Movement in Mind: Dance, Self-Awareness and Sociality -

An investigation of dance as treatment/therapy

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ABSTRACT

Dance has always occupied a central place in human culture. Why humans dance, however, and the role of dance in health, are questions that have yet to be fully addressed. Research to this point has been challenged by limitations in study design, differences in qualitative/quantitative evaluations, and dualistic perceptions of body and mind. This study proposes a shift in explanatory framework and research methods for the examination of dance in therapeutic contexts. Incorporating methods and views from neurobiology, dance/movement therapy, embodied cognition, and somatic education, this interdisciplinary project presents an innovative study design and novel perspective on the role of dance as a treatment for conditions that may be understood as mental/physical or both. It concludes that the practice of dance is essential to human flourishing, and may best be understood as a behaviour that nurtures our human capacity to adapt and thrive.

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I thank you all from the bottom of my heart-feet.

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PART ONE

Preface

Over the last two years, while completing this project, I have become a Dance Therapist. I had previously practiced dance with therapeutic ends, for myself and for students in my classes, and was intimately aware of the considerable benefits cultivated through dance, in particular (at least in my case) with more somatic dance forms involving improvisation and problem-solving. But I had not formalised this knowledge into a practice, and would not refer to what I was doing in therapeutic terms; in my understanding, I merely practiced a somewhat alternative pedagogy.

In 2013 I auditioned for, and was accepted into, Canada's first comprehensive training program in Dance/Movement Therapy, at Les Grands Ballets Canadiens in Montreal, a project of their newly-formed National Centre for Dance Therapy, itself an expression of their mandate, "danser pour vivre". Here I encountered a rich and complex world, filled with historical knowledge, and challenges. Our teachers were some of the pioneers in this field - Mimi Berger, Diane Duggan, Tina Erfer, Judith Bunny, Martha Davis; Les Grands Ballets imported lock, stock and barrel the program from New York City's Harkness Centre, a reincarnation of a program previously offered at New York University (NYU).

At first I was surprised by the training's emphasis on psychology - I had not realised that dance therapy was essentially dance *psycho*therapy, with practitioners fighting long and hard for acceptance into professional organisations, and for recognition as Expressive or Creative Arts therapists. This fight has been due to both the relative "newness" of using dance as a treatment option for people in psychological distress (which is actually not new at all, I will address this below), and to the challenges of performing evidence-based research, particularly clinical trials,

with complex interventions such as dance - more so when the dance involved is improvisational and focused on client-centered movement development.

These challenges with gaining recognition, acceptance, and appropriate valuation of labour are not new to the dance field in general, and haunt many professions primarily held and developed by women. What is happening currently, however, is that this historical background is playing out amidst growing evidence that dance is, without a doubt, a powerful intervention for improving the lives and symptoms of people whose challenges may be mental, physical, or both (and as I will argue below, there may not be a difference). The success of programs such as Dancing for Parkinson's and accompanying research suggest dance is neurorehabilitative, neuroprotective, and neuroregenerative, with brain imaging technologies and improved testing protocols contributing new kinds of data to the field. What was once difficult to establish is gradually becoming incontrovertible.

There is a need at this point to redress the discourse; Dance Therapists have been operating on principles and theories from traditional psychology - which historically has focused exclusively on the *mind*, and what are termed "mental processes" - applied to explicate and elaborate a practice that is embodied, movement-driven, and socially dependent. This unhappy marriage of theory and practice has led to some sticky problems for researchers, confusion on the part of practitioners and students, and a dearth of effective studies in a field that has produced many excellent, even astonishing, outcomes.

As new research indicates, it is the wisdom of dance itself that is of benefit to people. Dancers' specially honed skills in timing, composition, body awareness, memory, dynamics and spatial projection are of enormous import and value. What needs reshaping is not the practice of dance or dance therapy, but the categorical separation of mind and body that continues to affect

our discourse and practices around health, wellness, function, and the importance of expressive movement. By shifting our explanatory framework around dance and dance therapy towards enactive/embodied cognitive neuroscience and neurobiology, we discover something of fundamental importance about what a body is, how we function, and what dance is for. As complex systems organised by oscillation, resonance, rhythmicity, and coherence (Llinas), it is evident that we live by, and through, the elements of dance - *danser pour vivre*, indeed.

While dance therapy may have developed in the back wards of mental hospitals across the United States over the last fifty years, the practice of using dance to heal our wounds, whether visible or invisible, is extremely old. It is only recently that we have, many of us, ceased to dance, especially in community settings. As the cost of what we have lost mounts, the evidence for regaining dance accrues; in the future, perhaps dance will once again occupy a central, and essential, position in society - promoting personal and social regulation, integration, and growth. Already, just at the beginning of my practice in dance therapy, I have seen people in pain from osteoarthritis, fibromyalgia, depression, anxiety, Parkinson's, bulimia, and other conditions, throw the bandage off, smile at each other, and start to move in new ways.

I have seen a future in which we come to dance.

Rebecca Barnstaple, York University, March 2016

CHAPTER ONE

INTRODUCTION

This study proposes a shift in explanatory framework and study design for the examination of dance in therapeutic contexts. Although Dance/Movement Therapy (DMT) has existed for well over fifty years and has many reported benefits, it has yet to gain widespread recognition and accepted clinical applications. Historically, DMT has relied on psychology to provide a theoretical and explanatory framework of its utility; this has resulted in problems both for conducting research and in licensing practitioners. Although DMT originally developed in the context of mental hospitals, I propose that the mechanisms of effectiveness are not best explained by classical psychological theories related to affect, drives, and attachment (although there may be elements of these at play); instead, DMT is an approach that engages fundamental aspects of nervous system regulation and neuroplasticity, and can be better understood by appealing to theories from cognitive science such as embodied/enactive cognition. Dance is a way of *knowing*, it mobilises elements that assist in organising and effecting organic change and rehabilitation of the entire nervous system. Dance fosters neurorehabilitation, and where it involves somatic practice, restores a harmonious sense of self that accords with environmental information while increasing cognitive flexibility, agility, and resilience. Dance is both an epistemology and a tonic, and I propose that it is for these reasons that it has occupied a central role in all human cultures.

Dance seems to have existed since the dawn of time; all societies, and all young humans, exhibit signs and aspects of dance behaviour. It bubbles up from the streets and favelas, in parades and parties, as omnipresent as it is forgotten and irrepressible. And yet, research on dance is still in its infancy - compared to studies of widespread human activity such as language

acquisition, Dance Studies is a very young field. Why have we devoted little attention to a human practice so widespread it would seem to be a primary activity, central to what has allowed us, as a species, to flourish? In evolutionary terms, life forms do not expend energy on frivolous pursuits if they are to survive and be successful. Humans have high-cost complex nervous systems and big brains; where could we have come up with the additional resources to devote to *dancing*? It can be argued that dance plays an important role in group cohesion and facilitates hyper-sociality, major components of the niche humans have carved out and exploited which has allowed our species to propagate across the globe. But what if dance has also been a driver of the development and maintenance of all our "fancy processing equipment"? What if we need dance in order to think, feel, and behave efficiently? What if dance is both an organiser, and a mechanism effectuating all our so-called higher processes? What if dance is the adaptation that drives our *adaptability*?

I will argue that this is indeed the case. Appealing to contemporary theories in philosophy positing that cognition is embodied, enactive, and socially constrained (as opposed to the classical view that the brain is a symbol-manipulating, information processing machine), and to neurobiology which holds that there are brain-based structures (or *activity* - I am looking at neural oscillations) underlying all our conscious processes, I will show how brain and body are not just connected - they are essentially two aspects of one and the same thing. Our central nervous system is the distribution of "brain" function throughout the body, and movement and thought are closely interlinked processes. Dance, which brings together and expresses all the elements of our movement repertoires and meaning registers, drives the development and maintains the health of our complex, integrated human systems, in both individual and group organisms.

There are two parts to this project: First, I will give a historical overview of dance and Dance/Movement Therapy - this is simultaneously an exploration and critique of various cognitive/psychological models - and I will propose an alternative view of DMT/cognition and behaviour, while addressing gaps in the literature and challenges for researchers in this field. Second, I will describe a novel research design and preliminary results of a Pilot Study to determine if this view is testable, and what kind of results it may yield.

A. A note on Interdisciplinarity

This is, of necessity, an interdisciplinary project, as it addresses and critiques fundamental notions of mind and body that are the substrate of prominent assumptions in both the humanities and the sciences. Classic cognitivism - computational Theory of Mind - has much to answer for in how questions have been framed in neuroscience and biology; psychology's pursuit of "internal" drives, emotions and memories, and the information processing (IP) metaphor, have propped up mind-body dualism for a long time. The lived, and always moving, *danced* body unifies social and individual realms, experience and expression in an organismic phenomenon that subsumes multiple levels and categories. Movement is a process, a transforming and transformative activity, and the more we understand our physical selves, the more motor initiation, patterning, and learning seem absolutely central to what we are. This "what" is an event unfolding, not a static state or condition - and this shift in perceptual framework has profound implications for our health and *function*, both "mental" and "physical" - there is no difference. By bringing together theories, insights and methods from disparate fields, we synthesise and integrate knowledge in much the way we move through a novel environment. Our experience is shaped by what we encounter, which in turn prepares us for whatever comes next. In the following pages, data, theories, and experience combine to produce new patterns

and language with human referents; a new understanding is mobilised; and the people we find are remembered, incorporated, *danced*.

B. Background - Dance and Therapy; Dance Therapy

> *They gather in a circle. Heads and hands lifted, they begin to sway. Feet lift and drop, a rhythm emerges, growing in strength and volume. Advancing and retreating, they start to move within the circle. Fingers touch, arms drop and shoulders roll back as they depart. Again and again contact is made, self and whole are asserted and affirmed. A voice calls out, they answer. They come together and apart, the intensity increasing; they freeze, hands joined in a knot above the centre. One at a time they let go and step back. Gazing at each other, they slowly back away, join hands, and prepare to start again.*

The scene described above occurred in a ballet studio in Montreal in the winter of 2015; there were eighteen of us in the training program for Dance/Movement Therapy, the first of its kind in Canada. We were not intentionally reenacting any form of ritual or ancient dance practice, but according to folk beliefs, we may well have been. Maxine Sheets-Johnstone observes in her essay of the same name, "Man Has Always Danced" (2005), pointing to the prevalence of this notion expressed by pioneers of modern dance, early dance academics and lay persons alike. Reaching back into a foggy prehistory, there is a prevalent belief, at least among dance scholars and anthropologists, that dance is something humans have always done, the first and most highly ordered of our cultural products, both eminently natural and consciously performed. Mithin has proposed that dance preceded language, perhaps even forming the basis for it (2006). Without dance, it seems that we would not be entirely human, at least not in the way we currently understand ourselves. Given the centrality of this phenomenon, it seems odd that dance has only become an object of serious academic interest in recent years; many seminal texts such as Susan Foster's *Reading Dancing* were only published in the 1980s. *Why* we dance, what dance is, and why it is thought to be a universal human phenomenon, are questions that

have not been fully addressed in literature on dance practices and their relationship with culture[1]. As dance is a bodily performance, and the ever-present body is a condition we can hardly ignore, the idea that dance is somehow ancient and deeply associated with our humanity is not surprising. What *is* surprising is how long we seem to have forgotten about it, only recently delving into the powerful healing potentials of this complex, and yet entirely accessible, medium.

Study after study has recently appeared in journals ranging from neuroscience to psychology, aging, and medicine, indicating the myriad benefits of dance for our health - cognitive, physical, spiritual and emotional (Batson, 2014; Kattenstroth et al., 2010). Neuroimaging has allowed us to detect subtle changes and dramatic effects resulting from participation in dance, and the impressive results for people with severe disorders, such as Parkinson's, seem to speak for themselves. Through exposure to dance, balance, walking and even mood are improved, and this progressive, neurodegenerative disease is, if not halted, at least slowed in its tracks (Levkov et al., 2014). Dance has been shown to reduce the chances of developing dementia by 76% (Verghese et al., 2003); dance may reduce depression (Koch, Morlinghaus, & Fuchs, 2007), and has been found to improve self-perception and decrease body image dissatisfaction (Burgess et al., 2006). After languishing for years on the sidelines of alternative treatments worthy of scientific investigation, it seems dance has finally come into its own.

[1] Kimerer LaMothe's recent publication *Why we dance: A philosophy of bodily becoming* (2015) articulates an understanding of dance as an enabling condition of human potential and as such, a vital art; I am in deep accordance with her perspective, and see my research as part of an emerging discourse in which dance is an essential human behaviour whose importance cannot be ignored or denied.

C'est quoi, la danse? (Got rhythm?)

> *The essence of music and dancing is rhythm.*
> - Buzsaki, 2006

What, precisely, are we referring to when we speak about dance? Dance encompasses a wide range of activities and phenomena, from a multitude of folk and ethnic dances to instances of elite performance (such as in ballet, ice dancing, street dance, and artistic gymnastics); seniors line-dancing, children and parents at a park or party, and a touchdown celebration or "happy dance" are all expressions of dance; popular metaphorical borrowing of "dance" (*she danced into the room, the sunlight danced across the water, the words danced on the page*) are indications of how prevalent the concept of dance is. With such broad usage, it is difficult to propose a singular definition; dance seems to imply a shift in our behavior or awareness, perhaps towards play, drama, or other expressive and movement capabilities of our embodied state.

As there is something of an exploration of the possible in dance, it resists delimitation. In this section I will submit my impressions (at this point!) of what dance is and can be, complemented by definitions from scholars within dance studies and beyond. I offer that dance is movement behavior that is felt/understood as dance, by either/both the agent performing it, or by an observer – and this perception can occur even after the "dance" has ended. We may use the term "dance" when an encounter is particularly poignant, playful, or charged with significance. This brings up the relation of dance with meaning, so that we may further say that dance is a shift in behavior that is *noticed* in some way (by the actor or witness), which articulates something about *what a body can do*.

Dance could essentially be described as a transformation of movement behavior along the axis or dimensions of Space and/or Time – an alteration of expression that resonates in the medium of our awareness. It is precisely these dimensions that Rudolph Laban refers to as the

qualities that determine the type and style of movement in dance. Laban's contribution to dance studies cannot be understated, and my use of capitalized terms in this treatise is drawn from his work and typologies (a complete outline of Laban's theory and methods is beyond the scope of this work; for an overview of concepts see Dell, 1977 or Bartenieff, Crow, and Dell, 1977).

Dance scholar Judith Hanna conducts an extensive anthropological survey in her book, *To Dance is Human*, and offers that dance is "...human behaviour composed, from the dancer's perspective, of purposeful, intentionally rhythmical, and culturally patterned sequences of nonverbal body movements, rather than ordinary motor activities, the motion having inherent and aesthetic value" (1979, 57). She further states that a behaviour must meet all four of these criteria to be classified as "dance". In this section, I will unpack the components of this definition, looking at why dance is predominantly considered a human activity, why rhythm is an essential component of dance practice, how dance embodies attention, and how dance shapes and is shaped by culture and meaning production.

There is little evidence, at this point, for dance among our close human relatives, and many have great difficulty with seemingly related tasks such as tapping along with a metronome (Zarco et al., 2009). Birds display melodic patterns related to mating (and language), and elephants have rhythm, but the range of movements produced and organised by humans in complex, often repeating, spatial and temporal patterns is prolific. Entraining our movement with a beat, using rhythm to coordinate our actions and move in synchrony with each other, and music, comes so naturally to humans that even Darwin assumed that musical enjoyment (or the possibility for it) would be widespread among the animal kingdom. As it turns out, this is not the case (Patel, 2014); at least, that's what it would seem based on the available evidence. New research may show us otherwise.

Why rhythmic entrainment comes so naturally to humans is not well understood. Patel's vocal learning hypothesis suggests that it stems from language (2014), theorizing that the adoption of complex vocal language drove brain changes that allowed us to develop this capacity. Neural resonance theory (Large and Snyder, 2009) posits that beat perception arises when nonlinear oscillations in the nervous system (endemic to all mammals) entrain, or sync, with external rhythmic stimuli; this is an attractive idea, but it does not explain why some of our close (and cohabiting) mammalian friends, such as dogs, who have regular exposure to human-produced music, do not possess rhythm and appear to have no inclination to dance.

Not all dance involves music, but we cannot speak of dance without rhythm, which is the organising principle in all movement, and is produced in self-related patterns when we coordinate our actions. Maxine Sheets-Johnstone points out "rhythm is regularly invoked as an integral element of dance if not its defining feature. Why would this be if not for the fact that rhythm is inherent in the movement of living bodies" (1999, p.320). She goes on to suggest that rhythm, together with a sense of play, and the freedom of movement allowed by bipedalism, point to evolutionary sources of dance. Bipedalism placed new demands on sensorimotor control which both required, and enabled, larger and more complex brains in a classic example of how we are both made *to* move, and *by* the movements we make. Mithen would be in agreement that bipedalism should not be underestimated as a contributing factor in the development of dance behaviour, as he points out:

> Rhythm, sometimes described as the most central feature of music, is essential to efficient walking, running and, indeed, any complex coordination of our peculiar bipedal bodies. Without rhythm we couldn't use these effectively: just as important as the evolution of knee joints and narrow hips, bipedalism required the evolution of mental mechanisms to maintain the rhythmic coordination of muscle groups. (2006, 150).

While rhythm may perhaps be the fundamental organising principle in dance, there are other aspects that I propose are equally of import. The first is a quality or type of attention, and

the second is expressivity; engagement with images and meaning production. LaMothe speaks of dance as a "rhythm of bodily becoming", the purpose of which "...is to *create and become patterns of sensations and response*" in ways that "...cultivate a *sensory awareness* of our participation." (2015, p. 4 - 5, emphasis in the original). This sensory awareness can be used as a guide to "allow our bodily selves to find ways to move in response that align our health and well-being with the challenges of the moment" (LaMothe, 2015, p. 6). This understanding of dance as essential to human flourishing, a mechanism of our human capacity to adapt and thrive in a wide variety of circumstances, is the essence of somatic practices that contribute to, and align with dance practices, whether or not these relations are explicitly stated.

An underlying quality of *embodied attention*[2] unites diverse practices considered to be "dance" both in private and public productions. In this view, quotidian behaviours such as walking, if conducted attentively, can be considered dance - and in fact are, within the field of Dance Studies, even in professional environments (Banes, 1987). This attention gives dance the power to evoke story and sensation through movement alone, no props necessary. LaMothe's vision of dance is similarly inclusive - "Any movement opportunity can offer a chance...to create and become our bodily selves...shift our sensory experience, and...do so attentive to what we are creating and becoming" (LaMothe, 2015, p. 6).

[2] A better term would perhaps be *bodily* attention; as Maxine Sheets Johnstone is quite clear on, there cannot be *dis*embodied attention, thus *embodied* anything is misleading and in many ways asserts the very body/mind divide or disconnect it seeks to address. Following a talk she gave at the IHSRC conference (2016) and a conversation at that event, I am mindful of this term and attempt to avoid empty usage of it.

Somatics and Bodily Awareness

The field of Somatics (or Somatic Education), which has grown up quietly side-by-side with dance studies over the last fifty years, is concerned with the cultivation of this subtle awareness. This collection of practices, including Alexander and Feldenkrais techniques, seems more like a rediscovery of some rather ancient concepts than a contemporary innovation. Somatic education can be defined as increasing the quality of self-awareness, through movement, in relation to the environment. By paying attention to *how* a movement is accomplished and noticing fine detail, it is possible to attune to messages in the initiation and quality of movement, fostering integration of various aspects of experience and function. According to Batson and Wilson (2014), the knowledge found (and developed) at the interstice of dance and Somatics is best captured in the concept of self-regulation: "...a conscious commitment to turn inappropriate and ill-fitting reactions into viable responses...Vital to sustainable living, self-regulation is how humans endure." (p. 3); this fits well with LaMothe's defense of dance as a means and mechanism of adaptation. As I will argue in later sections, techniques which develop awareness through movement [3]constitute a natural exploration of our bodily state, and contribute to the formation and maintenance of our complex nervous systems as they attune with surrounding conditions. As such, somatic education returns us to the fundamentals of human being and behaviour - where am I, and how do I move? Knowing this can help us to achieve greater efficiency of movement along with more adaptive behaviour as awareness fosters choice and agency.

According to Moshe Feldenkrais, a pioneer of the somatic field, "The object of education should be to eliminate...compulsive states and to help the person to acquire the ability for potent action; that is, to be able to control the body excitations and act as in the case of spontaneous

[3] Awareness Through Movement® is the name given to one form of Feldenkrais class, delivered in group format.

action." (1985, p. 11). Somatics is now part of many professional dance educations, and the work of contemporary choreographers such as Benoit Lachambre is informed by familiarity with (and study of) somatic practices[4]. Dance education includes somatics as a way of improving the quality and range of dancers' movements, while promoting health and reducing injury. Roots of these practices may be detected in yoga, which uses the breath as a means of fostering "heightened" (or different) awareness while, and of, moving. Integration of all aspects of the person, self-knowledge, and more effective action and engagement, are the focus of these practices.

The often gentle movement explorations proposed by somatics provide movers with a type of awareness that is both acute and expansive, taking in detail while building a more comprehensive experiential gestalt. Refined knowledge of postural and movement habits can eventually produce more efficient and effective movement behaviours. Feldenkrais replaces our notion of posture with his own term - *acture* - the sum total of all that we have done, and all that we are prepared to do (1985). By becoming aware of our movements, and how they relate (us) to the environment, we become educated in the most intimate and constant aspects of ourselves - what we do, how we do it, how it could be better. We may also come to an understanding of why we have acted in a particular way, along with a desire to either accept or change it. By paying attention *through* the moving body, we can begin to connect cognition and behaviour.

It could be argued, in fact, that this is how we evolved into what we are, and thus this is what we evolved to do - pay close attention and develop flexible behavioural responses to various environmental situations. As we negotiate complex social situations and move over diverse and sometimes challenging terrain, we have experiences and learn things, changing our

[4] Lachambre draws on Mitzvah technique, as he has explained in workshops I've attended. Mitzvah technique was developed by a disciple of both Feldenkrais and Alexander, additionally inspired by the movement style of Bedouin peoples walking long distances across the desert.

mindful body[5] in multifarious ways. Somatic practices are a means of bringing this process to the fore in our attention, and paying attention is the first (and crucial) step in the learning process. In this sense dance, as a practice that both refines awareness of, and introduces new patterns to, our moving, embodied state, can be understood as an experiential catalyst - remember this, try that - which, as I will argue in later chapters, increases our functional capacity and *repertoire of response.* We are always in the condition of responding - being present - flexible, agile, and diverse in our options - creating an optimum range of functional behaviours and adaptations. As LaMothe writes:

> …humans need to move and be moved in ways that open us up to our own ability to create and become new movements. We need to move and be moved in ways that encourage us to cultivate a receptivity and responsiveness to the impulses arising in us as a result of the movements we are making. We need to be experiencing, on an ongoing basis, the pleasure of learning to make movements that unfold and release the ever evolving movement potentials of our bodily selves. Our health and well-being, as well as the health and well-being of our relationships and communities, depends upon it. (2015, p. 56).

Dance is both the process and product of our endless capacity to observe and generate new movement patterns, relating us to the world, each other, and ourselves in new ways, offering fresh affordances or paths of action that open precisely because we are moving them into being.

When dance scholar Sally Ann Ness speaks about the process of learning the choreography "For Betty" in the opening chapter of *Body, Movement and Culture* (1992), she says "In dance, the mind's "I" can become variable, and may inhabit the person in an infinite number of ways, investing the authority of the first person in different body parts, or in the whole body simultaneously in any number of spatio-temporal relationships" (p. 6). The discovery of possibilities for a previously unknown or unrecognised self in movement demonstrates both cognitive flexibility and the inherent power of dance. Through movement, combined with

[5] This is one of Sheets-Johnstone's preferred terms - to paraphrase, "we are not embodied minds but mindful bodies, learning to create synergies of meaningful movement" (IHSRC 2016).

attention and agency, we discover, create, and determine identity while manufacturing potentials. Thus dance is not just an aesthetic or cultural product; it is inherently bound up with resilience, adaptability, and survival. Returning to LaMothe's defense of dance, she states "In order to survive, (humans) need to be creating where the medium and the end is not necessarily a freestanding work of art but one's own sensory-kinetic palette of possibilities." (p. 57).

Expressivity & Meaning Production - Dance, Ritual, and Ceremony

> *All dance is charged with power.*
> (Jonas, 1992, p. 17)

Across cultures, stories of the creation of the world include dance and music; in India, Shiva Nataraja, Lord of the Dance creates and sustains the universe through dancing (Wosien, 1974, p.7); in Greece, Lycinus notes that among the ancient mysteries not one is to be found that does not include dancing. Dance is also a means to connect with "the forces of nature that govern the natural world" (Jonas, 1992, p. 26), as in the Hopi Snake Dance to bring rain. Movement, on earth and in the cosmos, is associated with powerful dynamics, transformation, and life itself. Dancing, humans emulate natural forces while connecting with their own vitality and source of animation. Lamothe describes this as creating a sensory awareness of the *earth within*, revitalising our relationship with the dynamics that surround and support our existence. "As long as humans walk the earth, dancing remains the practice by which humans acquire the ecokinetic knowledge needed in order to participate consciously in creating culture that honors, abides by, and upholds the movement of earth in and around us "(2015, p. 197).

Dance is sense-making. Through dance, we interpret, repeat, rehearse, react to, and share our experiences. We come to understand where/who we are, and how we got there - and this may be done as a community in conversation with itself and others. Movements emerge in

response to circumstances, and are pieced together, elaborated and refined to tell a story about what has happened and what it means. In this regard, dance is a practice engaged in as a means of articulating and creating one's self, an aspect of belonging to a culture, and a way of making sense of one's place in the world. Through dance, we both respond to and create a world - lifting movement from its original context, enhancing aspects and relinquishing others, humans can move with lyricism, power and grace, telling stories about ideals, fears, desires, dreams. Movement is a powerful narrative medium through which we can articulate who and what we want to be. Dance, as an integral aspect of many human cultures, is performed in connection with ritual, meaning, self-shaping narratives of identity, and the restoration of health. Historically, the performance of dance at times of ceremony and transformation points to its central role in the creation of selfhood, agency and group cohesion.

While it is impossible to know the exact origins of dance, as previously mentioned, evidence suggests that it has appeared universally, along with language, in all known human cultures: "To dance is human, and humanity almost universally expresses itself in dance" (Hanna, 1979, p. 3). Statements concerning the incontestable prevalence of dance in prehistory dominate the introductions of books on dance, as common as they are incontrovertible (or conversely, proven). Sources for these claims include early cave paintings, many of which seem to convey movements, including jumping, running, and hunting, with what appear to be dance-like patterns and organisation (for example, see Clarke, 2004); and the persistence of dance behaviours in communities around the globe, particularly those that retain a connection to their land base.

Along with the appearance of dance as formalised movement, or "...motion having inherent value" (Hanna, 1997, p. 36), are ritual, religion, and ceremonies that reify culturally

meaningful symbols and behaviours. "There is an element of religion or magic in all dances except those for entertainment" (De Mille, 1963, p.23). If we consider the connections between organised movement and religious behaviour from an etymological perspective, it can be observed that *religion* (Latin; *religare*) is "to bind"; this has a marked similarity to the Sanskrit term *Yoga*, meaning "union, to yoke or join". This binding, or joining, may refer to creating a conscious connection with our state of being a body, our rhythm of bodily becoming (LaMothe, 2015), and becoming aware of the processes and dynamics that support life as we know it most intimately, manifesting throughout our body. Many religious practices, such as meditation, yoga, chanting, and singing, begin with the breath; this is the portal between the autonomic (involuntary) and somatic (voluntary) nervous systems. Becoming conscious of the breath, it is possible to control, or at least become aware of, processes that keep us alive while at the same time generally proceed beneath the level of conscious awareness. Dance is an extension of this, as quotidian movements and behaviours that carry us through our day are codified, repeated, exaggerated, shaped and performed in organised patterns or fluid expressions that take the mundane, unconscious aspects of our lived experience and make them extraordinary and explicit. Awareness of embodied experience brings with it a wider range of options for response.

Folk or traditional dances are a repository of movements common to a people - drawn from the environment of local culture, behaviours, and beliefs, every folk dance is different, combining Effort qualities and shapes in complex, unique ways. Dance studies, with roots in anthropology, cultural studies, history and ethnography, looks at dance, festivals, and movement vocabularies particular to a region or time, contextualising these in relation to other cultural dynamics. Dances are closely tied to identity[6]; they may serve to articulate or form a shared identity, or resist one. Their movements provide an opportunity to comment on standard cultural

[6] See Ness for an extended exploration of this - *Body, Movement and Culture* (1992)

behaviours or practices - how one feels about what one does - outside the context of actually doing those things. Dance provides critical distance from which to refer to daily happenings and find one's place and relationship to them.

When work involves rhythmic, full-body movements, the leap from here to dance is relatively easy. In many wealthy industrial nations, people no longer make full-body movements in their work, and technology has separated us further from nature and processes of production - sources and inspiration for dynamics that affect our lives. We manipulate machines, virtual objects, bodies and environments rather than our manifest one. In an environment increasingly interconnected and created for and by technology, there is a sense that our movement could be anything, and yet many people move little more than their fingers and thumbs - our world is both more extreme, and more limited. How this retraction in movement repertoire affects us is not known - but I propose that a lack of familiarity and *practice* with our embodied state, which includes facility with a rich and varied movement repertoire, has severe implications for function and behaviour.

If we do not know what our options are, and lose skills related to cultivating well-adapted, flexible response habits, as are (even more) necessary in the complex social environments we inhabit, we become restricted in our capacity to mobilise ourselves and engage effectively with the world. The rise in "mental" health problems globally seems to coincide with the loss of traditional, enculturated movement practice. There are, of course, many ways we can look at this phenomenon, including underlying assumptions in technologised cultures about the separation of mind, body, individuals and society, which set up categorical conditions that allow for "mental health" problems to emerge, but there remains the fundamental reality that in many

contemporary cultures, people do not engage in diverse movements in naturalised environments as we have throughout our history.

We sit. And sit and sit and sit. We sit to work, to drive, to talk, to eat. We may exercise by going to a gym - but this is movement that is isolated from an environmental context in which it not only makes sense, but would require constant adaptation to reckon with inherent diversity. It is also movement that is detached from meaning and social connection. We have grabbed the object, but missed the essence - the point of moving is not "to move" - it is to respond, adapt, and flexibly organise behaviour. Moving makes us human. And dance, especially, even more so.

The healing dance

> *All peoples have prayers for health.*
> *Dances for health are called medicine dances, and nearly all primitives[7] employ them.*
> \- Agnes DeMille, 1963

Given the evident relationship between movement and life, dance and health have a well-established connection through much of history and in many locations. Dance, as a vessel of culture that transmits the values and behaviours of particular groups and ways of living, can both remind us of meaning, and restore our sense of purpose where it has been lost. Choreographic phenomena, in this respect, always represent on some level the recent findings of culture bearers, "...findings about the world they physically inhabit, findings about the society they embody, findings about what it means to be a living, breathing human being in their particular place, in their particular historical moment" (Ness, 1992, p. 233). Culture is an aspect of health, of wholeness. We live in communities and create shared meaning structures that support and frame our sense of being and purpose. When these, or our connection to them fail, illness occurs. A

[7] Obviously the use of "primitives" here is dated, and serves as testimony to an unfortunate historic interpretation. I include this quote as it highlights that dance has been, and continues to be, seen as medicine in some contexts, and also as an opportunity to redress, rather than forget, historical perspectives that have caused much damage.

sickness of the spirit, which may be understood as a loss of connection to meaning, can be as serious (or perhaps more so) than injury-induced physical impairment.

Historically, dance has been used to rid the body of poisons, both mental and physical; there are countless examples of people dancing to improve their own health, that of someone they care about, or in their role as doctor/dancer for the health of the community (Wosien, 1974). Physician Carl Hammerschlag, describing his time among the indigenous peoples of the American South West, recounts that the second question he was asked by a Pueblo elder, following "Where did you learn how to heal?" was "Do you know how to *dance*?" He is then told "You must be able to dance if you are to heal people" (1998, p. 10). When body and mind are understood as a continuum or whole (a view supported both by science in neurobiology, and philosophy through embodied cognition/enactivism), mental illness can be framed as a disruption, or disorder, of the entirety of this system. In Wendat (Huron) culture, in whose traditional territories I now live, ceremonies and dances were performed to reintegrate anyone suffering exclusion, understood as a form of sickness:

> Through their soul desires, individuals who felt neglected, abused, or insecure could make claims upon the community for attention and psychological support. The ultimate aim of satisfying soul wishes was not, however, to alter the behaviour of individuals but to modify their relations with society (Trigger, in Sioui, 1999, p. 163)

This introduces a broader question - what do we refer to when we speak of "health"? The World Health Organization (WHO) currently defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"[8] This definition, however, is almost sixty years old, and though groundbreaking at the time for not merely defining health in terms of absence of disease, contemporary critics feel it is too static,

[8] From the preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. It has not been amended since.

and unsuited to the circumstances of growing numbers of people who globally live to a more advanced age, often with chronic conditions. "Complete" is problematic in this definition, as it does not allow for operational measures, and instead promotes a model in which pharmacological interventions are often proposed and the threshold for determining disease is lowered (Huber, 2011, p. 1). At a 2011 conference in the Netherlands, international health experts proposed revising this definition and adopting a more dynamic frame based on resilience or capacity to cope, maintain and restore one's integrity, equilibrium, and sense of wellbeing (Huber, 2011, p. 3). This view includes the ability to adapt and self-manage across the three domains of health: physical, mental, and social. This style of definition is easily operationalised, and can be measured in terms of *function*.

Applied Dance

> *Dance….makes us feel more alive.*
> - Ann Hogan, Director of Education at the Royal Academy of Dance

In 2013, the Royal Academy of Dance in the U.K. hosted a conference entitled *Dance for Lifelong Wellbeing*, showcasing "the power of dance as a force for inspiring people, regardless of age or situation, to change their lives and communities for the better" (Darcey Bussell, President of RAD in Hogan and Bussell, 2015). Over the last ten years, professional dance companies around the world including English National Ballet, Mark Morris Dance Group (New York), and Queensland Ballet (Australia) have been opening their doors to people with movement disorders such as Parkinson's disease, challenging perceptions of what dance is, who does it, and why.

Many of these initiatives include research partnerships with academic institutions; studies associated with these programs suggest that there are cognitive benefits associated with movement (Houston & McGill, 2015; Westheimer et. al. 2015) that may foster

neurorehabilitation (Dhami, Moreno & DeSouza, 2015); these introduce new language to the discipline of dance, and are fundamentally shifting traditional parameters within the field. Programs such as Dancing with Parkinson's at Canada's National Ballet School and the Dance/Movement Therapy training program at Les Grands Ballets Canadiens reframe dance as having intrinsic value, clear benefits to wellbeing, and capacity to engage new audiences via participation.

Looking at dance as a *treatment*, whether curative, preventative, or complementary, alters our ideas of both dance and health. It also brings many new people to the dance floor who perhaps had never dreamed of going there before receiving a diagnosis. As new research, particularly in psychology and neuroscience, uncovers cognitive and behavioural aspects of dance performance and participation, we are given more reasons to dance - as a multimodal, complex, challenging, social activity, dance offers every kind of benefit, and is adaptable to any population. Shifting theories in cognitive science and philosophy towards embodied or enactive cognition yield further ground to the importance, and centrality, of dance in our lives. We are entering an era of what I term *Applied Dance* - using (or returning to the use of) methods and techniques of dance to improve quality of life for an enormous range of people, in the studio and beyond.

C. Dance/Movement Therapy - past to present and beyond

While the use of dance in healing may be as old as time, and the American Dance Therapy Association is celebrating its fiftieth anniversary in 2016, the idea of using dance to treat various physical/psychological disorders seems somehow both innovative and strange to many people. Finding acceptance as a profession has been hard and long-coming to trained dance therapists, and research to this point has been impeded by poor quality or insufficient

robustness of studies (Kiepe et al., 2012; Mala et al., 2012; Strassel et al., 2011). A 2009 article in *The Lance*t sums up the state of research in, and biomedical opinion of, Creative Arts Therapies (including dance therapy) in the context of treating dementia; the challenges continue to apply, in the treatment of all forms of ailments that include "mental" aspects using dance or other arts-based therapies:

> The observational and anecdotal evidence that different types of arts-based therapy can improve the quality of life for, and even cognitive function of, patients with dementia is huge: large enough to support the existence of associations of registered therapists all over the world; large enough for the UK National Health Service (NHS) to be the country's number one purchaser of such services. *But there is little hard scientific evidence to show whether or not these therapies truly help*. (Burton, 2009, p. 784 - italics mine).

One of the major obstacles in performing research with a complex intervention such as dance is the multimodal and improvisatory nature of the treatment. Dance therapy engages the individual in a social context, and uses spontaneous, emerging movement patterns that are often generated by participants, rather than prescribed in advance by the therapist. This makes replicating any intervention, finding suitable outcome measures, and comparison with control groups notoriously difficult. However, recent advances in technology as well as interdisciplinary research and multidisciplinary teams are making a difference in this field. With the advent of neuroimaging and mixed-methods study designs, we are now able to investigate what is happening in biological terms when we engage in dance, and relate this with the complex experiences of participants. By correlating improvements in specific symptoms (both "motor" and "non-motor") with participation in dance, we may establish what are clearly quantifiable benefits. Before outlining the research problems (and proposing some solutions), I will give a brief overview of the major theories and methods used in Dance Therapy.

What is Dance/Movement therapy? The Practice of Presence

The North American professional body of dance therapists, the American Dance Therapy Association (ADTA) defines Dance/Movement therapy as follows:

> *Dance/movement therapy uses movement to further the emotional, cognitive, physical and social integration of the individual. Through movement, DMT can help individuals with a wide range of psychological disorders achieve greater self-expression.*[9]

The emphasis on the expressive qualities of movement, linking these with emotions and psychological disturbance, is a gesture towards the early development of the field which was influenced by psychoanalysis and coincided with the emergence of Group Therapy (Chaiklin, 2009). Perhaps due to these influences, as it developed into a profession, Dance Therapy in various incarnations relies on the inclusion of *verbalisation.* Movement "material" is generated during the sessions, but there is a belief held by many dance therapists that until, and unless, these experiences are translated into some form of language, they remain unconscious and unprocessed. "While movement is the prime tool, verbalization should not be ignored. There is a need to develop cognitive and thought processes in relation to movement in order to maximize its potential" (Chaiklin, 1975, p. 710). Some Dance Therapists, particularly from the West Coast school, such as Mary Starks Whitehouse and Joan Chodorow, understood their work as a direct expression of psychoanalytic concepts, in their case Jung's "Active Imagination". Dance Therapy is understood to differ from verbal psychotherapy in its emphasis on the integration of "psychological and physical aspects of experience, and...(dance therapists) see movement as the best means to achieve that integration" (Stanton-Jones, 1992, p. 6). But note - as much as Dance Therapy states it is about the unity of mind, body and spirit, there is a fundamental disjunction between this statement and the core process involved. If Mind and Body (and Spirit) require integration - or movement requires verbalisation to develop "cognitive and thought processes",

[9] From https://adta.org/

then the underlying assumption is that these are disparate parts or things. The introduction of the verbal also takes us away from the realm of dance as "nonverbal movement...having inherent and aesthetic value" (Hanna, 1979, p. 57), as we examined in the previous section. I will argue here that if we collapse the space between "psychological and physical aspects of experience", we have a more coherent and applicable theory of what dance therapy is, and how it achieves results.

Marion Chace, who many consider to be the originator of contemporary DMT, states in an essay of the same name "Dance alone is not enough." She held that dance therapy demands "special skills and training" which is "comparable to other disciplines in a hospital setting" (including, interestingly. "training in proper tools for research") (Sandel, Chaiklin and Lohn, 1993). Chace's emphasis on clinical skills doubtless emerged from her own experience as a member of the team at St. Elizabeth's hospital in New York, from the early 1940s. This demand for professionalisation of the field remains today, and training in Dance Therapy requires an extensive background in Psychology. While there are clear benefits to acquiring facility with the language and terminology of other professionals at the place in which one works - which *may* be a psychiatric setting - there are problems, I feel, with placing so much emphasis on psychology as a training ground for DMT.

Psychology, explicitly, is the study of the *mind*, and over much of its history, this focus precluded or entirely ignored the body. The classic image of the psychiatrist's couch, on which a reclining patient plumbs their interior depths is a prime example of this. Thus we have dancers, experts in bodily awareness and movement, turning away from their acquired skills and knowledge - their *embodied epistemology* - to focus on theories that were developed in relation to stationary, denigrated, and predominantly ignored bodies. This fallacy is overcome if we shift the framework towards neurobiology, to understand how our experience is generated by, and

entirely dependent on, embodied sensation and processes. If DMT can accomplish this shift, I believe we have a very effective treatment modality whose workings are no longer mysterious, difficult to apply, or impractically vague.

If "dance alone is not enough", and the missing ingredient is not psychiatry, then what is? Dance Therapists themselves are not always clear about this. They refer to terms such as "therapeutic alliance" and "kinesthetic empathy", and at other times say things like "We are no longer witch doctors, but instead call ourselves dance/movement therapists" (Chaiklin, 2009, p. 11). There is a strong connection for many dance therapists with shamanism, ritual, and ceremony - this could be attributed to the historical association of dance with these areas; however, I will suggest another commonality - the *practice of presence*.

Dance Therapy differs from a dance class in that the therapist is "non-directive, and neither prescribes the emotions the client is to express, nor instructs the client on how to move" (Stanton-Jones, 1992, p. 3). It is process, versus product, oriented work, and does not aim for aesthetic outcomes or any kind of performance. Dance therapists do not, in general, use specific choreographies or teach movement sequences; they also don't give corrections. How do these differences from a dance class, whether therapeutic, professional, or recreational, lend DMT something extra that is believed to facilitate "integration"?

I believe the simple answer is *presence*. By requiring participants to attune to their current state - their needs, desires, how they wish to move, what they want to express right now - in an ever-changing environment with others who are doing the same, collectively witnessing the movement develop in ways that are continually novel and engaging, forces attention to remain focused on the present. Many "mental" illnesses are characterised by intrusions related to past (remembered) or future (anticipated) experiences - and I will specify that these are remembered

and anticipated by and through a body, with hormones related to fear responses, disruptions in dopamine production or absorption, tension held in the muscles. Through improvisational exercises and problem-solving in the here-and-now, DMT brings body experience to the fore in a way that is immediate and affirmed by other participants. This is the "integration" referred to; it's a temporal readjustment.

Dance, in all its forms, works with the dimensions of time and space. Timing is essential to coordinate our actions with others or music, and rhythmic synchronisation is one of the most fundamental human attributes, visible even in newborns. Rhythmic mirroring appears very early in infancy, and has been observed even in congenitally blind children, suggesting this to be an innate behaviour with deep evolutionary history (Trevarthen, 1999). "Inter-synchrony" can be observed between a newborn's hand movements and the syllables of adult speech as an example of early interest in, and mirroring, of a kind of syntax, or narrative form inherent in rhythm and music (and it follows, dance). Mirroring, in which the therapist or others in the group reflect an individual's movement choices and vocabulary, is a core practice in DMT, and is considered to form the basis of the therapeutic alliance.

Through automatic motor programs (AMPs), we coordinate all of the body's actions - rhythm, and rhythmic patterning, which are what allow more complex patterns of movement and behaviour to emerge. Disruptions in motor programs are associated with many diseases and disorders, including Parkinson's. Music and dance are capable of "fixing" problems in this system by introducing an external rhythm - as soon as we change the time scale in which we accomplish an action, we leave the AMP behind and engage different parts of ourselves - we're learning a new pattern, the novelty of which is inherently satisfying, and utilising non-habitual

aspects of the nervous system, including imagery and synchronisation with others or music. It is this simple shift in awareness that I believe accomplishes much of the work in dance therapy.

This same theory can be applied to emotional expression and regulation, an important area for dance and all other creative arts therapies. In a paper from 1956 titled "Bodily Experience and the Expression of Emotion," Miriam Berger (another of the pioneers of Dance Therapy) looks at the "inter-relationships by which the body experiences and stimulates emotion, how it expresses this emotion, and how various somatic processes can influence the affective state" (p. 152). In this piece, Berger is very clear that it is the sum of interactions in the totality of the person and the environment, and primary sensory and physical process, that produce experience; this highlights the physiological aspects of emotion, which she states manifest themselves "somatically and autonomically" (Berger, 1956, p. 157). This perspective is prescient, and draws on the James-Lange theory of emotion which posits that visceral, bodily experience precedes interpretation - we have an initial embodied response, which is immediate; subsequently we become aware of, and interpret this response as an emotion.

Berger's statements are amenable with neuroscientist Rodolfo Llinás proposition (2001) that emotions may be considered as "fixed action patterns" (FAPs) - actions that are not motor (intentional), but *premotor*. This means they are initiated by reflexive processes that are carried out beneath conscious awareness. His argument is grounded in evidence that emotions are among the oldest of our brain properties, enacted by the rhinencephalon, a very deep structure. According to Llinas, emotions are stereotypical responses triggered by peptide modulators, explaining why there are universal characterizations of primary emotions across most human cultures (2001, p. 156). This understanding of emotions as physical, immediate response patterns that connect and embed us in the environment *pre-consciously*, helps explain why

changes in timing and awareness could regulate or shift habitual patterns. Rather than nebulous terms like “self-expression”, this provides a concrete mechanism for understanding how dance therapy can contribute to emotional regulation - through accessing these deep response patterns and introducing changes in timing and quality of expression.

Rudolph Laban, the early twentieth-century Austro-Hungarian dance master and lifelong scholar of movement, developed theories related to the range and potential of human movement repertoires, and a language for observing and recording movement upon which many dance therapists still rely. As Fran Levy describes, Laban’s complex view of body movement included “...its potential use as an expressive medium of both conscious and unconscious thoughts, feelings, and conflicts and also a vehicle through which societies pass on traditions, coping behaviours, and religious rituals” (Levy, 2005, p. 109). The central use of Laban’s theories and methods in dance therapy fits with the understanding of emotions as fixed action patterns; by uniting “conscious and unconscious thought,” dance and expressive movement provide access to the world of fixed response patterns, and may allow change to take root. Berger, whose seminal academic work on motion and emotion in dance therapy I quoted previously, was a student of Laban’s disciple Irmgard Bartenieff, and from 1970 - 1990 trained many of the primary practitioners of DMT on the American East Coast (Levy, 2005, p. 121), ensuring that Laban’s ideas propagated during the development of the field.

Self-awareness on the part of the therapist, and detailed comprehension of the client’s movement repertoire, are the primary applications of Laban in DMT. Expanding and balancing movement repertoire is thought to facilitate healing and integration, and for this reason many DMTs commence a session with a movement circle that aims to both elaborate existing movement preferences and gradually introduce new vocabulary. A classic start to a DMT

session is the “gesture circle” - a simple exercise during which participants make a simple gesture, sometimes accompanied by their name, and this gesture is mirrored by the group. This accomplishes several things - it allows the initiator of the movement to be seen (and reflected) by the group, enhancing self-awareness and self-esteem, it offers novel movements as people “try each other on”, and promotes synchrony.

As Laban states, “The astonishing structure of the body and the amazing actions it can perform are some of the greatest miracles of existence. Each phrase of movement, every small transference of weight, every single gesture of any part of the body reveals some feature of our inner life” (Laban, 1988). Dance therapists apply this to interpret their clients’ stories, needs and desires. The smallest of motions is understood to carry meaning; what is debatable is whether this stems from an unconscious origin in repressed emotions, or is an expression of movement patterns and habits that reflect the history of a current bodily state. When we shift the explanatory framework towards FAPs and AMPs, there may not be a difference.

As I will outline in greater detail in later sections, our capacity for what we refer to as thought, metaphor, and meaning, is thoroughly grounded in our bodily experience. With this view, it is entirely comprehensible that a dance movement therapist would be interested in developing the skills to engage, body-to-body, with another’s experience; as Stanton-Jones writes “...the dance movement therapist uses movement to interact with the patient, and reads the patient’s movement for its symbolic and expressive content” (1992, p. 59). The content referred to here is quite different than the mental contents of mindreading, but offers an alternative theory and approach to how meaning and intention are constructed and shared.

The alterity of dance therapy’s focus on holistic, embodied, spontaneous movement is part of why research to this point has been challenging. If mind and body are one continuous

shifting experience, best accessed through one's own attentive and nuanced skills pertaining to the movement characteristics and capacities of this bodily state, the standards of clinical research are difficult to apply. There is no neutral subject or researcher, and replication of an intervention is, to be blunt, impossible. No moment, or movement, between rapidly shifting bodily agents is ever going to be repeated in exactly the same manner. We can look at *states*, but not specifics. For this reason I propose that multidisciplinary, multi-platform research, combining tools such as neuroimaging with participant and researcher records of experience, movement observation, and other forms of reporting, both qualitative and quantitative, will give us the best (and possibly only) means of measuring the effectiveness of the multi-modal, ever-changing, mercurial and entirely situated experience that is dance/movement therapy.

CHAPTER TWO: THEORIES/LITERATURE

Despite more than fifty years of history and development of professional practice standards for DMT in the United States and the U.K., until very recently there has been little institutional uptake of dance as a serious, "real" treatment modality for disorders, be they mental or physical. There have been instances and media reports (which are becoming more common) of programs that have implemented dance/DMT in a mental hospital, or studios that have created adapted dance programs for specific populations, but there remains a lack of what is called "hard evidence". To be fair, criticisms have focused more on the lack of acceptable evidence than on specific outcomes; this points as much to problems in research design, methodologies, and perspectives as it does to DMT and/or dance being inappropriate or ineffective as a treatment modality.

Part of the problem stems from what is accepted as hard evidence, and what constitutes a water-tight research design in the field of health, which is dominated by biomedical perspectives; the problems in research on dance for health point to a larger issue in scientific research, a persistent body/mind schism, which dictates the kinds of questions that are asked, and the manner of framing these questions. If mind and body are understood as a continuum, or aspects of one and the same thing, questions and methods drawn from disciplines that categorically separate them are going to miss the mark. Equally, disciplinary boundaries that result in siloed perspectives produce research of limited scope and application. Dance and DMT are movement-driven, and movement does not fit neatly within the boundaries of any one discipline or set of research methods. Dance studies has perhaps devoted the most attention to this arena, but dance is not a field dedicated to developing Randomised Control Trials (RCTs); dancers rehearse and repeat movements, but are *performing*, not *replicating* their choreography. The criteria for

validation and replication, two aspects required for any study to be considered as having high methodological quality in the sciences, are slippery at best, and perhaps ultimately inapplicable to research on dance. This does not mean that research on dance in the context of health and DMT cannot be rigorously conducted or further developed; rather I am suggesting that what is required is the adoption of a broader range of methods and assessments than have previously been applied.

A. Criticisms of DMT research

There have been a number of recent publications on the subject of DMT and Dance research for well-being, including our own review of the literature for studies on dance and ageing (Kshtriya et al., 2015). As anecdotal and practical evidence accrues, dance programs for everyone from the elderly to the very young seem to be proliferating, and dance companies around the globe are offering programs focused on dance for health, and dance for reasons that go beyond aesthetics, entertainment, diversion, or fitness (for example, Houston Ballet's Adapted Dance program[10] and Dance for Parkinson's programs in the UK, US, Australia, and Canada). Research programs attached to these, including a collaborative initiative between York University and Ryerson which investigates the effects of Dance with PD program at Canada's National Ballet School, are in early stages. The challenges these new research programs must address are associated with a dearth of acceptable evidence on the use of dance as a treatment.

In a 2015 Cochrane Review of the literature on DMT for depression, Meekums et al. found "The low-quality evidence...does not allow any firm conclusions to be drawn regarding the effectiveness of DMT for depression. Larger trials of high methodological quality are needed to

[10] Specifically developed for children with Down's Syndrome: https://www.houstonballet.org/Education-Community-Engagement/Adapted-Dance/

assess DMT for depression, with economic analyses and acceptability measures and for all age groups" (p. 2). Their inclusion criteria were RCTs (Randomised Control Trials), that looked at outcomes for depression as defined by the trialist, which had at least one group considered DMT with clear psychotherapeutic intent. Only three small trials with 147 participants met this criteria, leading to their conclusion that "Future studies should be of high methodological quality, comparing DMT with other treatments for depression, and include economic analyses" (Meekums et al, 2015, p. 3). This is interesting, as it points to the necessity to consider participants' social conditions and context, a complex arena often not mentioned in lab research. Kiepe et al. (2012) reviewed research on DMT and ballroom dance as interventions for adults with mental or physical illness, and also found insufficient evidence to make any definitive claims, although there were notable benefits for participants in all studies reviewed. They suggest that "further good quality research is needed to gain more profound insight into the efficacy of these treatment options" (p. 404). Koch et al. provided a substantial meta-analysis of the effects of DMT on health-related psychological outcomes (2014); in their estimation , many of the problems that have dogged the "quest for evidence-based DMT research" stem from the reliance on qualitative research and case studies in connection with creative arts therapies, which emphasize creativity and subjectivity and are often suspicious or critical of quantitative methods, as they are seen to de-emphasize aspects of therapeutic relationships and individual change. Koch et al. make several recommendations for future research, which are worth noting here: more well-designed studies, with adapted study designs for DMT/dance research; more RCTs with well-suited control groups; blinding of the randomization procedure and blindness of assessors; larger sample sizes; multicenter studies; standardized measurements; inclusion of all descriptive statistics; detailed descriptions of the interventions; and specific investigation of the

factors of effectiveness (2014). Note that these recommendations are made *in addition* to the recommendation for further qualitative studies; the authors also note that there has been an increase in research interest over the last twenty years.

In Part Two, I will describe my Pilot Study, which is an attempt to begin to address most, if not all, of these recommendations. Before turning to the practical aspects of carrying out research in DMT, I will outline several bodies of literature that provide support for the hypothesis that dance and/or DMT may fairly constitute an appropriate treatment for impairments, be they characterised as mental, physical, or both. To make this assertion, I will provide examples of evidence for effectiveness and ask questions appropriate to investigating how and why dance may cause improvements in various conditions: How are "mental" conditions expressed in the body? And how do "bodily" conditions and experiences resonate in the mind?

I will argue first, that *mental disorders have motor expressions*, and thus movement interventions constitute a reasonable, and effective, treatment option (although I will not, at this point, make the stronger argument that dance may be the only treatment necessary). Second, I will argue that an *embodied perspective incorporating neurobiology*, as opposed to mind/body dualism, provides a useful framework for addressing how dance involves what are termed "motor" and "non-motor" aspects which are essential to how humans are organised, and necessary to preserve and develop efficient function of our complex systems. Third, and lastly, I will give examples of neurodegenerative disorders and phenomena such as Parkinson's, dementia, and aging, which are understood as having both "physical" and "mental" symptomologies, and consider recent research that *dance is an effective treatment or protective measure* in these cases. Taken together, these arguments make a strong case for how dance and

dance therapy can be used to treat impairments, supporting and supported by the view expressed in the preceding section that dance is an essential part of human flourishing, and an integral practice in human culture.

B. M**otor expressions of mental disorders**

All action of a living being is accomplished through muscular contraction and release.

- Feldenkrais

Forms of mental disorder, illness, or irregularity are recorded throughout human history (see for example, Harris, 2013). What is termed "mental illness" today is still not entirely defined, and categorical diagnoses have shifted in even the last fifty years (Matthews, 2007). I will argue that this confusion is rooted in a poorly conceived definition of the mental that persists in psychology. Many contemporary treatments are based on an understanding that chemical imbalances in the (isolated) brain are the root cause of symptoms and disorders deemed "psychological," and redressing these through drug-based interventions will lead to improvements or cure. While pharmacological treatments are proven to be beneficial in some cases, they may also have adverse side effects, and are not always effective. "Chemical imbalance" as a root cause of mental disturbance is a reductive myth that goes hand-in-hand with the pharmaceutical treatment model; as depression (and other mental disorders) may be diagnosed on symptoms alone, it is impossible to determine to what extent someone definitively "has" a mental illness, and to what degree the associated complexities can be treated with medication. Problems, including adverse symptoms, resistance to "treatment", and even worsening of some conditions, emerge as drug-based interventions target very specific processes in ways that are neither comprehensive nor holistic; there are ripples through the dynamic organism that are impossible to predict or control. The misguided assumption that "mental

illness" is housed in the mind, somehow synonymous with the chemical activity of the brain, undermines the relevance of our dynamic, embodied and socially embedded organisms.

Every form of psychopathology, from mild anxiety to chronic depression, schizophrenia, and bipolar disorder, has "motor expressions" - "mental" disorder both effects, and is affected by, the way we move, which is the basis of all behaviour and function, whether expressive or instrumental. Other forms of mental illness, whether considered neurodegenerative, such as dementia, or neurodevelopmental, as in the case of Autism Spectrum Disorder (ASD), also have motor symptoms. It is time we cease to separate body and mind, in treatment and diagnosis. Mental disorders have motor aspects; we could even say they are prolonged or systemic motor disturbances. Thus, it is reasonable to expect that effective treatment (and prevention) should involve the motor system.

Mental disorders are often described by differences in expression, which appear contrary to norms or seemingly counter to individual benefit, in *behaviour* and *function*. These are inextricably linked with unusual or changed *movement patterns*, whether these are more extreme/exaggerated or limited/reduced. Outside of this, there can be little agreement on what constitutes a true "mental illness"; considering that there is no possibility for a purely mental existence apart from the body, and that all behaviour necessarily implicates the motor system, this confusion is understandable. The persistence of the "mental" category is indicative of the extent to which a reappraisal of all our systems, including those related to health and well-being, is desperately needed. There is no doubt that having what is termed a "mental illness" is related to suffering, difficulty with achieving various tasks and functions, and widespread challenges to the human person as a whole. These are often said to be more difficult because they are

"invisible" - having a mental disorder is not like having a visible physical disability, requiring a wheelchair or other apparati. However, I do not think this is completely true.

Although motor symptoms are widely recognised as central to the diagnosis and experience of mental disorders, standard responses involve treating "the depression" (or "the anxiety" etc.) with the intent that the psychomotor effects (considered as secondary) will improve with treatment of what is considered the underlying "mental" condition. I offer that this paradigm is in need of radical reconfiguration - categories for mental disorders such as "depression" are abstract, and remain challenging to define and treat. If we are to consider a new model for mental (total) health that treats the whole person, we must begin to examine the motor expressions of psychological distress as primary. Recognising what are termed "mental disorders" as *movement* disorders, and treating them as such, opens up new paths for treatment and rehabilitation. By directly addressing aspects of disorganisation or dysfunction in the motor system, we introduce better ways for the affected person to adjust and function, facilitating multisensory integration, improved performance, and changes in mood.

The difficulty in defining mental disorders points to the inappropriateness of current categories and definitions. The American Psychological Association only removed homosexuality from the DSM in 1973; autism and ADHD may or may not be considered as mental illnesses; hysteria was a category until it was changed to "conversion disorder" in 1980. Conversion disorders themselves constitute a category that perplexes neurologists to this day, being one of a class of "functional/psychogenic movement disorders", which also include somatization disorder, and psychosomatic, neuropsychiatric, and dissociative motor disorders (Dallocchio et al., 2015). These labels, and the difficulty neurologists have with appropriate treatment and diagnosis for these patients, indicates the uncomfortable presence of the body in

the mind, something which "the irritating historical division between neurology and psychiatry...at its most arbitrary in the field of movement disorders" (Lennox & Lennox, 2002) has yet to answer for.

Common examples of motor symptoms in mental illness:

Depression - What is termed "psychomotor retardation" is a central feature of depression, having been recognised as a fundamental feature by early psychiatric authors, and broadly used in contemporary classification systems (Bennabi et al., 2013). It is included among the symptom criteria required for diagnosis of a depressive episode in the DSM-V[11]. Psychomotor retardation refers to characteristic slowing down of thought and movement, most observable in major depression and bipolar disorder. Past episodes of depression may even leave a psychomotor "scar", which is predictive of higher recurrence rates and decreased chance of antidepressant response (Gorwood et al, 2014). In 1997, Soben & Sackheim summarised contemporary knowledge concerning psychomotor symptoms of depression, noting that depressed patients differ from normal and psychiatric comparison groups with regard to objectively quantified gross motor activity, body movements, speech, and motor reaction time. They concluded "current knowledge of psychomotor symptoms is conceptually obscure, yet a large body of evidence specifies their manifestation and supports their significance" (p. 4).

In an update on the Soben and Sackheim review, Schrijvers, Hulstijn, & Sabbe (2008) found psychomotor disturbances to be of great diagnostic significance for the depressive subtype of melancholia, recommending a standardised battery of tests to assess, and clarify, the role played by these. Depression is also characterised by a slumped posture and difficulty with coordination (Caligiuri and Ellwanger, 2000).

[11] The *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition; this is the standard reference for psychiatric diagnosis, and is issued by the American Psychiatric Association; it was last updated in 2013.

Autism - ASD (Autism Spectrum Disorder) may be alternately classified as a mental disorder, or a neurodevelopmental one. As it is found in the DSM-V, I will address it here. The subject of classification is an interesting one, as it could be argued that schizophrenia, Pervasive Developmental Disorder, Tourette's, ADHD and other problems of psychology appearing, or with roots in, childhood should also be recategorised. "Neurodevelopmental/neurodegenerative" may well replace "mental" when referring to these conditions; while rooted in the brain, "neuro-" is broadly inclusive of the Central Nervous System (CNS) as a whole, which is distributed throughout the organism, not just in "the mind".

Children with ASD are known to themselves, family and therapists as having poor or reduced physical coordinations; John Elder Robinson in his memoir *look me in the eye - my life with asperger's* often refers to his own clumsiness in making friends and in making movements. In a retrospective clinical record review, Ming, Brimacombe, & Wagner report the prevalence of hypotonia (51%), motor apraxia (34%), reduced ankle mobility, history of gross motor delay, and toe-walking (19%) in a cohort of 154 children with ASD (2007). Interestingly, some of these motor symptoms, particularly hypotonia, improved as the children grew older, suggesting that either ASD is not progressively neurodevelopmental, or that there is a compensatory mechanism such as hyperplasticity in early development. A more recent study found significant group differences in postural stability during one-legged standing in average-IQ adolescents with ASD, suggesting that static balance is impaired (Travers, Powell, Klinger & Klinger, 2013). They further found that current ASD symptoms were related to postural stability while standing on two legs for individuals with ASD.

Schizophrenia - One of the most debilitating and classic psychiatric disorders is schizophrenia, which is known to have characteristic motor symptoms. For a long time,

however, there has been confusion as to whether these are caused by medication, or are innate. Recently, there has been renewed research interest in motor symptoms associated with schizophrenia, as symptoms have been found in patients who have never received medication. Walther and Strik (2012) suggest the development and maturation of the human motor system appears to be closely linked to the emergence of motor symptoms observed in schizophrenia, indicating a kind of pathobiology. They also point out that there are overlaps in concept and definition in many of the major categories of symptoms, which include abnormal involuntary movements, parkinsonism, neurological soft signs, catatonia, negative symptoms, or psychomotor slowing. Their review of recent studies found a specific association between motor abnormalities and white matter structure in schizophrenia, supporting the idea that motor symptoms are closely related to neurodevelopmental disturbances.

Peralta, Campos, De Jalon, and Cuesta (2010) tested two hundred antipsychotic naive patients with schizophrenia spectrum disorders for motor abnormalities, which they found clustered into seven clinically interpretable factors: abnormal involuntary movements, hypokinesia, retarded catatonia, echo-phenomena, excited catatonia, catalepsy, and parkinsonism; all save the last were interrelated. They reassessed 189 of the participants after a four week trial of antipsychotics to determine which symptoms improved, and which were amplified by medication; in their study, only parkinsonism worsened. They concluded that primary motor dysfunction is a prevalent and heterogeneous condition of schizophrenia, hypothesizing a differential dopaminergic dysfunction to be involved, as an explanation as to why some motor domains improve while others worsen with antipsychotics.

Eye-movement abnormalities are well documented with schizophrenic patients; however few studies have investigated whether specific motor abnormalities can be found in other

domains of motor control. A review of the literature by Wolff and O'Driscoll (1999) found evidence that approximately one-fifth of neuroleptic-naïve patients with schizophrenia have increased rates of parkinsonism and neurological soft signs; they also found delayed motor development in high-risk pre-schizophrenia subjects, poor motor skills in the offspring of patients with schizophrenia, and reports of increased neurological soft signs in first-degree relatives. From this evidence, they suggest that motor abnormalities are not limited to eye movements and may constitute markers of vulnerability.

Other examples and conclusions - Gait abnormalities are present in all forms of dementia (Waite, Broe, Grayson, & Creasey, 2000); psychomotor agitation is a known symptom of bipolar disorder; conditions such as Post Traumatic Stress Disorder (PTSD), also considered a mental illness, develop as a result of exposure to violent or disturbing events in the environment. Out-of-sync (temporally or spatially) stress responses (physiological), which under normal conditions form part of the natural response repertoire of a sensitive, environmentally situated organism, can produce unwelcome symptoms such as re-experiencing the traumatic event, intrusive thoughts and mood disturbances. Victims of violence and abuse carry scars in their manner of embodiment - symptoms include agitation, anxiety, depression, and chronic apprehension. These are incorporated and expressed in maladaptive movement behaviour. Mental disorders or illnesses may be better understood, as these cases indicate, as echoes of experience, moments where the past of our embodied experience somehow tempers the present, primarily in uncomfortable, unwelcome ways that inhibit effective functioning in the here-and-now. "Motor" symptoms show up to varying degrees when diagnosing several types of what are termed mental disorders, as catalogued previously; however, they often are overlooked in terms of treatment. If psychomotor expressions are fundamental to every kind of mental distress,

suggested to be markers of vulnerability, and closely related to the development of these disorders, it makes sense to intervene and propose treatment that assists in regulating and integrating various domains of motor control.

C. *Mindful Bodies, Embodied Minds, Social Cognition and the Central Nervous System*

In this section, I will argue that theoretical frameworks which take as their point of departure the Mindful Body, a unified domain of action and engagement which does not submit to dualistic constructions of mind/body, brain/body, or even brain/mind, are not only more accurate in describing the lived experiences of animate beings, they are also highly complementary to the practice and findings of dance. If we consider the brain to be a squishy lump of grey and white matter housed in the skull, we must also consider that it is, first and foremost, an organ of movement; as such, the brain is inseparable from (and meaningless without) that vast complexes of nerves and muscles that extend throughout any organism, existing solely for the purpose of generating and correcting movement (Llinas, 2001).

Representational Theory of Mind (RTM), in contrast to this, assumes there are abstract, commonplace mental states such as beliefs and desires which are symbolically represented, occurring in some kind of interior space, and these isolated symbolic processes condition and control our behaviour. RTM is a fundamental doctrine in cognitive science, and continues to inform and influence research in psychology and neuroscience. RTM is the basis for computational metaphors which view the brain as a symbol-manipulating machine, generating representations of the external world; this Information Processing (IP) model has dominated research for over fifty years (Epstein, 2016).

Challenges to the Representational Theory of Mind include embodied cognition and enactivism, which posit that "mental" processes are *embodied* in the sensorimotor activity of

organisms which are inherently *embedded* in their environment (Clark, 1999; Varela et al., 1991). Embodied or enactive models differ from the IP/RTM models in which the mind somehow internally reconstructs input from an opaque world in order to figure out how the body it enervates should react; instead, these views suggest our abilities to think and reason emerge directly from our bodily experience of moving within an environment (Gallagher, 2005), with other, similarly animate, agents.

Folk Psychology, Theory of Mind, and Mimetic Understanding

A field in which we can clearly trace the development and implications of mind-body dualism and RTM is Folk Psychology, a branch of philosophy which investigates the problem of Mindreading - how we understand and predict the actions of others. For over half a century, scholars in this and related fields have debated how it is possible that we understand the thoughts, desires, and intentions of other agents, since, if we follow the IP metaphor to its reasonable conclusion, these are symbolic processes operating at sub-personal levels, taking place in the inaccessible reaches of other agents' mysterious minds. Andrews (2012) provides a useful version of a standard definition of Mindreading - we predict behaviour by attributing mental contents (beliefs, desires). We may employ heuristics, but still require the capacity to attribute mental contents (Theory of Mind - ToM). As she points out, a theory of scientific explanation has been imported into standard Folk Psychology (FP), perhaps to its detriment; FP explanation has goals beyond "truth". It is intended as a descriptive theory in that it attempts to convey the processes at work when we engage in explaining or predicting what people do. The scientific model leaves out much of the effective indeterminate (felt, subjective, and bodily) aspects of how we do this.

In a classic defense of Mindreading, Ian Apperly (2011) takes as his starting point the fact that we live in a world populated by agents whose behaviour can be understood by supposing that they have mental states (beliefs, desires, etc.) that interact according to psychological laws (e.g. people act to satisfy their desires on the basis of beliefs). He suggests the ability to think about beliefs, desires, knowledge and intentions is uniquely human, at the heart of cognitive processes for social interaction and communication, and is lacking in psychiatric disorders. In his account (shared with most standard FP) the main problem is that we don't have direct access to others' mental states. I question this assumption, mainly on the basis that we most often are aware, on some "level," such as "feeling uncomfortable", a bodily state, of the salient aspects of what is happening with those around us. "Mental states" are ill-conceived as contents of opaque minds, apart from bodies that we cannot access or engage with; mental states are, of necessity, bodily states, which have movement characteristics - viscerally shared with resembling bodies.

In standard accounts of Folk Psychology, the ability to engage in Mindreading is considered absolutely necessary if we are to successfully interact and coordinate our behaviour with other agents. It is further assumed that we need complex language to do this, specifically to make the belief/desire attributions held to be indispensable for knowing and describing the contents of other minds. This description seems an inadequate account of what happens in even (especially) the most quotidian of social encounters, and as such is increasingly being called into question. In actuality, it seems that the only times we do not know what the people around us are doing/going to do are highly anomalous, extreme situations. These lead to a state of affective tension or explanation seeking - itself an embodied feeling-state.

Our situatedness in a familiar environment, saturated with (movement) norms, takes much of the work and mystery out of folk psychology, leaving only anomalous circumstances to be worked out, deductively or otherwise. As Andrews (2012), Zawidsky (2013) and others have pointed out, we have methods aside from belief/desire attribution to explain and predict behaviour, including bodied and environmentally situated and contingent norms, personalities, habits, hormones and stories. Embodied cognition adds to this an implicit level of immediate comprehension; in Gallagher's (2008) rendering, the behaviour of others is a continuum in which we play an integral part. This perspective is made very evident in practices that refine sensibility to physical states, such as in dance therapy; here, dance is an expression of our embodiedness, involving the production and engagement of knowledge structures grounded in the parameters of our physicality. Through dance practices such as somatics, we enter a state of heightened awareness; of self, environment, space, and time.

Dance expresses and gives access to the world assumed hidden in RTM - a world that is not as inaccessible and opaque as its proponents would lead us to believe. "Mental states" are bodily conditions, patterns, and habits of response, and as such are visible to the attentive eye; even when we are not specifically paying attention, we coordinate our actions with others, as in the movement of a crowd on a busy city street - Sheets-Johnstone calls this "moving in concert" and suggests that it is something in which all animate life forms participate, with movement organising us as individuals, and as a group (IHSRC, 2016). The spontaneous choreographies of our everyday interactions are complex exercises in timing, response patterns and creativity; our sensitivity to these are deep-rooted in our phylo- and ontogenetic histories. As Sheets- Johnstone elaborates, we coordinate our movements first with ourselves, and then with others, generating a kinetic-kinesthetic repertoire, a wordless language that relates us to the surrounding world and

other agents in and through movement (from a talk delivered at IHSRC, 2016). Sheets-Johnstone posits that it is through an awareness of movement that we develop agency, which is a prerequisite to self-awareness and effective relating to others. She refers to a series of experiments by Kelso and Fuchs, in which a mobile is attached to the leg of a three-month old infant; in what is termed "conjugate reinforcement", the child becomes aware of their capacity to act on the world through movement, providing the basis for a theory concerning the origins of agency (Kelso & Fuchs, 2016)[12]. RTM considers complex language necessary for the formation and holding of intentional states such as beliefs and desires, and thus has questioned at times whether infants and animals may possess a ToM (and hence, agency). In Sheet-Johnstone's estimation, this logic is inverted - infants are not *prelinguistic*, language is *post-kinetic*.

There can be no question that we often sense and respond to what others are thinking, and when our organism is functioning efficiently, we effortlessly coordinate our actions in ways that allow us to live in, and adapt to, diverse and complex environments. The question of how this is achieved has ignored many vital signs in searching for an answer. We are not merely information processing machines with symbolic mental contents; we are fully-fleshed creatures that move through many worlds, natural and social; we evolved to live in complex groups in often dangerous and unpredictable circumstances. As such, we have keen senses and capacity for a wide range of expressive movements.

Our understanding of ourselves, others, and environments, is entirely conditioned by how we move, and the contingent development of a response repertoire. Linguists George Lakoff and Mark Johnson (LJ) have proposed that movement-derived metaphors garnered from our embodied experiences undergird what we refer to as "thinking"; if you push this further, our subjective experience *is* our sensorimotor domain. In LJ's Integrated Theory of Primary

[12] Their work is an extension of that of Carolyn Rovee-Collier (1942-2014) on infant memory and learning.

Metaphor, we begin our lives in a state of *conflation* in which early subjective experiences and judgments are undifferentiated; these become our primary metaphors, which are instantiated as permanent neural connections that cross conceptual domains. At what they refer to as a "higher level", but I contend is increased experience, maturity and facility, these primary metaphors can be combined in new ways, creating novel inferences. The implication is that what we bodily experience becomes how we think, and these embodied, experiential metaphors are used to reason with (Lakoff and Johnson, 1999).

To provide an example of this phenomenon - in infancy, warmth is conflated with affection, and closeness is synonymous with intimacy. These associations are embedded in our experiential, embodied memory in such a way as to be instantly available; as we mature, these primary metaphors become ways of sorting through our relations to others, cultivating closeness and proximity, and making judgments about people we meet or those we already know. This plays out in situations such as John Bargh's well-known coffee-cup experiment, in which subjects judged other people to be more generous and caring after they had briefly held a warm cup of coffee, rather than a cold drink (Ackerman, Nocera and Bargh, 2010).

Thus, sensorimotor experience is integral (equivalent, even) to what is referred to in RTM as holding beliefs. We reason with primary metaphors created through bodily experience; the first movements we make (towards, away from, reaching, ducking, crawling, standing) become the ground of "thinking" - the application of accrued movement knowledge of novel situations - a *practice,* not an abstract series of representations. Gesture is always inherently about something; in the absence of an apparent reason for movement, reasons can be (and are) inferred (felt, bodied) from a common human lexicon of primary metaphors. Deficits in this lexicon, which may be the result of limited movement exploration (endemic to our sedentary

lifestyles) may correlate with a reduced repertoire of response, or the closed-off, limited thinking and intrusive, repetitive thoughts associated with many mental disorders. This lexicon must have enough in common with our cohabitants that we can understand and communicate basic response patterns. Falling out of step with the world around us is symptomatic of "mental" distress; abnormal movement behaviour, whether more extreme or absent in comparison to conspecifics, is maladaptive in most cases.

Zawidsky (2013) proposes the "human sociocognitive syndrome" as an alternative to RTM; he suggests our ancestors developed a complex signalling system involving music, dance and ritual, which allowed for the expression of cooperation between members of a group. Pervasive cooperation is central to his "mindshaping" hypothesis, which requires shared attention (and intentionality); Zawidsky proposes that rhythm and synchrony form the basis of communicative gestures.

In phylogeny and ontogeny, synchrony appears before what is considered to be formal language, and further investigation reveals a rhythmic "protolanguage" innate to all humans. Self- and group formation can be tied to the emergence of this rhythmic protolanguage connected with music, dance and ritual. The evolution of self-consciousness, shared attention (and plural subjects) spawned by synchrony are the seeds of the human "syndrome", and the ground which fosters the complex narrative landscape of motives, scripts, and agents in which we move. Zawidsky's complex signaling system may simply have been an elaboration of elements that were already widespread; it is likely that music and dance were originally inseparable, comprising an embodied communication system that only recently has been dismembered. It is not possible to make music without moving, although contemporary instruments and technologies do not require the same range and extent of full-body movements as African drums.

There is an evident connection between movement and singing that seems indicative of a connection with the conceptual realm of primary metaphor:

> ...humans are born with an intrinsic sense of behavioural and experiential time adapted for sympathetic motivation in imagination, for 'mirroring' or 'echoing' the motives in another's song. This would appear to be a fundamental aptitude integrating both action and consciousness, and leading to thought and language, as well as what is currently called 'executive functioning' and 'working memory. (Trevarthen, 1999)

From the evidence pointing to the centrality of rhythm in human culture, communication, and health, and the previously explored connection between dance, rhythm, and agency, we can better understand how and why dance came to occupy a central place in our history. In the next section I will look more at the biology behind these phenomena.

D. Neurophysiology of Humans Dancing

Neurophysiology is the study of the functioning of the nervous system; unlike neurology, the nervous system is understood to be distributed throughout the body (not just in the matter contained in the skull), intimately connected with movement and action. Without a body, there is no brain; the brain evolved as a consequence of having capacity for an infinite repertoire of movement, and through the complex process of calibrating our internal rhythms and responses with the external environment. Systems neuroscientist Gyorgy Buzsaki (2006) describes this when discussing neural oscillations - "Without adjusting internal connectivity and computations to the spatial and temporal metrics of the external world, no constructive, "real-world" functions can be generated by the brain" (Buzsaki, 20o6, p. 11). Our brain and central nervous system coordinate movement, and at the same time, are organised *from* the movements we see and make during our individual development. The vast, complex neuronal networks of our minds are organised first by our self-relational movements (reflexes - again, see Buzsaki for a detailed description), then by orienting in an environment. Brain structures and networks are built up in

increasingly complex fractal patterns generated by our movement experiences. Dance, as a complex, organised form of movement, may be understood in this light as the expression of everything we are capable of as human beings, including movements, meaning and images.

Rudolpho Llinas makes a persuasive argument that the ultimate function of the brain is to predict (movement), and that what we call the self is the centralization of prediction (2001), which is continually operative at most, if not all, levels of brain function. Whether reflexive or conscious, we are always responding to and integrating information from our surroundings, generating what Llinas refers to as "the mindness state", which he describes as evolving "...as a goal-oriented device to guide the interactions between a living organism and its environment" (Llinas, 2001, p. 22). The Default Mode Network (DMN), which has been identified as being of interest in relation to the self since 2001 (Sandrone, 2013), may correspond to this "mindness state". Comprised of neurally associated regions that may be the actual substrate of self - awareness and/or consciousness, and detectable across the lifespan, (ibid) the DMN is more active when we are not engaged in a specific task, and has been shown to have associations with memory, self/other identification, navigation and Theory of Mind (discussed in previous section). It overlaps with the Mirror Neuron System (Molnar-Szakacs and Uddin, 2013), part of the proposed Action Observation Network (Karpati, 2015; Kirsch, 2015), associated with the expression of empathy and the ability to coordinate actions with others. These regions, and the activities associated with them, clearly demonstrate the body-in-the-mind, and show how movement plays a role in self-perception and self-other relationships.

We can further understand the role of movement in contributing to the overall function and development of the nervous system by looking at neurobiological differences between expert dancers and people with little to no dance experience. To illustrate - Koeneke, Bezzola, &

Jancke (2010) found differences in white and grey matter between dancers and non-dancers; Blasing, Tenenbaum & Schack (2009) found that expert dancers create different mental representation structures in long-term memory, related to functional phrasing of movement; these may provide the basis for enhanced motor control. These studies indicate that dance experience may lead to increases in functional connectivity, associated with better overall performance. They also point to the fundamental intermeshing of brain, body and environment, which produce overlapping effects across domains they intimately comprise.

Functional connectivity refers to the temporal dependency, or correlation, of spatially disparate brain regions, and is related to neuroplasticity - how neuronal networks are built and changed by experience over time. The brain is not a static computing machine with finite, unchanging pathways and structures; increasingly it is apparent that the brain and nervous system are sculpted by experience, with connections evolving between areas which enhance reaction times and contribute to expertise. The idea that areas that "fire together, wire together" is now accepted doctrine in neuroscience, and the study of functional connectivity provides important insights as to how this process unfolds. Neuroscientific investigations have revealed a high degree of plasticity within and between seemingly disparate cortical and subcortical regions in dancers, giving rise to the ability to learn new movements quickly by professionals whose livelihood depends on this skill (Cross, 2014). My suspicion is that our ancestors would have *all* depended on this skill, for the increases in group cohesion, acceptance, and communication benefits it conferred; thus the accompanying neuroplastic effects and benefits that have been observed would have contributed to our species rapid evolution of advanced cognitive (and sophisticated motor) abilities.

Differences in the function and structure of the nervous system in people with greater dance exposure and expertise may be due to the comprehensive engagement of cerebral, sensory and muscular areas when engaged in dance. Dance involves the use of rhythm, imagination, touch, timing, spatial awareness, planning and precision, all of which are complex multimodal processes involving high levels of neural coordination. Areas related to music perception, and motor programming and execution, could be conceived of as forming a "dance network" - regions that coordinate and are active during engagement in dance-like activities (Kung, Chen, Zatorre, & Penhune, 2013; Zatorre, Chen, & Penhune, 2007). We might expect, then, that such a network would be further developed in expert dancers, and could be observed to function more effectively than in recreational dancers, or people with little dance experience.

The main areas considered to be involved are the primary sensory cortices (Auditory, Visual and Somatosensory), important during the learning of a dance through visualization when cued by music; these are involved in music perception, mental imagery and processing rhythmic patterns, melodies and timing. The study of the neurocognitive processes engaged by dance is fairly recent, but the issues emerging from it, such as the effects of training on multimodal integration and memory, attentional focus in motor learning and performance, the effects of motor experience on brain activity in response to live performance (as the LIVELab at the McMaster Institute for Music and the Mind is capable of exploring), the positive effects of dance activity on well-being across the lifespan, and applications for rehabilitation (Blasing et al., 2012) are richly varied and incredibly vital to our understanding of both how these processes develop, and how they may be cultivated.

While it is impossible to isolate any function or behaviour to a particular neurological structure, brain areas underlying or involved in the "dance network" (regions that show high

levels of activity related to dance behaviour) demonstrate how the complex aspects of dance necessitate activation of disparate areas of the brain, and the areas involved perform multiple functions. For example, the cerebellum, a small structure at the base of the brainstem accounting for 10% of the brain's volume, yet containing twice as many neurons as in all the rest of the brain, is involved in many functions, including the maintenance of balance and posture, coordination of voluntary movements, motor learning, and also many aspects of cognitive function. Auditory processing, and improvised generation of rhythmic and melodic structures also occur here, during imagined and perceived familiar melodies (Herholz, Halpern, & Zatorre, 2012). The overlap of "cognitive" and "motor" roles in this deep neurological structure (where depth is an indication of how old a particular area is, in evolutionary terms) further suggest how inseparable these processes are. Other cortical nodes include the superior temporal gyri, the dorsal premotor cortex, the pre-SMA, and the SMA - Supplemental Motor Area - (Brodmann's area 6). The SMA is a critical region for motor planning of sequences of movement (Makoshi, Kroliczak, & van Donkelaar, 2011; Thickbroom et al., 2000), and important for motor execution and imagery (Burianová et al., 2013; Jeannerod, 1995; Lotze & Halsband, 2006; Lotze et al., 1999); it also mediates beat perception and reproduction (Grahn & Brett, 2015).

Historically the SMA has been shown to be active during the mental imagery of motor tasks, and in those which involve mental imagery accompanied by music (Leonardo et al., 1995, Chen, Penhune, & Zatorre, 2008; Cross, Hamilton, & Grafton, 2006; de Manzano & Ullén, 2012; Herholz et al., 2012; Zvyagintsev et al., 2013), In data from the Dancing with Parkinson's program at NBS, the SMA seems to be the most critical region for visualizing of a previously learned dance that has been performed over a season (Bar and DeSouza, 2012). This overlap of

visualisation and motor planning again points to the relationship between cognitive and motor areas, in terms of both structure and function.

E. Dance as treatment

Dance, compared with exercise, shows a very high rate of adherence in treatment programs - people find attending a dance class to be a rewarding experience, and the inclusion of social aspects and sensory elements such as touch may contribute to this enjoyment. The use of imagery, memory, narrative, and imagination lift people out of current circumstances and transport them to a realm where they experience themselves, as bodies, in an entirely new way. If expert dancers, as research suggests, develop differences in brain structures that make them better equipped to respond to movement cues, we have the basis for a theory that not only validates dance as a positive adaptation, we have reason to believe that learning dance, at any age, can promote improvements in one's ability to carry out motor programs. The comprehensive involvement of multiple areas of the brain and coordination of the central nervous system in dance suggests that dance not only corresponds with neural organisation, it can help reorganise aspects of that system, and improve overall function of the organism. This provides evidence that dance and the elements of dance are naturally rehabilitative and productive of health.

Data from recent studies suggest that this is indeed the case. It appears that engagement in dance is both neuroprotective - i.e., it helps preserve neuronal structure and function - and neurorehabilitative (Dhami, Moreno & DeSouza, 2015); dance seems to promote recovery in the nervous system, from physical/psychological trauma. Examples of dance used to treat complex neurodegenerative disorders such as PD and dementia are proliferating, and the research to go along with these, although in its inceptual state, is already starting to demonstrate that dancing

promotes health in longevity (Houston & McGill, 2013; Kshtriya et al., 2015; Westheimer et al., 2015).

Dance for Parkinson's programs have sprung up recently around the globe, buoyed by reports in news and journals of dance's power to improve the lives and symptoms of those affected by this debilitating movement disorder. Parkinson's is a progressive, neurodegenerative disease, for which, at the moment, there is no cure. Symptoms progress from tremor and rigidity to general loss of control of movements in both the sympathetic and parasympathetic nervous system. Patients may find temporary relief through pharmacology - drugs such as Levodopa can reduce symptoms for several hours at a time. However, once patients begin taking this drug, its effectiveness gradually declines, eventually leaving many without any relief. High dosages of this medication cause side effects – dystonias which are also unpleasant. Dance seems to offer reprieve from the symptoms, temporarily, and possibly even longer (how much longer, no one knows). Reported benefits have brought many sufferers in search of dance classes, which are now offered around the world, some by professional companies such as English National Ballet and Queensland Ballet in Australia. A pilot study conducted by a lab at York University (JoeLab) in conjunction with Canada's National Ballet School (NBS) investigates the neurobiological correlates of improvements in motor and non-motor symptoms for participants in a PD class. Based on methods developed by Mark Morris' company in New York, in a program taught by David Leventhal, participants attend a 75-minute dance class once a week. For this brief period of time, they are dance students, warming up, improvising, and learning choreography. And for this time, according to many reports, Parkinson's symptoms diminish, and in some cases, are even felt to have disappeared.

Data thus far have shown that, along with physiological improvements in balance and the ability to get up from a seated position, there is a notable increase in supplemental motor activity, evident after just 11 weeks, and even more pronounced after 15 weeks. This suggests that training in dance is causing neurobiological change - there is putatively a neuroplastic effect, in which existing brain structures are modified and participants discover improvements in their motor abilities. Dance contributes to a more responsive and better-equipped motor system, capable of improving performance - be it in a professional dancer, or an elderly person combatting a debilitating movement disorder.

In reviewing the literature on dance and aging, we found many reported improvements in conditions as a result of participation in dance programs (Kshtriya et al., 2015), some of which I will outline here. In terms of cognitive benefits, Kattenstroth et al. (2010) report general improvements in all domains of cognition for amateur dancers engaged in ballroom dancing over a period of 16.5 years, when compared with an age-matched sample with no previous dance experience. In a related study, attention, concentration and intelligence were found to be statistically better in a group of expert dancers with over 25 years of experience in ballroom dance (Kattenstroth et al., 2011). Groups who participated in a study of quality of life that used Turkish folk dance found participants in the dance group reported improvements in mood and increased happiness after dancing (Eyigor et al., 2009). Verghese et al. (2003), in an oft-cited study which compared leisure activities for the elderly, found that dance was the only physical activity that showed a significant association with lowering the risk of dementia. Other studies conducted with groups that had dementia showed improvements in the condition; Hokkanen et al. (2008) found significantly improved scores on cognitive tasks for a group that received DMT compared to a control group that did not; Hamill et al. (2012) saw improvements in cognitive

function and mood in a group that participated in 10 weeks of circle dancing, compared to a control group. Rosler et al. (2002) saw an improvement in procedural learning for a small group of patients with Alzheimer's disease who participated in a 12-day ballroom dance program. Dance was also found to have benefits for an elderly population with traumatic brain injury. Berrol, Ooi & Katz (1997) found significant improvements in cognitive performance for a large group (n=107) of elderly individuals who participated in dance therapy over a 5-month period.

Dance has also been related to improvements in self-esteem and self-image among adolescents (Burgess et al., 2006) and DMT has a history of excellent outcomes when used in the treatment of eating disorders (Krantz, 1999). In my professional work, I offer Dance Therapy for Chronic Pain at a community health centre, a popular program with a long waiting list, and participants reports have been overwhelmingly positive. I have witnessed dramatic improvements in mobility, function and mood over the course of a 10-week program, and my observations have been corroborated by participant's program evaluations. We are commencing a formal research aspect for this program to investigate statements that participants have been able to reduce their dosage of pain medication as a result of engaging in dance.

Conclusions of this section

Dance is uniquely movement *about* movement, and as movement is the ultimate function of our brain and central nervous system, the means by which we perform any task, connect and communicate with others, and the essential medium in which we live, dance addresses (and may transform) the core of who we are, what we do, and how we do it. When we put together the preceding arguments - that dance mobilises our entire nervous system and demands complex, comprehensive brain activity; that we organise, and are organised by, rhythm; that dance

involves complex social learning and communication; and that dance is conducive to improved functional connectivity, which translates to better performance in all domains, the benefits of participation in dance are evident. What is also apparent is that dance has always played more than a recreational role in human society - dance behaviour may have driven the evolution of the very things that make us human. Complex coordination, symbolic thinking, language, and problem solving have roots in dance, and from this we can understand why the absence of dance is detrimental, and that a return to dance can heal.

It is also apparent that previous research has fallen short in addressing the challenges presented by dance in therapeutic contexts. Unimodal measurement tools and outcome measures that are either wholly qualitative or quantitative are unable to fully capture and adequately describe the experiences and results obtained where dance has been applied to heal chronic conditions or improve symptoms in complex cases. A unified view of the mindful body and the richness of movement may provide future researchers with better tools through which to investigate dance for well-being. Part Two models a Pilot Study that attempts to bring research on DMT in a new and promising direction.

PART TWO

CHAPTER THREE - PILOT STUDY

A. Introduction/Background

If we proceed with the understanding that Mind and Body are one phenomenon, and the "brain" (or central nervous system) extends throughout the organism, influencing and being influenced by movement and related sensory input, then we may gain insight as to the effects of an experience by measuring changes in the electrical field of said "brain". Neural networks oscillate at several distinct frequency bands, and the resulting interference dynamics are a fundamental feature of the global temporal organisation of the cerebral cortex (Buzsaki, 2006). This organisation is, evidently, complex and fluctuating - not unlike the emergent, dynamic patterns that accompany any embodied practice, and most real-world experience. Historically, research in Dance Therapy has been challenging, because of the complex, multimodal and holistic aspects of a dance experience and connections with improvisation (Batson, Hugeenschmidt and Soriano, 2016: Olshansky et al., 2015). Neuroimaging technologies, capable of recording aspects of activity related to the functioning of the CNS, provide a new kind of "hard" data - numbers that can be statistically analysed and correlated with other outcomes to provide insight as to how a specific experience (or aspects of it) may resonate in (and alter) a particular system.

DMT provides an experiential ground in which participants engage in movement and multisensory attentional exploration, directed inwards or outwards, that can result in profound and lasting changes. Exactly how and why this happens has been difficult to establish, given the constant shifts in organisation of the group and its members in a treatment situation, and the need to remain focused on the details of present developments, rather than predetermined plans. It is

remarkable (to me, at least) how the structure of a Dance Therapy session closely resembles Buzsaki's description of emergent order in the brain, which he states "does not emerge from disorder...transient order emerges from halfway between order and disorder from the territory of complexity (135, ibid). This seems to further support my hypothesis that participation in dance, and the elements of dance, helps to organise our complex systems, and engaging in an activity that is structured in much the same way as we are (in terms of the CNS) could lend itself to better health and function of the overall organism.

In assessing the effects of a dance intervention, correlating the frequencies of neural oscillations with other measures, such as psychological scales, questionnaires, participants' reports, and movement observations, creates a rich data set corresponding to the multimodal experience associated with participation in a holistic treatment/approach such as Dance Therapy. In our recent review of studies incorporating dance interventions and testing their effects in elderly populations, it was clear that many cognitive/sensorimotor improvements can be measured as a direct result of involvement in dance (Kshtriya et al., 2015). Although underlying neurobiological factors were shown to be affected, there were few studies found relating data and significance to aspects of brain related biological factors and structural changes. Research programs using dance with Parkinson's patients have also suggested cognitive benefits associated with movement (Houston & McGill, 2013; Westheimer et al., 2008; 2015), and a scoping review of literature on exercise, dance and movement has shown that dance may clearly foster neurorehabilitation (Dhami et al., 2015). With the use of neuroimaging, it is possible to further investigate the potential neuroplastic effects of dance interventions, and consequently to understand how engaging in dance is capable of reshaping our biology and experience.

Engagement in tasks that increase wave-function in a single frequency band appear to improve functional connectivity across networks, even when these have been damaged or compromised. As an example of this, Mottaz et.al., (2014) found that neurofeedback techniques targeting alpha frequencies led to clinically meaningful improvement post-stroke, and this persisted over time. In light of previously outlined findings suggesting that dance offers a rich model for neurorehabilitation (Dhami et al., 2015) and that long-term dance training can cause changes in both grey and white matter (Karpati, 2014), I propose that participation in dance increases functional connectivity across networks in the brain; that we have cortical structures and pathways that prime us for participation in dance-like behaviours and tools such as rhythmic synchrony; and the absence or diminution of dance-associated phenomenon in our environment can be linked to the development of various disorders. Conversely, exposure to and participation in dance behaviours and DMT tools such as expressive movement and group synchrony can lead to improvements in many symptoms, both motor and non-motor (as traditionally described). Large neural networks such as the Default Mode Network (DMN) have been proposed as associated regions that may be the actual substrate of self-awareness and/or consciousness. The DMN is more active when we are not engaged in a specific task, and has been shown to have associations with memory, self/other identification, navigation and "Theory of Mind"; it overlaps with the Mirror Neuron System (Molnar-Szakacs and Uddin, 2013), part of the proposed Action Observation Network (Karpati, 2015; Kirsch, 2015), associated with the expression of empathy and the ability to coordinate actions with others. These proposed networks clearly implicate the body and our embodied visualisation skills in self- and other recognition.

Historically, a primary application of Dance/Movement therapy is in the treatment of mental disorders; although research findings for therapeutic and rehabilitative outcomes

associated with DMT have been positive, many have been criticised as insufficient to demonstrate effectiveness. Electroencephalography (EEG) is a non-invasive neuroimaging technique allowing for the collection of data related to "internal states" such as mood, which can be correlated with quantitative data (such as validated scales) and/or qualitative data (such as interviews, journaling) to form rich, mixed-method data sets that emphasise the inclusion of participant voices, accompanied by "hard" data that can be statistically analysed, independently verified and validated within and across groups.

Depression is a serious global health problem, and statistics show rates are rising alarmingly, with adults aged 45 - 64 the most likely to receive a diagnosis of depression. Some proportion of late-onset depression in this age group may represent a prodromal phase of dementia or other acquired cognitive dysfunction (Fiske, Wetherell & Gatz, 2009); with dementia rates estimated at almost 15% of Canadians 65 and older, and the number of cases projected to double over the next fifteen years, finding ways to combat early signs and cultivate neuroprotective factors is of great importance. Many people with depression do not seek help or receive a diagnosis, suggesting that real numbers are even higher than estimated. In my region (Simcoe County), only one of every five people who present with depression symptoms actually receives help; others remain on a wait-list. DMT offers a cost-effective, efficacious means of providing treatment to more than one individual at the same time, with the adjunct benefits of participation in a group and the known positive outcomes associated with physical activity (including improvements in cognitive function - see, for example, Erickson et al., 2011; Voss et al., 2013). In this pilot study of a group treated for depression with DMT, we observed changes in the alpha band frequency that provide further insight into the way dance may change the brain, and how and why it might be effective for treating depression.

B. Goals/Background/Development/Reasons for measures used

The goal of this study is to attempt to measure neuromodulation associated with participation in a dance therapy intervention specific to a population reporting with diagnosed depression; changes in individual alpha peak power (iAPP) detected by EEG are correlated with data pertaining to behaviour and mood, as well as participants' responses to questionnaires and the therapist's movement observations.

This pilot study builds on data gathered from the Dancing with Parkinson's program at Canada's National Ballet School in Toronto, in which our lab detected changes in the alpha band in conjunction with lower depression scores after just one class, as well as over the course of the 12-week program (Levkov et al, 2014). Following this pilot study, members of our team will be carrying out a mixed-methods study on DMT for mental health at McGill University in September 2016, for students presenting with symptoms of anxiety and depression; thus we will be able to correlate and compare results from multiple locations, and this pilot study provides important insights concerning study design and participant screening. Previously, our lab began to address the neural mechanisms of learning dance in experts through the use of fMRI (functional magnetic resonance imaging - Bar & DeSouza, 2016; DeSouza & Bar, 2012; Olshansky et al., 2014). We have extended this research program to look at neurobiological changes resulting from dance in individuals with Parkinson's disease resulting from dance, using behavioural measures in conjunction with resting-state electroencephalography (EEG). One of these studies examines changes in balance, walking speed, depression, and resting state EEG (rsEEG) associated with dance in participants with PD, as well as in healthy age-matched controls, by examining these measures immediately before and after participation in one 75-minute dance class (Levkov et al 2014). We examined changes in iAPP and iAPF rather than

averaging alpha power over a predetermined range (ie 8-12Hz) as these values give a more accurate estimate of alpha modulated activity (Bazanova & Vernon, 2014; Haegens et al., 2014). This pilot program replicated our previous protocol, allowing us to compare data and results across populations, and with a different style of dance intervention in people without Parkinson's disease.

In the DMT literature, Koch, Morlinghaus & Fuchs' 2007 study of circle dance for depression suggested that dance, particularly when offered with upbeat music and structured form, has a positive effect; Jeong, Hong, Lee and Park's study (2005) suggested that DMT may help stabilize the sympathetic nervous system, based on their analysis of concentrations of neurohormones (dopamine and serotonin) in middle-school age seniors. Meekums, Karkou and Nelson's recently completed (2015) Cochrane review on dance therapy for depression found only three studies that met their inclusion requirements; they concluded these provide low-quality evidence for effectiveness. The current pilot study seeks to address this gap in the literature by providing a model for research that can provide clear initial evidence of brain-based biological changes as an outcome of participation in dance therapy, correlated with behavioural and mood data to create a rich data set demonstrating the value of further research.

What is rsEEG?

EEG - Electroencephalography - is a non-invasive technique which records the electrical activity caused by naturally (and constantly) occurring neural oscillations, detected by placing electrodes on the surface of the scalp (Buzsáki 2006; Han et al., 2013; Nunez & Srinivasan 2006). Because of this superficial placement, it lacks spatial resolution, meaning it cannot be used to determine structural referents for the observed activity; however, it provides excellent temporal resolution and high test-retest reliability (Han et al., 2013). The mean electrical field

activity measured results from ions moving across cellular membranes (postsynaptic potentials), indicating the level of activity in a particular area (or frequency band) which may be excitatory or inhibitory - this is something we can only infer from what is known of the different frequency bands. Resting state EEG (rsEEG) is a measure of this activity without the addition of any external stimuli - participants are asked to remain still, with eyes open or closed, and not to do anything in particular. This allows a session of EEG to be only 6 minutes unlike task-related EEG which can be much longer (>1 hour). What is measured are the natural shifts in frequency and oscillations that reflect the "background" activity of the CNS, and includes the mean field activity of approximately 100 million to 1 billion neurons (Nunez & Srinivasan 2006), primarily in the superficial layers of the cortex closest to the scalp. Historically, EEG oscillations have been labelled according to frequency ranges (many of which were determined by available technologies), the primary divisions being delta (1 – 4 Hz), theta (4 – 8 Hz), alpha (8 – 13 Hz), beta (13 – 20 Hz), and gamma (> 20 Hz) (Han et al., 2013). For this study, we focus only on the alpha rhythm as we have done in previous studies, allowing us to compare data sets; it is also of primary interest here as it is associated in the literature with depression (more on this below).

Why Alpha?

Alpha amplitudes are highest when we are awake and relaxed with our eyes closed; they diminish somewhat when eyes are opened or we engage in an activity or task requiring effort. (Goldman et al., 2002; Han et al., 2013). They are thought to be associated with the default mode network. Reports of alpha asymmetry associated with clinical disorders, including depression, have been replicated for over three decades (Gordon, Palmer and Cooper, 2010). Depressive and anxiety disorders trend towards right-lateralized resting alpha, to a degree that has been suggested might be a potential biomarker for depression (ibid). Wheeler, Davidson and

Tomarken, in a foundational study (1993), showed that alpha asymmetry - specifically, greater right frontal activation - is correlated with negative affect states. Past studies have also indicated that lower alpha peak frequencies in clinical populations correlate with lower scores in cognitive performance (Soikkeli et al., 1991; Angelakis et al., 2004). Other studies report that alpha power (and alpha peak power - Gutmann et al., 2015) may be increased by involvement in exercise (Kubitz & Pothakos, 1997; Lardon & Polich, 1996; Schneider et al., 2009). The mechanism behind this is not well understood, although Dustman et al. (1994) and others have noted in animal studies that there is evidence of improved neurotransmitter functioning and preservation of dopaminergic cells post-exercise (Lardon & Polich, 1996). These exercise-induced increases in left frontal alpha power are associated with more positive emotions (Schneider et al., 2009).

` There is support for our hypothesis and some precedents for our study design in the field of Music Therapy (MT); Fachner et al. (2013) show that MT may shift frontal alpha asymmetries in depression. Kwon, Gang & Oh (2013) conducted a study with a schizophrenic population that used a similar rsEEG protocol (6 minutes of data collection, pre- and post-session) and found consistent strengthening of alpha power in the experimental group. Yang et al. (2012) found elevations in the alpha percentage following MT that correlated with reduced scores on the Beck Anxiety Inventory (BAI) in hospitalised psychiatric patients. As Dance Therapy involves elements of exercise (body movement) and responding to music, it seems reasonable to expect we may find evidence of similar effects in the current data. Investigating this lateralized pattern of frontal alpha activity in patients with major depressive disorder, Cantisani et al. (2015) found a correlation between frontal alpha asymmetry and measures of motor activity, which in turn covariate inversely with alpha activity over the motor cortex. This gives further support to the

hypothesis that looking at rsEEG could yield rich results on the neurophysiological correlates of depression, and also indications of how and if these may be altered by specific motor activation.

Data from a study conducted by our lab on Parkinson's symptoms in the context of a dance intervention, using the same EEG protocol, showed differences in iAPF and iAPP with lateralized differences between PD and Control groups (Levkov et al., 2014). The control group (n=23) demonstrated an increase in left frontal alpha power, while the PD group (n=24) showed increases in right frontal alpha power, with trending increases in left as well. This difference may be due to lower alpha peak frequency in baseline for PD when compared with age matched controls, a difference that remains consistent throughout the literature (Moazami-Goudarzi et al., 2008; Soikkeli et al., 1991). This study seeks to clarify how, and if, these differences may be correlated to baseline depression scores in a population that does not have PD, and if there are detectable changes in the alpha band that may be attributable to participation in dance.

C. Methodology

One or two participants volunteered each week to be scanned pre- and post- a 50 minute DMT session - a total of 23 scans of this type were performed on 10 participants; in addition, all participants were scanned for baseline iAPF and iAPP before the program commenced, and again at 6 weeks for a longitudinal data - this period was determined by when the equipment was available. rsEEG data was acquired using a wireless 14-channel Emotiv EPOC® EEG Neuroheadset and recorded with TestBench software (Emotiv Systems, 2012, San Francisco, CA). The Emotiv EPOC® is an EEG system used both for gaming and research purposes, and has been validated against a purely research based EEG system (Neuroscan) for collection of auditory event-related potentials (ERPs) (Badcock et al., 2013). Electrode sites are in

accordance with the International 10-20 System and include: AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8, and AF4, with two reference electrodes (CMS and DRL) at P3/4. The system samples at a rate of 128Hz with a 16-bit ADC resolution with digital notch filters at 50 and 60 Hz. All stimuli were created in and presented by MediaLab (v2012.4.119, Blair Jarvis for Empirisoft Co., New York, NY). Data markers were sent from MediaLab to TestBench via Virtual Serial Port Driver (Version 7.1, Eltima Software, 2013, Bellevue, WA). Statistical analyses will be conducted with SPSS (Version 20, IBM Corp, 2011, Armonk, NY).

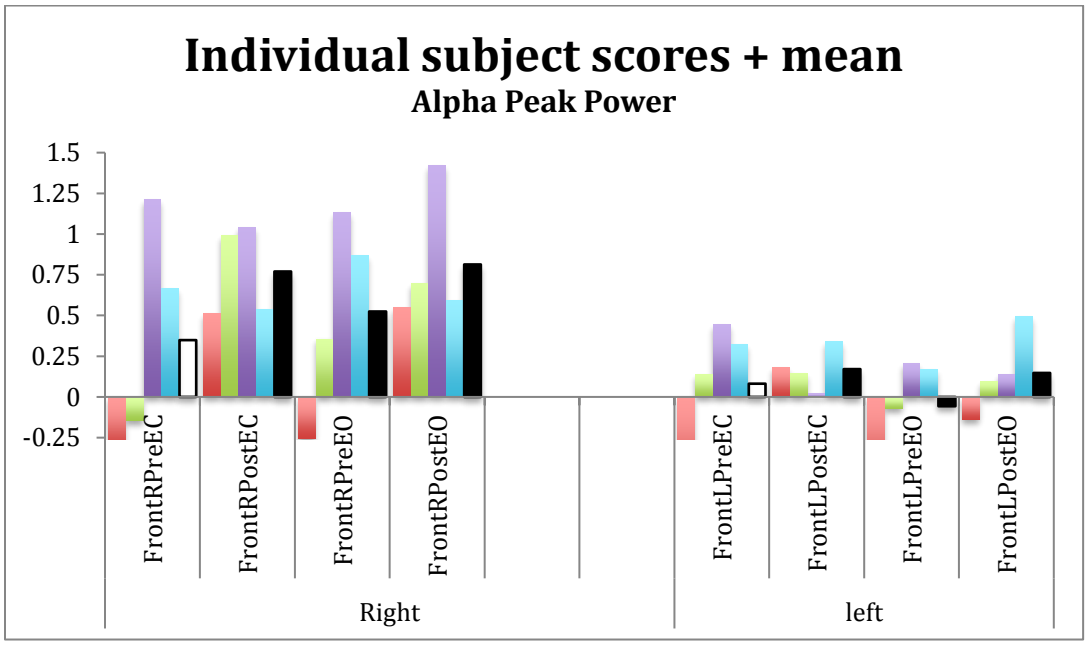
A total of 10 volunteers were drawn from a pool of people who consulted at a local community health centre for anxiety and/or depression. All participants had been diagnosed with depression and in some cases other conditions (including bulimia, bipolar disorder, and chronic pain; they were all under the care of a physician and/or mental health professional and were receiving their usual treatment in addition to the dance sessions). Participants formed a diverse group with a range of ages, abilities, and severity of diagnosis; they were compensated for their participation in research aspects and received no-cost access to dance therapy as part of this pilot study. In addition to the rsEEG, participants were asked to complete the Geriatric Depression Scale (GDS), General Anxiety Disorder test (GAD), Patient Health Questionnaire (PHQ-9), and Quality of Life measure (QoL) before and after the first and last sessions, and also completed a short questionnaire regarding their experience at the end of the program. Completing the questionnaires took about 15 minutes to 20 minutes; our EEG protocol was generally completed in twenty minutes per participant. These scales were chosen so that data could be compared with that collected at other research sites (NBS, McGill).

For the intervention, participants attended 7 dance sessions over 8 weeks (weeks 1 - 5 were dance only; week 6 was a second data collection day; week 7 was dance only; week 8 was a

combination of collecting responses for Scales and Questionnaires and a shorter dance session). For weeks 1 - 5, one or two participants volunteered to come early and stay afterwards to complete additional EEG scans; week 6 all participants came for a scan; weeks 7 and 8 there were no scans performed (the equipment had to be returned to the lab). The dance intervention itself was typically a 50 to 60-minute session comprised of a group warm-up, which took place standing in a circle and progressed through a series of gentle movements, from breathing together, to enforcing body boundaries and tactile awareness through self-touch (brushing, tapping, squeezing), to gradual stretching and exploration with the spine and head, arm and leg movements, to full-body movements through the space, turning, tipping, rocking and jumping. This sequence draws on the Brain Dance (Anne Green Gilbert, http://creativedance.org/about/braindance/) while incorporating basic principles of DMT such as starting with the extremities and moving towards the centre, while also following and responding to the movements made by participants. From here, we moved to individual explorations, often using elements of space and time; these led to partner work such as mirroring, sharing in the group, and we often concluded with a movement circle and further sharing/mirroring of movement as a group. We ended by returning to stand in a circle, usually closing with gentle movements and breathing together. Detailed descriptions of the content for each week can be found in the Appendix, including notes on treatment goals, themes, music, original plans and alterations. Working with dance in this way, I feel it is important to emphasise that plans change, and they must, to be responsive to the needs of the group or individuals within it. Dance in therapeutic or community settings, or DMT, is not intended to assist the participants in mastering a particular movement sequence or style, but rather is about personal exploration and growth through movement.

D. Results

Data were analysed using the same pipeline as in Levkov et al. (2014). Averaged frontal alpha power was computed for electrodes corresponding to the left (F3 and F7) and right (F4 and F8) hemispheres. A 2 (Time) x 2(Hemisphere) repeated measures ANOVA was performed, to investigate if there was an increase in alpha across both hemispheres resulting from participation in the dance intervention. A pairwise comparison was performed, to detect any asymmetric changes. We also looked at (Time) and (Eye State) to detect differences in alpha peak frequency associated with both (eyes open, eyes closed) conditions. GDS, QoL, and responses to the dance questionnaire were analysed for verification as to whether the intervention has any reported effects on behaviour, mood, or experience of the participants.



Alpha Peak Power is shown here for each subject (coloured) and the mean (black), for Eyes Closed (EC) and Eyes Open (EO) conditions, Pre- and Post- class measures, averaged across Right and Left Hemispheres (R/L).

The rsEEG data presented here are for the pre-class/post-class measures only; data markers were missing for the longitudinal POST measure, making an analysis of PRE/POST impossible. This was likely due to human error. We had to exclude data from one subject as the numbers fell outside the matrix for analysis, suggesting there may have been environmental noise in the data for this subject. Some subjects left the study for personal or medical reasons, and two sessions were adversely affected by inclement weather (snow days) resulting in low turnout. In total 8 scanning sessions on 4 subjects whose pre- and post-class data could be used for this study. Even in this small sample, the preliminary data from pre-class and post-class show interesting trends that correlate with what has been previously observed in the literature.

For the four subjects, alpha power was notably lateralized towards the right hemisphere, particularly pre-class, and the effect was even more pronounced in the EC condition. This lateralisation effect was seen to diminish post-class. In the longitudinal analysis of GDS and GAD, there were decreases in the scores of all participants, showing a trend towards more positive affect that would correspond with the changes observed in the alpha lateralization. QoL showed improvements, and in the questionnaire concerning their feelings after participation in the dance class, all subjects reported increased enjoyment and general reports of better mood.

As both a practitioner and researcher, I found it very challenging to take detailed notes on movement observation while providing the class and collecting data. The best I could achieve in this area were immediate observations that were incorporated into how I structured the class in the moment, and informed decisions I made related to future structures. I would have liked to take detailed notes using standard notation such as LMA (Laban Movement Analysis - in which I have training but left out due to time constraints). I suggest that future studies make use of a team - multiple people in various roles - a therapist to deliver the program, a researcher (or

multiple researchers) to administer tests and collect data, and one or more trained movement analysts to keep detailed notes on specific group members, as well as general notes on group trends. It would be excellent to have video recordings of some or all sessions, which is something I hope to include in future groups if participants allow. This will allow individuals to view and rate the subjects' perceived improvements due to DMT. To give a gross sense of what I recorded (and note, this record is somatic - felt/lived by my body as a participant; had I stopped to write this down I would have lost connection to the group, and the lived movement experience would be lost). I noticed a general tendency for the group to enter more quickly and easily into movement propositions as the program progressed; they also made larger movements that occupied a greater amount of space.

Questionnaires and Responses

For the participants who completed all aspects of the testing and the entire program, several trends of interest can be noted in their responses. As this is a very small sample size, I did not perform statistical analysis of the results, but noted if there were obvious changes and looked for themes that could be of interest in further research. Participants completed a Medication Questionnaire, a short-form Geriatric Depression Scale (GDS), a Quality of Life Scale (QoL), a 7-item Generalized Anxiety Disorder Scale (GAD-7), A Patient Health Questionnaire (PHQ-9), and a questionnaire developed for the DwPD class at NBS that asks 5 questions related to how a person feels after dance class, and two open-ended questions about beliefs and motivations pertaining to their experience. I will present some of these here as examples of responses given.

Participants were taking many different medications, including some for pain, depression, bipolar disorder, and other conditions. This was by no means a homogenous group.

For the standard scales -

PHQ-9: no notable changes. Scores remained basically the same (only 5 weeks)

GAD7: improvements for all participants - lower anxiety scores, in one case from 13 to 5

QOL: slight improvements, larger for participant who was most withdrawn in areas related to socialising, helping others, participating in recreation and engaging with entertainment

GDS: almost no change, although marked improvements for one participant (from 11 points indicating Depression to only 2; others went from 5 to 3, 10 to 8; one N/A)

Responses to questionnaires:

A. How is your body feeling after the dance class? All participants' answers were either "Better" or "Much better"
B. How is your state of mind after the dance class? All participants' answers were either "Better" or "Much Better"
C. Do you feel that the consequences of the dance class impact your life on a daily basis? 2 yes, 2 no (one was qualified - maybe on the day of)
D. If yes, how long do you feel that the impact lasts? hours/days for responders
E. How is your mobility after dance class? 3 Better, 1 same
F. What do you believe specifically makes the dance class work for you? 2 answers about "awareness", others comment on the movements
G. What brings you back to class each week? 2 answered: "commitment", one: "makes me happy"

E. Limitations and Conclusions

Evidently, this was a small sample size, and as such cannot be taken as indicative in any way. However, the trends, challenges, and methods here will certainly be of interest in the creation and management of other studies, such as one that our group will conduct in September 2016 at McGill University. Many of the challenges and reservations I had as a researcher filling multiple roles will be addressed by enlarging the research team, such that people can support each other in conducting the various elements of this complex research. Although I had reservations about attempting to be both researcher and group leader, in the context of the small town in which I live it was a practical necessity. Filling multiple roles allowed the project to get underway, providing a service and alternative treatment option to local residents, and although I feel the conditions were not ideal, it seems it was a valuable experience for all concerned.

As this group was conducted in the context of a Community Health Centre, and I made use of their standard system of online enrollment (which subscribes people to a group in the order they apply), my group was composed of the first 10 people who signed up, some of whom were referred by their physician. Because of this system of inscription, my group was diverse in terms of age, type, and severity of diagnosis. This presented several challenges to me, both as a researcher, and as a practitioner of dance therapy.

All subjects were taking medication - and all the medications were different. One subject attended the group with the support of a caregiver. This subject had a more restricted movement repertoire, and at times became anxious if music was not playing; this had repercussions on how the sessions began and evolved. It was difficult to balance the needs of these diverse individuals with the needs of the group as a whole, as levels of stimulation were very different. For future groups, whether for research or therapeutic goals, I suggest a pre-program screening that

includes an assessment of movement facility and access, and the creation of sub-groups that allow for an appropriate range of motion to be explored. It is very important in this client-centred work to provide conditions that allow for a feeling of success, inclusion, and achievement; while this is possible in a mixed group, I feel the group as a whole may evolve more quickly when it is less diverse in terms of capacity for movement and expression.

Conclusions for the Pilot Study

I modelled and tested a mixed-methods study design including longitudinal recordings of resting state EEG with a depressed patient sample, and the results indicate that this is a promising direction for further research, as preliminary outcomes corroborate previous findings in the literature on EEG and depression, and reported benefits of dance. It was my hope to demonstrate potential for finding previously unreported levels of effectiveness in using DMT to treat depression by investigating evidence for neurobiological changes, which when combined with other measures, may demonstrate positive neuroplastic effects resulting from participation in dance therapy. Our study design is simple, and may be replicated and expanded upon by other researchers interested in investigating the effects of dance on the brain, and also builds evidence for DMT as a recognised, effective treatment for depression. The EEG setup we use is portable, affordable, and user-friendly; it would not be difficult to implement this study design with other populations, in other locations, to build a very strong data set that could be made accessible to all researchers. As our global population ages, and mental health crises are on the rise in all age groups, it is of increasing importance to maximise access to low-cost, effective therapies - dance has little to no adverse side-effects (as compared to many pharmacological interventions), and fringe benefits such as increased physical activity and a social environment make it an excellent candidate for further research, and as results accumulate, potentially widespread application.

CHAPTER FOUR - Discussion and Conclusions

> *....dance is not just for the studio; it needs to permeate every aspect of society.*
> - Darcey Bussell, President of the Royal Academy of Dance

I offer that dance, and therapeutic applications of dance techniques, have a vital role to play in the regeneration of individuals and society; moreover, this is what dance has always done and been for. Dance has played a central role in human culture, it seems, at every moment in recorded history. Far from a recreational diversion or aesthetic product with limited appeal, dance is fundamentally important for the growth and maintenance of our complex nervous systems and in developing the wide variety of adaptive behaviours humans are capable of.

With examples of dance programs now offered in settings as diverse as hospitals, prisons, long-term care facilities and special education programs, lingering conceptions of the well-lit studio as the natural domain of dance, a high-art performed by a class of elite athletes and highly-trained professionals, must be challenged. Dance belongs to each and every one of us; it is our first language and birthright as flexible, fleshly creatures. Dance is at home in our skins, and in the space enlivened between us by movement, intention, and awareness.

This shift is already happening - dance companies around the world are welcoming people with movement difficulties, challenging perceptions of what dance is, who does it, and why. Many of these initiatives include research partnerships with academic institutions, marking a new era of inter-sectorial collaboration. Studies associated with these programs suggest there are cognitive benefits associated with movement that may foster neurorehabilitation - these findings break down historical divisions between mind and body, introducing new language to the discipline of dance, and potentially shifting the traditional parameters of philosophy, medicine, and science.

Colleagues who work in rehabilitation are incorporating dance in their treatment regimens, and report that once discharged from treatment, patients are more likely to register and participate in community-based dance programs, allowing them to continue to benefit from the effects of dance. University-led research programs investigating the benefits of dance from the perspective of scientists, social scientists, and dancers are looking into subjects ranging from community-based arts practices (Calgary), dance and neurorehabilitation (York), and restorative dance (UQAM); due to the newness of this field and disciplinary silos, much of this research is taking place without the benefit of exchange with other researchers in related areas. With little yet published in the area of dance and social well-being, we can suppose that many researchers may be unaware of the projects of potential colleagues whose work may be housed in different faculties in various institutions. The current study invites researchers, practitioners and stakeholders to collaborate and share their particular knowledge and methods, so that together we may advance the field of dance as it relates to well-being.

Collaborative, multidisciplinary research incorporating a range of perspectives and diverse skill sets will raise the profile of dance, and increase awareness of its myriad benefits. Researchers from disciplines who are new to dance (including health-related and medical sciences) can misunderstand the details and requirements of dance-based interventions, and research designs suffer from a lack of familiarity with methods on both sides. Through collaboration, we can begin to develop methods and protocols for research together, informed by shared experiences. Tools such as neuroimaging offer new kinds of data and information related to biological changes associated with dance; when we incorporate new technologies with validated scales, interviews, and other methods drawing on both qualitative and quantitative approaches, we create rich data sets that do not seek to compress results along one axis or

dimension of experience. Just as the mind and body are aspects of the same (complex) thing, we need to find methods capable of describing what happens when we dance, rather than assume there is nothing of medical interest or merit if it cannot be contained or repeated.

Methods related to describing and measuring the effects of dance, such as research/program evaluation methods, conditions for reproduction/comparison, and details about what is being taught to participants, and how, are important aspects of this new field. By focusing on mutual exchange and collaboration, we can subvert hierarchies of knowledge production that privilege strict traditional parameters such as replicability in quantitative research; diverse methods and approaches may be considered as having something to contribute to our understanding of this complex phenomenon, with emphasis placed on the experiential dimensions of dance. Equally we must be careful to understand what we are looking at, and why, as technology is rapidly approaching the point that we can look at real-time neuroimaging of bodies in motion; we must attend to and be careful of how such data is collected, parsed and used, to be sure we are asking relevant questions in appropriate ways. As we move towards a deeper and more holistic understanding of health, wellness, function and disease, I am hopeful that dance will once again occupy a central place in human society, restoring our inborn potential to adapt with grace and ease, dramatically improving our lives by its presence.

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Appendix - Themes, Goals, and Structure of Dance Sessions

1st session: Introduction

What I thought I'd do:

- A nice slow warm-up, in a circle, with a touch of brain dance. Intended to follow Chasian method (DMT), beginning with extremities and working towards centre
- Focusing on different body areas - hands, heart, and head
- Using hula hoops, explore in/out and up/down (with chairs) - change of perspective
- Connecting and closure

Themes - Do what's right for you; no talking while doing
Treatment Goals - increase self-regulation, self-awareness; exploring movement repertoire and providing tools to begin expanding this

Music plan:
Buena vista social club - 3 tracks to warm up
Lhasa, the Living Road - J'arrive a la ville - hoops and chairs
Matthew Herbert - The Audience
Chillilli - folk dance
Bia- Nocturno
Sur o no sur

What actually happened:
We stood for the whole session.

Warm-up:
Brain Dance without then with music - Totnes 1 and 2; walking into Totnes 2.
Why? The slow warm-up with emergent structure did NOT work for this group. They seemed uncomfortable and unsure, within a minute I switched to a more structured frame.

(no music) Find something that draws you in the space - approach direct, indirect, with others.

Why? The space provided a safer space/thing to explore than bodies and others. First time in new space - gave permission and agency to engage with it. Safe way to engage with others without speaking. Move towards something together - interesting way to start noticing and engaging in nonverbal communication.

(J'arrive a la ville) Journey through/with hoops - I put hoops randomly on the floor. Instructions - find a place to start. When the music begins, move wherever, and however you like; feel free to pick up and move the hoops, to interact with them in anyway. Think about one idea: In/Out. Further instructions during movement - you may interact with others if you wish (saw some people doing this).

Result - people spontaneously created a "path" with the hoops across the space towards the end of the song, then took turns walking along it. People sometimes created something for someone else to walk in or through.

Why? I kept the theme of "going somewhere" from the previous exercise. I also felt it gave permission to continue exploring moving among and within others without talking.

(Sur o No Sur) Do a hula hoop duet - gave each dyad a hoop - most already had one. Suggested they move together, with the hoop. They can hang on, or let go, but it is to be a dance involving both of them, and the hoop.

Why? This was something that emerged during the previous piece, and seemed like it could use some room to grow and evolve. Not everyone had tried this yet. Lots of people bonded over this exercise, and it occurred in many different ways. Some people threw the hoops back and forth quite energetically, some simply moved through space holding on to them

(no music) Gesture Circle - beginning - say your name and make a gesture, the group does it with you 3 times. Then we do it again, without saying the names - just the movement. One more time bigger and slower. Then with music - Benny Goodman

Why? The group seemed much more comfortable with themselves, each other, and the situation. This is a nice way for people to say their names and present themselves for the first time. There was a lot of laughter and support. Changing the speed/size introduces new movement vocabulary. Introducing movement provides another frame and context.

End - breathing - take a few breaths together, thank yourself and each other for being here

Why? Focusses and closes the group. Gives a calming moment. Reflects breathing at the start.

2nd Session: The Snowy Day

What I thought I'd do -

- Brain dance
- Green, red, and yellow balls - pass around and play a game
- Walking and changing weight together (Putayama kids, Cielito Lindo)
- Salsa - introduce basic movement with weight shifts/timing (Buena Vista Social Club)
- Chichilli - a folk dance

Themes - moving in relation; how do we move together?
Treatment goals - increase awareness of, and comfort with, others in group; establishing safe boundaries for relating with others, awareness of proximity/distance and choices; intimacy - moving in time with another person, the music, different parts of the body

What actually happened:

Again, we stood for the whole session
People arrived very gradually - it was a snow day at school and the driving was terrible
Note - for future sessions, specify that if the busses are cancelled, so is class!

Brain dance (Penguin Cafe Orchestra - broadcasting from home), leading into walking through the space, exploring the space between people in the group, closeness/distance, tipping

Why? The music provided a supportive frame for the Brain Dance warmup, which this group really needs. When we started moving through the space, it seemed important to emphasise relationship, specifically proximity and distance. By giving people the option to be near/far/between or around others it highlights aspects of agency in relational movement. Tipping emerges naturally from the Brain Dance sequence, and allows playing with balance and taking risks in a safe, structured way.

Pass the Ball (Penguin Cafe cont) - each person has a ball; we can play with or pass it on. Green balls were to be passed quickly to someone else, yellow ones slowly, red balls are kept until someone else gives you a ball in exchange.

Why? This introduced an element of Time (speed and duration) and purpose/direction to the previous activity. People could choose who they would pass a ball to, and when, while how was already determined. The simple activity brought engagement and meaning to the relationships started to form in the previous exercise.

Walking Together (Cielito Lindo) - with a partner, who is standing beside you, shift weight to be in time with each other then walk together on the beat, stopping and starting in unison. One person may be leading/initiating this movement, and then switch the lead to the other person

Why? Now we are moving through space, in proximity to another person, with whom we are coordinating our movements. This shifts the sense of agency to being shared, and allows for the development/exploration of joint intentionality. The simplicity of starting and stopping together frames the more complex aspects of negotiating shared intention and direction in space.
Intro to Salsa rhythm (Buena Vista Social club - first two tracks) - exploration of salsa rhythm through timing and weight change - long, short short - to the side and back to the centre. On your own, and then with a partner

Why? This simple exercise really works on timing and coordination. Salsa can be danced at half- or double-time, allowing room for interpretation and scaling to the level of participants. The clear direction of movement and constancy of weight shifts can give a sense of calm and order, while leaving room to explore expressive qualities such as Flow and suppleness. Negotiating the difference in doing the movement alone or with a partner provides a lot of feedback to the sensory system - this is a more complex rendition of the previous exercise where joint movement was first introduced

Dance circle (Kids latin music) In a circle, we review, repeat movement patterns that were explored in the class, adding new ones. Going around the circle, each person proposes movements that the others follow; these evolve as we take them up.

Result - we made a burrito! This came from the group, a spontaneous image, but all were involved in adding ingredients, rolling it up and eating it!

Why - this provides participants a chance to express, through movement, things that have emerged in the session or as a response to the session. The creative component of spontaneous imagery allows the group to express material in new ways - in this case, the burrito seemed to indicate a growing sense of cohesion and shared creativity. As the burrito was eaten by all, it seemed to indicated that people were being "fed" by what happened in the session.

(no music) - Take 3 shared breaths, in a circle, standing close together, to close the session.

Why? This is a calming action that mirrors how the session began (with shared breathing). Standing together shows the development of intimacy and closeness in the group. Breathing also connects inner/outer and makes us aware of our own nervous system, returning us to an embodied place of agency before returning to the world.
Notes - This was a good session, HOWEVER in the future I would advise against the use of specific styles of movement for this particular population, with diverse needs and abilities. Even

with the range of tempo and simplified choices I offered, not all participants could accomplish the shifts of weight related to salsa movements. This lent the session an aspect in which success/failure could enter, which does not conform with the overall intent of the program.

3rd Session: Effort and Imagination

What I thought I'd do: Exploration of the Efforts (Laban); Weight, Time, Space, and Flow

- Warm up and learning of the Dimensional Scale
- moving in vertical, horizontal and sagittal planes
- Kinesphere - near, mid, far
- Journey - take someone with you; change the effort, change the journey

Themes - how do we move our body in space, where do we go?
Treatment Goals: increased awareness and expansion of range and type of motion, opening up of posture, awareness of familiar and new movement pathways in space, body (and boundary) awareness, rhythm and group connection

What actually happened:
Again, we stood for the whole session.

Warm up (Penguin Cafe Orchestra - broadcasting from home) free-form warm up with stretching, leading into Brain Dance, leading into moving through and into spaces in the room

Why? I put the music on and started moving and stretching in the centre of the space, inviting people to join me in a warm up (non-verbally). While I had hoped to make this warm up less structured, it seemed the familiar movements and patterns of Brain Dance that had started our previous sessions were welcome and needed, so we gradually moved towards these. Participants recognised the music and the movement series, which helped to foster a sense of safety, comfort, and letting go. There is a deliberate movement here from connecting with oneself, connecting with the group, connecting with space and moving through it. Once again we were exploring intimacy and distance in moving towards, around, and through spaces created by the moving group. This also gives a visceral experience of dynamic movement and constant change that is available at any time.

The Efforts (Arvo Paart - Spiegel Im Spiegel) demonstration of the dimensions/planes for movement - vertical - up/down; horizontal - side/side; sagittal - front/back together with associated Efforts - rising/sinking; spreading/shrinking; advancing retreating. Try each aspect together as a group, first without, then with, music. Participants invited to explore on their own time, find their own preferences.

Why? The dimensional scale and Efforts of Laban are a simple way to explore movement potentials and associated states. By exploring together, participants have a supportive frame to investigate their preferences before having the opportunity to make their own time and choices.

Result - participants found this exercise very powerful - one was in tears. How we inhabit space, the way we move is attached to many sensations; touching on this through movement alone opened many emotions. I invited the participant to journal about her experience.
Kinesphere (Small Song - Lhasa deSela) - starting with the near/proximal kinesphere, participants move any way they like but simultaneously in a circular formation. On a cue from me we grow into the mid-kinesphere, then the far kinesphere, before retracting back to the near, then mid-range. The movement range is congruent with the lyrics of the song.

Why? This exercise allows for gradual transformation of range of motion, up to and including full extension of the limbs. The support of the group promotes exploration, while the non-structured movement choices allow for individual expression

Result - participants reported many feelings, including anxiety when going from far to near kinesphere quickly. Some made comments connecting the size and range of movements to the ways they habitually move in their lives, associating with things like fear of taking up space.

Mirroring (Yan Tiersan, Amelie - 2 tracks) - I show how to mirror with another person, suggesting we explore both the dimensions of movement and kinesphere with a partner, taking turns leading

Why? Having a partner allows movement in a new way - one is both seen and supported, and watching how a partner follows a movement gives additional feedback on the way the movement occurs. Mirroring often engages a sense of playfulness and sharing.

Result - laughter, new movements in space, new choices emerging

Closure (no music) - returning to the circle formation, participants take turns leading a movement that is mirrored by the entire group.

Why? This provides the opportunity for participants to return to a movement that has had meaning for them during the session, or to make a recuperative movement, and share it with the group. Seeing one's movement echoed by the larger community promotes a sense of being seen, and accepted, just as one is. There is a felt sense of support and community. We end with breathing together and thanking ourselves, and each other, for attending the group.

4th Session: Weight and Time (note: this was another snow day, very bad driving again)

What I thought I'd do:

- Brain dance warm up
- Ways of walking, including strong, medium and light weight
- Shaking, vibrating, floating, stomping
- Moving without music, not moving with music
- Exploring High, Mid, and Low spaces
- Transformations - changing position at a specific time, exploring duration

Themes: weight (the force we put into a movement) and position (where/how this occurs)
Treatment goals: clarifying and expanding choices around weight; exploring the force of strong weight and the expansion of light weight to alter movement patterns; understanding how position influences sensation, and how it can be transformed; using temporal shifts and duration to explore control in movement

What actually happened:
Again, we all stand; group was very small - 4 people - likely due to driving conditions

Warm up (Penguin Cafe) Brain dance, moving into exploration of ways of walking related to Light, Medium, or Strong Weight, in and out of the circle and eventually through the space. I gave out balls and suggested bouncing or throwing them in the air.

Why? Again, the familiar music and movement sequence seemed to calm and focus the group. As we traditionally end this sequence with walking, there was a natural flow into ways of walking. Maintaining the circle for the first part of this allowed the group to see each other, mirror movements, and begin to interact. Moving into the space allowed greater creativity and exploration. The balls became another way to explore weight and gravity - for the people who weren't as comfortable moving, they could bounce or throw the ball and watch the effects, which were related to light/strong weight.

Moving Energy Balls (Soledad - tango) - Taking inspiration from the feel and action of the balls, imagine that there is an invisible ball that you can move in your inner space. This ball of energy can move around and through you and can also be moved outside your body.

Why? I took something we were concretely playing with and turned it into an image. The intention was to facilitate exploration of movement and sensation internally, facilitating shifts between inner and outer space, weight shifts, and extension of movements

Result - this allowed for a surprising array of movements and looser bodies in exploration

Levels and Transformation (Beirut - Flying Club Cup - Nantes) Before the music came on, I demonstrated Low, Medium and High, and invited the participants to explore making shapes at these various levels. I suggested that each position be held for 3 counts, transformed over 2 counts, then held for 3 more counts before transforming again. (eg. Low 1 - 2 - 3 transform 1 -2 high 1 -2 -3 transform 1 -2 mid 1- 2- 3- transform 1 - 2- high 1 -2 -3 etc.).

Why? By imposing a temporal structure, the participants are drawn to coordinate their movement with the music in different ways. This also brings an awareness of time, and forces a shift in how one's movements are related to it. There is a sense that transformation is always imminent, thus it is not possible to be stuck in one position (or situation) for long.

Mirroring (Bach) Drawing on the movement explorations thus far, lead/follow a partner

Why? See previous explanations of Mirroring; the music chosen allows for light or strong movements, and I reminded participants that they could explore/inhabit various levels

Movement Circle (Artie Shaw - Moonglow) Gather in a circle, each participant takes turns leading a movement that is followed, joined, mirrored by the group

Why? Movement Circle provides each participant a chance to lead the group, be seen and supported in their movement choices, and to share and recapitulate their experiences together in movement

Closing (Silence) Everyone provides one movement, echoed by group

Why? A moving goodbye

5th Session: Time and space and Music

What I thought I'd do:

- Warm up without music - start moving and see where this goes
- Moving without music; not moving with music
- Journey - taking time to move to different points in the room, without music
- Journey with music, with a partner
- Dance circle with music

Themes: Tempo (whether introduced by self, partner, music) and Trajectory
Treatment goals: Manipulating elements of sensation and control as they relate to tempo and direction. Understanding how changing the tempo of movement or a trajectory through space changes the movement, and gives a sense of control; feeling the influence of moving with and without music, and discovering a sense of control, agency, or pleasure in this; coordinating tempo with a partner, to have a sense of shared purpose, direction, intent; choosing a path through space and manipulating elements of the performance of the path. Sharing movement together.

What Actually Happened:

Warm-up (2 tracks from Asian Dreamland, Moon Boat and one other; silence) Warmed up different body parts gradually, starting with hands. Went through aspects of Brain dance. After 2 tracks turned off music and continued exploring with hands, incorporating movements such as pushing, pulling, throwing and changing the tempo and effort of each action while moving towards and away from others in the circle

Why? Some participants were not very comfortable starting in silence. One began to shake and move her arms in agitation while moving away from the group. Once the music and more familiar movements began, she was able to join the group again. By emphasizing particular body parts and basic body actions, we were able to expand the movement repertoire in specific ways outside the Brain Dance structure. After two songs, the group was feeling more relaxed and able to tolerate moving without music. The circle formation gave clear spatial structure and support to the explorations. Changing the tempo of actions such as pushing/pulling altered the Effort qualities.

Gesture Circle (no music; Inner Ninja) Participants chose an action and decided whether we would do it quickly or slowly together. We then tried all the movements in sequence slowly, then quickly.

Why? This was an extension of the warm-up and provided a frame for deeper exploration of how movement quality, tone and meaning can be altered along the temporal axis. The group seemed

to notice and respond to differences in temporal/emotional qualities; for instance, one participant said moving quickly increased her anxiety. All members contributed actions which were mirrored by the group. We made these into a "dance" through the addition of music and continuous movement; I used Classified's "Inner Ninja" for its upbeat tempo and empowering lyrics. It also fit well with the type of movements offered by the group - pushing, swinging, kicking.

The Journey (no music) Choose a place in the room to be your home base (a), Move from there to another place (a); move to another place (c), return home (a). Decide how you will move from place to place - directly, indirectly; quick, slow, a combination. Remember your path (Journey).

Journey together (Arvo Part) Take a partner on your journey, go on their journey. No speaking! Is there a way of weaving your journeys together into a longer journey?

Why? This exercise gives participants the opportunity to explore trajectories in the room and the idea of a "place". By paying attention to tempo and trajectory, they can alter how they get from place to place. Accompanying or being accompanied by someone on a journey is a deep kind of world-sharing. The addition of music brings a new quality, altering the tempo and other aspects. Incorporating someone else's experience changes the journey, and changing the narrative thread of locations and movements in the room can bring fresh meaning to the experience.

Mirroring while moving through space (Llasa de sela - Tu Lado) With a partner, do a mirroring exercise. First one person will lead, then the other, then it will be both leading together. Feel free to move through the space while doing this (rather than standing rooted in one spot)

Why? People have a tendency to remain in one place when mirroring - this may just be a result of a lack of input instigating movement through space. I wanted to incorporate this aspect, as we had just been exploring it. I directed when to change roles, interestingly many dyads spontaneously recapitulated elements of their journeys, as if there were traces of them left in the space. The music chosen is slow and meditative, allowing time for the movement to evolve and move into new spatial directions

Gesture Circle/Closure (no music) Each participant offers a movement in the circle which is taken up and repeated by the group. We take three breaths together.

Why? This is a grounding opportunity for people to share their experience in movement, with the group, a final time before departure. The shared breaths calm and centre participants.

6th Session: Head, Heart, Hands; More Journeys

Themes: Body parts and symbolism, Origins and Directions
Treatment Goals: Explore movement metaphors and common gestures, expand movement repertoire and patterns, consciously choose pathways in space and change the temporal execution associated with them; uncover and change unconscious motor programs

What I thought I'd do:

- Warm-up focussing on different body parts, especially hands, heart, head
- Journey, marking the origin/destination with a hula hoop
- Movement circle - longer, with larger movements and moving through space as group
- Cool down

What Actually Happened:

Warm-up (latin music - Totnes CD) move different body parts, starting with hands, moving in and out of the circle

Why? The group was ready to do something outside of the Brain Dance to start, and it worked. The structure of coming in and out of the circle allowed for connection, joining hands and touching briefly as we went in and out of the circle. This led to smiles and laughter; connections important.

Hand-Heart-Head (Piazolla tango) Explore movements led by hands, by the heart, by the head

Why? Movements that seem to initiate with various body parts have different felt-aspects to their performance; this is also a means of expanding movement repertoire through individual exploration of possibilities. Movements directed by the head, for instance, are both common (as in "yes" and "no") but seldom consciously attended to. The hands are highly expressive, and exploration with them often leads to surprising things.

Where have you come from/Where are you going? (No music; Calendar Girl -Stars) Each participant is given a hoop (or two, if they wish). Use the hoop to mark the start (or end) of your journey; travel away or towards it in the manner you wish.

Why? Movement with an origin or destination is inherently meaningful and quickly takes on symbolic dimensions. Without music, exploration is more free-form, although participants seem a little more self- conscious. I did not want the music to dictate their story. Once it was clear that everyone had completed an exploration, I added music to see how that changed things for them.

At the end, we shared where we had been. Everyone went very different places - one was on a golf course; one was driving a sports car; one took a train across the country; and one moved from being cast in a set-form to freedom. All were able to articulate something different about their experience.

Cool Down (3 tracks from Totnes; Latin-inspired) Movement Circle

Why? We had covered a lot of ground in this session, and it felt right to reconnect with each other through movement. I started the movement circle and we took turns leading. We were able to sustain a longer period of engaging in this activity, and I let the music continue into a slower track for our centering and closure

7th Session: Goodbye

Themes: Closure, return
Treatment Goals: Termination, Review of material, Motor control, symbolic movement exploration

What I thought I'd do:

- Warm-up with different music (Haushka - Blue Bicycle)
- Moving together through space (Penguin cafe)
- Beginning/Ending gesture and transformations
- Moving with/without music (Phonomonalies)
- Dance party circle, with upbeat music
- Ask what the group would like/need

What Actually Happened:
As this was our last session, we needed time to complete Scales and Questionnaires, which took longer than anticipated. People had different rates of completing, so the class was only ready all together about twenty minutes after our usual start time. For this reason, we had a short session.

Warm-up (Penguin Cafe) Warm up in a circle; simple movements and Brain Dance

Why? We returned to familiar music and familiar movements, as this felt like the right thing to do.
Filling out the Scales was taxing for some participants, and it seemed we needed something familiar and not too difficult to bring us into the session.

Moving without music/Not moving with music (Phonomonalies) When the music plays, don't move; when it is not playing, move

Why? This is a simple and fun exercise, and the music I used is very funny. I felt like we needed a laugh, as well as revisiting the idea of music, tempo, and motor control. It is quite difficult to shift our relationship to music and NOT move when it plays. This structure is like a game, participants enjoy it, and it gives a clear sense of how we decide when to move.

Where did you begin? Where are you now? (no music) Make a pose or movement representing what you remember about how you felt at the start of our sessions. Make another one for where you are now. We go around the circle and share these movements.
Why? Thinking-in-movement and finding a way to represent where we were, and where we are, is deeply symbolic. Very interesting things came out of this exercise. Everyone was able to identify something; most people's movement and gestures went from closed to more open/expansive. Sharing this with the group allowed for further witness of transformations.

Centering and Closure (no music) We spoke a bit about the group and associated research.