking place in different dimensions (**Figure 1**). In this way, choreosonic improvisation became an analogy for current thinking emerging from theories of the Bayesian Brain. The idea that our brains are like computer systems, continually updating experience from bottom up and top-down processes and priors, whilst seemingly anathema to the privileging of whole-body awareness and mindbody integration in somatic dance knowledge, offered an alternative way of perceiving how we creatively and artistically process experience through improvisation.

Visualising the architecture of the brain at the start of our rehearsals had a profound impact on the dancers. Luigi described:

I found it beneficial to begin rehearsals with Carol sharing neuroscientific concepts, to practise approaches to embody these and apply them within choreographic thinking... To begin each rehearsal with a focussed learning provided an entry back into our conceptual world and related this mental space to the three-dimensionality of our bodies, to our tools of creation...These variables allowed us to research the

relationship between new neuroscientific/mental health concepts on the shared and evolving movement vocabulary and choreographic systems we were creating.
Vescio 2021

The analogous mapping Luigi describes between disciplinary knowledges – translating neuroscientific concepts into movement materials – is a feature of human creativity and intelligence. Cognitive scientists, Fauconnier and Turner (2002) claim this ability to create analogies, relies on our capacity to integrate conceptually, and blend. When we combine the elements of different mental spaces or disciplinary knowledges into new configurations or blends we conceptually integrate them. Accordingly, mental spaces are temporary constellations of enacted thought, constructed as we think and move in a relational matrix. Applying this thinking to a practice like improvisation where dancers are trained to stay with the moment of movement and the impulse it gives rise to, we think with the body in constellations of kinesthetic transmission and embodied cognition. In improvising, you think with the next impulse, not further, and not back.
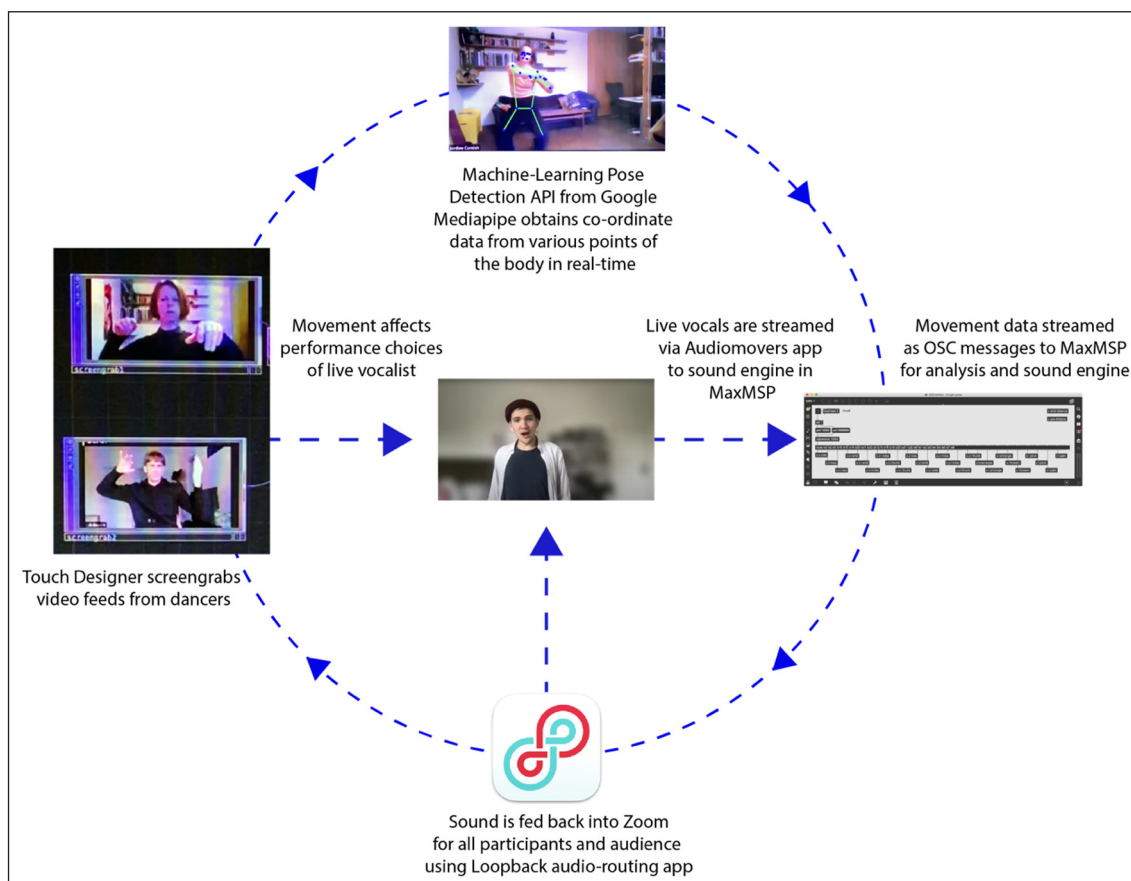
Figure 1: Performers Jordine Cornish, Luigi Vescio and Austin Haynes. Diagram of networked relationships in *Mental Dance*.

The Bayesian Brain hypothesis is based on the Predictive Coding theory which assumes algorithms prepare for the future by changing the parameters of their predictions to minimize surprise in case they are confronted with the same situation again. This might seem counterintuitive to creativity where novelty, surprise and the unexpected are celebrated. However, Cognitive Scientists are increasingly realizing that the brain is not just a detector that passively takes in information about the world and reacts to it. Instead, it constantly shapes its vision of the world by making assumptions or inferences about the world, doing so in a *top-down* manner (meaning that higher-order concepts shape the way lower-order sensory data is perceived in the first place). The Predictive Coding theory postulates that our perspective on reality is generated by constant updates of prior beliefs and external sensory input. Accordingly, the concept of predictive coding transforms classical notions of perception as a bottom-up, emergent process driven by sensory signals. Alternatively, it proposes that perceptions are determined by top-down predictive signals arising from external cues being continually modified by bottom-up prediction 'error signals' that communicate mismatches between predicted and actual signals (Seth et al 2011).

Bayesian Inference is thought to take place on a great many layers of cognition, from motor control to attention and working memory. Accordingly, every cognitive task brings with it its own predictions, its own internal models, and unique timescales. As performing artists, we are non-experts in the field of Bayesian Brain science. However, working with Marta Garrido, we were able to explore ways of perceiving brain body relations that supported the development of a novel method for choreosonic improvisations based on this model. Insights into the relationship between top down and bottom-up processing of 'data' reinforced experiences of artistic research where intellectual and conceptual processing of ideas are met by the stimuli of sensory information and experimentation with machine learning and improvisation.

Provocation #2: Your body is the developing material for a definition of neurology

Word Prompts: Heavy head / Floating head / Headstrings / Headstrong / Head led / Out of it head

The 'top down' nature of Predictive Coding within our biological system was reflected in the prediction models and parameter tuning of the machine learning systems used for pose-estimation. Rather than being limited to the individual experience, however, the pose-estimation technology represented a predictive system trained over tens of thousands of images of people all over the world, a tool built by finding a balance between an overfitted model of the human body in the world vs an underfitted model, individuality vs homogeneity.[2] The paradox of the body in a private, domestic space

invaded and calculated by a collective, public algorithmic model was reflective of the times where public health policies on collective well-being forced limits to individual freedoms. In this way our performance system could also be read as both symptom and solution in relation to the global health crisis we were experiencing.

Neural Resonance

How we feel what another body feels is rooted in kinesthetic empathy and neural resonance. Theories of neural resonance have evolved our understanding of empathy to account for the ways that we come to know and share experiences (Limanowski 2012). Lived experience teaches us that body and mind are entwined in a dance of attention that is continually shaping perception and kinesthetic milieu (Rothfield 2021). Seeing neuroscience as a complementary rather than contradictory partner in our creative process led to terms like 'feedforward' and 'feedback' acquiring new meaning and significance in light of notions such as 'priors' and 'prediction errors'. At the same time feelings and affective resonances were our guiding compass for compositional choices and inferences within this framework.

Mental Dance demanded cognitive agility in pivoting to the incorporeal while it sought to empathise with hidden histories of mental distress and the traumata of individual stories of dancers in other eras who disappeared from the stage, in particular Vaslav Nijinsky and Lucia Joyce. Our collaboration, taking place in different frequencies, bandwidths, and lands, was a dispersed dancing together that we likened to a kaleidoscopic encounter with hallucinatory properties as it blended mental spaces that drew upon the literature of psychiatry, historical biography, and neuroscience.

At a time when our community was unable to present on stage or gather to practice physically, we likened the mandated isolation and our withdrawal from the public sphere to a kind of madness. A heightened awareness of our own mental states as a result of restrictions on our movement raised consciousness of the very real impacts of psychiatric care in the past that enforced isolation for sufferers of serious mental health illnesses such as schizophrenia and bipolar disorder. In paying attention to the perturbations of psychiatric conditions such as schizophrenia and attempts in neuroscience to better understand the underlying systems within the brain that cause disordered behaviour, we looked to the lived experience of dancers who have suffered mental health problems in the past and have as a consequence withdrawn (often forcibly) from public life and performance. In approaching *Mental Dance*, we sought to better appreciate the variability and diversity of neurological systems and explore how this knowledge might inform a collaborative interdisciplinary performance process undertaken during our own experiences of enforced isolation.

In *Mental Dance* we sought to create a dynamic interface for exploring the sonic and choreographic in relation to two case studies of dancers whose mental disorders prematurely ended their dance careers: Vaslav Nijinsky and Lucia Joyce. Their biographies sharpened attention to different historical-cultural constructions of mental health and our capacity to resonate with mental despair and chaos.

Sensing-Feeling at a Distance

In these viral times, the way we understand and situate ourselves has undergone a 'shock' that has repercussions for how we move and perform together. Working at the intersection between dance, music, technology and neuroscience, *Mental Dance* worked with these disrupted flows by creating a mutable system for distanced co-presence, *dancing together apart.*

Sensing each other at a distance drew upon a convergence of human and non-human agencies, interoceptive and exteroceptive sensations and perceptions. In the following reflection from the first part of the performance, Neural Networks, we describe this multi-sensory relational matrix:

Blindfolded, framed by rectangular tiles of a Zoom portal, one performer's T-shirt reads 'Oddball' the other 'Human Learning Algorithm'. On the screen beneath them are two smaller tiles that draw on their bodies bright green lines and points of interest (MediaPipe pose estimation landmarks). Their movements are in dialogue with a plurality of sounds – the rustle of bird wings, smashing glass, glitches, piano, distorted voices, buzzing, sliding pitches, mechanical rackets, bird song, crackling flames. With lightning-quick directness sounds – erratic and fragmented – ricochet between them. Though they cannot see each other they listen for synchronous moments when sounds cohere, and their movements are remediated. Movements echo, expand and ricochet with the frequencies, tones, marks, gestures, beats, and temporalities of mediated sounds.

We witness their immersion in a complex cacophony. They are both conductors and conducted; objects and subjects of technology; entangled, they remediate signals creating a sonic synthesis in the absence of sight, touch, smell, and proximity. Their play becomes a shared creation, at a distance. They collapse spatial distance in becoming together; sound courses through them; they sculpt the air as an instrument; they conduct frequencies; they alter pitch and recombine sounds. They are tracked and traced by an unsupervised machine learning algorithm co-creating constellations of choreosonic textures for a remote audience. Inside the computer, everything becomes numbers, outside the computer we operate through heterogeneous planes of composition.

Figure 2: Jordine Cornish and Luigi Vescio in *Mental Dance* (online), 10th October 2021. Screen capture by Monica Lim.

Choreosonic Analysis

Neural Networks, our first movement in the choreosonic cycle, was open-ended with no set duration or choreographic score. Blindfolded, the dancers had to use their aural sense and sense of contrapuntal rhythm to create a dialogue of movement through sound (**Figure 2**). They could not accurately predict at any one time what gesture would produce what sound, but they knew that putting their hands together would turn off the sound, providing a pause for the other. This shaping of sonic form was used by the dancers to find an ending together, regulating the duration of the work by 'hearing' each other's movement (or lack thereof) (see around 3:30 in the video).

We enact this performance as a space of possibility, a collective improvisation, engaging poetic, sonic and corporeal elements, with their ruptures, collisions, and reciprocities. The performers' skills in interoception and exteroception were vital to the project as they were able to sense their own and each other's movement despite working at a distance from each other.

This was particularly evident in *In My Head* (at around 22:10) when audience experienced a shift in reality and scale as Jordine's close-up face is juxtaposed against Luigi's full-body presence far away in his room. When Jordine looked in the direction of Luigi and shifted her perspective, she brought about a simultaneous increase in reverb of the sound, shifting Austin's voice from immediately present to a more faraway voice. This moment seemed to complexify the idea of the inner and

outer experience, as if Luigi was dancing inside Jordine's head, represented by the (literal) cage of his domestic space. The sound design of this movement reflects the idea of being trapped, with each intake of Austin's breath triggering an algorithmically programmed re-harmonisation of his voice constantly cycling between the tonic minor and its closest relation, the dominant major chord, but never escaping into a different harmonic space.

Interoception, as the process through which we perceive different signals arising within our bodies including heart rate and digestion, is important for self-awareness, emotional sensitivity, empathy, prosocial behaviour, and efficient decision-making (Christensen et al 2017: 2). Dancers, it is claimed, possibly through their trainings, have advanced interoceptive capabilities. In contrast, exteroception, involves the perception of stimuli originating outside or at a distance from the body. It can involve any form of sensation that results from stimuli from outside and is detected by exteroceptors, including vision, hearing, touch or pressure, heat, cold, pain, smell, and taste. In *Mental Dance* the performers calibrated their movement range, scale, energy and dynamic in relation to the stimuli of the sonic landscape that they were both responding to and shaping in realtime. Unable to see (when blindfolded) each other, sound became a compass for navigating agency, relationality, and spatiality. Performing at the interface between somatic states and sensory cues triggered by algorithms, they calibrated internal and external perceptions, manifesting moments that accumulated across time to form a compositional matrix.

In the final section of *In My Head*, Luigi and Jordine move synchronously on circular pathways within their living rooms (from 28:00 minutes), stirring the air and warping sounds of fluttering wings and voice. Austin's singing of text from Nijinsky's *Diary* – 'when I was God' – mashed up with the neuroscientific terms – 'priors are the death of me' – swells and crackles with increasing fervour as they move faster and more deliriously within their confined spaces. Unseen to each other they are uncannily in sync, generating an unsettled, perturbed state within their confined spaces. The audience watches a sense of breakdown of control, heightened in the final minute (31:30) when they propel themselves toward and away from the camera using the depth of their living rooms with velocity. This choreosonic state suggests both abandonment and restriction, as they land on walls only to push off again and confront their laptop cameras up close in proximity peering back at their imagined surveilling audience. The performance ends with a dishevelled Jordine staring into the camera and Luigi collapsed against the door frame between living room and bedroom with his back to the screen, as crackling and rustling sounds dissipate: their shared reverie and agitation felt in synchronous movement – *dancing together apart* – dissolves.

In *Mental Dance,* auditory information which came in from the sensorial pathways through the ears met external stimuli including the haptic environment of home and screen. On reflection, this folding of internal and external perceptions reinforced our thinking of brain signals as distributed, firing inside and outside the physical body as part of a neural network of resonances that we were all connected through. Relearning embodiment in viral times, navigating disruption and shock, we returned to the somatic perception of movement in relation. Taking place in different dimensions – the physical domestic space, the screen interface, and the computer algorithm of the AI – we recalibrated attention through choreomusical scores that guided intention and affect. This polyrhythmic dance was a finding and a founding of choreosonic space, a synthesis constantly being re-made and subject to shifting states of attention. While improvising vocally and kinesthetically, we search and find, make inferences and predictions, draw upon prior knowledges, and have 'oddball' moments of surprise and novelty.[3] Drawing on a deep knowledge of dancing in proximity, we experienced a new kind of performance space – one that transcended the binary of presence and absence.

Perceptual processing in a noisy world

In *Mental Dance* we asked: How might we dance-with the 'schizophrenic' tendencies of too much information? If our attention is constantly 'stolen' and our capacity to process new experiences overwhelmed by noise, how do we compose a sense of grounded relationality in the midst of unpredictability, isolation, touchlessness and change? Furthermore, how might we turn this noise, experienced through digital signals, into meaningful experiences that our nervous system can cope with and process? Philosopher of embodied cognition, Shaun Gallagher describes how motor control in dialogue with the nervous system is experienced in the body through mental states: 'we ask what a mental state is, it seems to be nothing other than a certain disposition of the body to act intentionally, plus the phenomenal sense of what it is like to do the action' (2005: 226). Consciously articulating a relationship between sound, movement and digital signal, the performers discovered mental states that were unexpected and surprising. Collaborating online and working remotely without the opportunity to convene physically, these states were navigated with psychological safety taken into account.

The mental health benefits of the arts are increasingly recognised particularly through the growth of creative arts therapies, however awareness of mental health conditions and the stigma attached to these within society persistently stumble upon cultural, historical, and often superstitious beliefs about 'madness' and insanity. Dance and music have a long history of association with 'madness,' from Vaslav Nijinsky (Nijinsky 1999) to Choreomania (Gotman 2018). The risks of being labelled

'insane' carry peculiar challenges for performing artists whose performing lives have often been invisibilised once they are diagnosed. Given this stigma, we questioned how contemporary dance and music (practiced in isolation during lockdowns), might let go of normative constraints on movement and offer the potential to appreciate corporeal and neurological diversity (Manning 2022). Like James Joyce who sought refuge from the predictability of life in his writing, might we as performing artists seek refuge from neurotypical behaviours in dances that attended to the variability of neuro-cognition in (in)corporeal dances?

Informed by Garrido's research into the oddball auditory tasks in neurodiverse people, we asked what the experience of music would sound like if disconnected from the imperative of time, and by extension, prior knowledge. Music usually unfurls through time, bringing with it an anticipation of future sounds groomed by previous sounds. Instead, in our work sound is driven by improvisation in the moment, shifting suddenly between different timbres, pitches, and amplitudes, forcing performers and audiences alike to hear only in the present. Thinking of the brain and its architecture through diverse genres of literature we created new assemblages, bringing together elements that are not usually put together. This schizoid approach, combining one thing with another, became kaleidoscopic. Fractals of sonic patterns, gestures learnt and remediated, provided the crystalline substrate for a dance of mental (dis)organisation. A peculiar mental architecture was shaped through the slippage of words and phrases culled from DSM-5 definitions of schizophrenia (American Psychiatric Association 2022), the diaries of Vaslav Nijinsky (1999) and the writings of James Joyce in particular *Finnegan's Wake* (1976) with the undercurrent of his 'mad' daughter, Lucia.

In Gilles Deleuze and Felix Guattari's project of re-engineering psychoanalysis, *Anti-Oedipus* (1977), the unconscious is schizophrenic at its core but machine-like in its processes. It creates 'desiring-machines', combining one thing with one another to produce an assemblage known as the subject. Our kaleidoscopic assemblages proposed 'empathy-machines' shaped by the material substratum of the brain's architecture analogously extending through the resonances of neural networks, making connections between private and public spaces, human and non-human agencies, present and past experiences, and the inside and outside of bodies.

Nightlessons

Existence can be found not only in beings, but between them (Souriau 2016: 106).

If existence is, as Étienne Souriau (2015) describes it, 'polyphonic', modes of existence are always plural and intermodal. A source for *Mental Dance* was the entangled relation

between James Joyce and his daughter, the dancer and calligrapher Lucia Joyce. Both father and daughter were called 'schizophrenic' (Fordham 2022: 655) though it was Lucia who suffered from a medically diagnosed mental condition that saw her become hospitalised from her mid-thirties. Joyce recalled his visits to his daughter Lucia Joyce as moments of reverie when they danced and sang together: To keep positive the unreason (Fordham 2002).

Whilst for centuries, psychosis, extremes in mood behaviour and thought processes have been linked with artistic creativity, for those who dance, write, paint, sculpt or compose (Jamison 1989), there is no straightforward relationship between psychopathology and creativity. Janka (2004) states that writers and artists' self-reports in diaries and biographies describe symptoms of hypomanic states in their intensely creative periods. Vaslav Nijinsky's *Diaries* (1999) are a good example of this and were a textual source for our creative process. Further, he argues that features of artistic creativity closely resemble many aspects of bipolar symptomatology which may contribute to highly creative achievements in the arts. Mania and hypomania lead to a rapidity of thought that can enhance creative traits such as associative fluency and combinatory thinking. Whilst psychiatric research suggests there may be a disproportionate rate of psychopathology in highly creative people (Jamison 2011), the quality of attention accorded the 'very strange forms' emotions and feelings can take in the creative process are also a norm within artistic processes. Radical psychiatrist, R.D. Laing (2010), saw conditions like schizophrenia as less a mental health condition than a social and political event. Describing how creative people are at greater risk of perturbations, he likened them to mountain climbers who adventure into remote mental territories. If the positive side of unreason is part of the creative realm, and accounts for the flashes of intuition that ignite a creative process, actual mental illness can negatively impact creativity. From historical accounts, this was the situation for both Lucia Joyce and Vaslav Nijinsky (Loeb Schloss 2003).

Mental Dance asked how might the performance of inter-relations between neuroscientific information and performance create novel events that, we propose have the power to cultivate health and wellbeing not through avoiding heightened states but through empowering heightened affective states? Artistic research in dance, neuroscience and sound design has the capacity to weave through disciplinary differences to generate altered states of expression, bringing things together that were not previously combined through blending mental spaces and states. Our polyvocal method offers a frame for thinking with the madness that dances us in states of touchless kinesthetic transmission and empathic intimacy.

Neuroscientific research into dancer's interoceptive accuracy (Christensen 2017) and somatosensory capabilities (Coleman & Turaga 2013; Mendrek 2022) demonstrates that dance has positive benefits for mental health. Our research into dancing together remotely would seem to indicate that there are also positive benefits to dancing together remotely through a remediation of the senses.

Braindances

Touch your head with your hands

Placing your hands on different surface areas of your head feel the texture of your hair, your skin

Then sense beneath the surface of your skin and hair to what lies beneath and feel the shape or your cranium

Place your hands at the front of your head where your cortex lies beneath, visualise the folds of brain matter – white and grey

Place your hands at the back of your head, feel your primitive brain, the hippocampus lies beneath

Place your hands on the sides of your temples and visualise beneath the layers of skin and bone to the fluid your brain is bathing in

Feel the shape of your brain matter, its white and grey, its textures and folds

Now move with the weight of your brain in your hands

Sense waves of neuro-spinal fluid slosh through your spinal column

The values and mores attached to head-torso relationships in most cultures tell us something about our understandings of mental health and neurodiversity. Metaphors like 'headspace', 'brain wave', 'headstrong' and 'brainy' perpetuate images of a mind/body split. As the above score solicits, in dance tasking we explored being head-led placing hands on our own heads as if to lead through different zones of the brain.

In our research process we drew upon neuroscientific, biographical, and psychiatric literature bringing together different languages and disciplinary knowledges to inform the concept of the work, creating a conceptual-corporeal blend. Choreomusical scores took hold of this material transforming it into mashups, tasks, probabilistic and choreographic procedures. These became embodied and encoded as evidenced in the below score (**Figure 3**) used for *In My Head:*

Figure 3: Choreomusical Score for In My Head in *Mental Dance*. Notated and reproduced by Monia Lim.

Underscored by a Bayesian Brain model of the world, we engaged in active inference, self-organizing through embodying choreomusical scores and resisting the system's tendency to disorder. Moving sound and sounding movement through a soma-technic system, we tested the potential for a poetic calibration of neuroscientific concepts within an experimental performance environment. Moving sound through gesture, currents of sensation shifted perceptions marking threshold moments of change with a dance of (in)corporeal encounter. If as Bratton (2021) proposes, a positive biopolitics must necessarily collapse the dichotomization of interpersonal and infrastructural modes of sensing, the challenge is to also see these terrains as mutually reinforcing. In *Mental Dance*, we created a network – a heterogeneous system – that was internal as much as external, personal and public within the condition of physically confined imaginations (Cachopo 2022). Its relationality interlaced the dancers interoceptive and exteroceptive capabilities through choreosonic improvisation within spaces that were both private, domestic and public, shared. This reciprocal system of human and non-human relations and interior and exterior spaces, proposed that becoming 'mental' might be a creative act, augmenting corporeality and spatiality through the charged affect of an interactive audio-visual screen. As João Pedro Cachopo states in *The Digital Pandemic,* digital remediation has reconfigured the topology of our lives (2022). In the digital age the sense of proximity and distance slips out of its constraints. Remediation becomes remedy and restoration of connection.

Notes

[1] In the podcast series *(in)corporeal encounters: Proposing Choreographies for the Future* Australian dance artist and researcher Brooke Stampe, talked of recent crises catalyzing a collapse of the body. Describing recent experiences of deceleration, disorder, and disorientation, she engaged a panel of speakers in speculative enquiry into this collapse as an 'emergent (dis) order of the kinesthetic' (Stampe et al 2022).

[2] Google MediaPipe BlazePose GHUM 3D Model Card, available from https://drive.google.com/file/d/10WlcTvrQnR_R2TdTmKw0nkyRLqrwNkWU/preview.

[3] The Garrido Lab undertakes research into the 'auditory oddball paradigm.' Electroencephalographic metrics associated with responses to pure-tone sounds, are neurophysiological markers of the brain's ability to implicitly encode complex statistical structure in the environment. Bird sounds used by the lab used in the EEG oddball auditory test became inspiration for sound samples and movement gestures. Patterns of predictability and surprise evoked by oddball sounds are evidenced in the EEG recordings.

Ethics and Consent

Research approved by the University of Melbourne Human Participants Ethics Committee, Reference: 21990.

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Competing Interests

The authors have no competing interests to declare.

Author Information

Carol Brown is a Melbourne-based choreographer and artist-scholar from Aotearoa New Zealand. After completing one of the first practice-led PhDs in Dance at the University of Surrey in 1995, Carol was invited to become The Place Theatre London's Choreographer in Residence. Together with composer Russell Scoones she founded Carol Brown Dances, a company renowned for the transdisciplinary reach of its collaborations across dance, installation, screen and interactive performance. The company's work has been commissioned by major festivals, toured internationally and featured in journal articles and book chapters. In 2019 Carol was appointed Head of Dance at VCA, University of Melbourne. Together with Monica Lim, Carol is creating a Digital Performance Research Hub for transmedia collaboration at the University's TrakLab Studio.

Monica Lim is a Melbourne-based pianist and experimental composer/sound designer. Born in Malaysia and then migrating to Australia in her teens, Monica has produced work for theatre, contemporary dance, installations and film, as well as solo and ensemble instrumental pieces. Her work has been presented at Arts House, AsiaTOPA, White Night, Melbourne Fringe and Arts Centre Melbourne as well as international symposia such as ISEA and NIME. Monica is undertaking doctoral research at the Faculty of Fine Arts and Music, University of Melbourne in gesture-led composition and new technologies. She is part of the research team at VCA Dance's TrakLAB and the University of Melbourne's Centre for Artificial Intelligence and Digital Ethics.

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