Urban Choreographics: Tracing the Extralinguistic Pedagogies of Montreal's Underground Metro System

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Abstract

Urban Choreographics: Tracing the Extralinguistic Pedagogies of the Montreal Underground

Eija Loponen-Stephenson

In North American cityscapes commuters must perform a specific set of gestures in order to efficiently move through and around public architectural spaces. The mass adoption of these gestures represents a form of extra-institutional learning facilitated by the choreographic characteristics of everyday architectural spaces. The urbanite's quotidian movement through the built environment may then inform their understanding of what normative movement looks and feels like.

The purpose of this research-creation thesis is to investigate how adult human cognition and epistemic formation is affected by bodily movement through contemporary urban architectural spaces. Locally there are few spaces where the procedural nature of city architecture is felt more than when using the underground public transportation network. For this reason, the Société de Transport de Montréal's (STM's) subterranean metro stations are the focal site of this inquiry.

Using ethnographic (experimental field recordings and naturalistic observation) and arts-based methods (inconspicuous public performance and long-exposure film photography) this performance ethnography identified and analyzed recurrent patterns and rhythmic structures of Montreal's underground architectures which cause these spaces to be propulsive for some and disabling for others. The findings of this qualitative study emphasized the hypervisibility of those whose bodies are dissociated from the rhythms of "normative" movement in these spaces.

Though further studies are needed to draw a causal relationship between human cognition and the public spaces they inhabit, this thesis demonstrates the potential of arts-based research to create an output which mediates metric measurement and one's embodied experiences of space for the purposes of research and critical reflection.

Key words: pedagogy of place, movement-based learning, urban architecture, performance ethnography, research-creation

Land Acknowledgment

I want to first acknowledge the ground in which the subterranean architectures of the (so called) Montreal metro have been cleaved into. In these vast brightly lit spaces it is too easy to forget that we are surrounded by the soil that once held all sorts of plant life from which the people of the Kanien’kegá:ka and many other nations procured food, shelter, medicine, and more. Through the process of creating this work the hostility of these places to anyone dissociated from the capitalist labour system has become increasingly apparent to me. What a shame it is that these monumental spaces buried deep in this rich earth cannot be used as a place of shelter for those that need it. It is my hope that this work brings your attention to how these physical structures affect our bodies and minds in relation to our understanding of social belonging.

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It is my great pleasure to thank those in my community who helped me bring this work into being. This project would not have been possible without the support of:

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Dedication

To my parents Shawn and Carla Stephenson who taught me that following your curiosities (with a healthy amount of skepticism) will lead you to where you're meant to be.

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Chapter 1**. Framing**

1.0 **Introduction**

Nearly a decade ago I moved to the city from a deeply rural environment in the Canadian Columbia River basin to pursue my post-secondary education. As if designed to be inlaid into the square matrix of the draftsman's net, the cubic units of my novel urban architectural surroundings demanded that I adopt a new set of gestures to efficiently navigate through and around them. Traveling between the intervals of streets in the city's gridded plan I learned to move at a measured pace in synchronization with crowds of strangers, just as the metronome trains the musician's body to absorb its tempo in muscle memory.

Figure 1.

"Underweysung der Messung" / "Understanding the Measurement" (1538)

Note: Woodcut print by Albrecht Dürer demonstrating the use of a draftsman's net as an aid for perspective drawing.

As I maneuver through the built environment my body reads its architectural surroundings, translating them into gestures danced to the rhythms defined by the spaces between traffic lights, trains, steps, walls, and gates. This vernacular of gestures animated in the material interstices of the cityscape constitutes what I identify as an "urban choreographics". Understanding the urban architectural environment as the relief of an anticipated set of gestures, the quotidian performance of these spaces, for example, in one's daily commute, I interpret as what Henri Lefebvre (1992) describes as dressage, or a "[p]rocess of bodily entrainment and repetition through which rhythm is learned and becomes evident in the body over time" (Lyon, 2021, p. 25). Through regular repetition these gestures become habit, facilitating ease of movement through the architecture of the city without much conscious thought. The morphological uniformity of the urban environment makes it easy to anticipate how to navigate most public spaces using a limited set of gestures. This extra-linguistic knowledge which is kinesthetically absorbed by the body in motion is referred to by education researcher David Greenwood (2003) as a "pedagogy of place", a form of experiential in-situ learning which is necessarily obtained outside the classroom and is part of our collective (muscle) memory. Greenwood (2003) argues that within the contemporary North American knowledge economy, educational institutions purposely obscure the omnipresence of this intricate place-based bodily knowledge as they cannot be metrically evaluated and therefore threaten the mechanisms that subdivide and instrumentalize knowledge as a commodity. I posit that urban

choreographics indicate a fault line in neoliberal models for teaching and learning which position the educator as the main epistemological authority in the process of learning[1].

In the face of a rapidly mechanized society Dewey (1915) is early to identify the memetic relationship between the institutional invalidation of the everyday environment as a place of learning and the increasing alienation of the worker from accessing understanding of their labour's significance within their local social ecology (p.24). The increasing "placelessness" (Greenwood, 2003, p. 620) of contemporary educational institutions naturalizes this perceptual division between the body and the environment but also the body from the mind. This perceptual mind-body-place segmentation which is a contingent condition for modern extractivist social development, positions the environment as an inert surface for the transportation of bodies, goods, and capital rather than an integral actor in the process of human epistemic formation (Clark & Chalmers,1998; Gins & Arakawa, 2008; Greenwood, 2003; Lefebvre, 1992; Manning, 2013; Manning & Massumi, 2014). Of this, Greenwood (2003) writes:

> When we fail to consider places as products of human decisions, we accept their existence as noncontroversial or inevitable, like the falling of rain or the fact of the sunrise. Moreover, when we accept the existence of places as unproblematic- places such as the farm, the bank, the landfill, the strip mall, the gated community, and the new car lot- we also become complicit in the political processes, however problematic, that stewarded these places into being and that continue to legitimize them. Thus places

[1] See Freire (1968) for an expanded description of the "banking model" of education.

> produce and teach particular ways of thinking about and being in the world. They tell us the way things are, even when they operate pedagogically beneath a conscious level. (p. 627)

To more clearly describe the pedagogies of place, I borrow Jane Randell's (2006) model described in her book *Art and Architecture: A Place Between* which differentiates space and place thusly: Whereas space can be understood as a *pre-formed* architectural envelope for human movement, place is a quality of space that emerges through the human kinetic activation of its material characteristics. In line with Randell's proposition Lyon asserts that places are made "through [the] mobile flows of capital, people, objects, energy, or matter which course through and around them" (2021, p. 39). Informed by Lyon and Randell's conception space and bodily movement as co-constitutive elements of place, I postulate that the semiconscious absorption of place-based pedagogy is facilitated by the learner's bodily movement through space. Like how the speech patterns of one's mother tongue lingers in the mouth- so too do habits of movement linger in the gait of the body. If the pedagogy of place is learned through our bodily experiences of space, then it follows that by examining the forms of movement facilitated by specific architectural environments, what bodies can perform these gestures, and the larger socioeconomic systems and cycles these movements are a part of, it may be possible to identify unspoken sociocultural values enfleshed through my own and my fellow urbanites' physical gestures. In this inquiry into urban public space I experiment with various arts-based approaches to document and make tangible the extra-linguistic pedagogies of the Montreal underground.

1.1 **Project Summary**

Over the course of a two-month self-directed artist residency/ethnographic observation period predominantly taking place in the Montreal underground I attempted to compose a “thick description” (Geertz, 1973) of the wordless pedagogical processes through which the rhythms sublimated in the material and sonic atmosphere of the underground influence human movement and the extra-linguistic habits of thought imbued in those gestures of locomotion.

The practice of research-creation is imbued with an understanding of art-making as an extra-linguistic form of knowledge creation and philosophy as an emergent outcome of “thinking in the act” or the textual manifestation of a “‘hypothetical sympathy’ with [...] intuitive making” (Manning, 2016, p. 41). The interpretation of the materials yielded from these creative approaches to fieldwork are both analytic and artistic resulting in an interdisciplinary body of work including sound, photography, video, sculpture, and this accompanying thesis document.

1.2 **Methodology**

Research-creation

The Social Sciences and Humanities Research Council (SSHRC) defines research-creation as “sustained, reflective research (with a developed scholarly apparatus) set directly and actively within the creation process itself” (Government of Canada, 2012). For Manning (2016) “[m]aking is a thinking in its own right” (p. 41) and research-creation is concerned with generating palpable traces of “thinking in the act” (Manning & Massumi, 2014) through artistic means as an integral aspect of theory building. These traces create

“conditions for encountering the operative transversality of difference at the heart of all experience” (Manning, 2016, p. 41) or in other words, the multiplicity of meanings that can be derived from specific events and/or processes. In her research-creation manifesto, Natalie Loveless (2019) describes the transversality of arts-based research as an almost enzymatic force that “mobilizes the artistic as a sensibility and approach attentive to how form makes worlds” (p.101) which offers “speculative frames through which to defamiliarize and reorganize the local [order of things]” (p.101). Rather than producing scholarship that claims to present novel concepts, jagodzinski and Wallin (2013) argue that “arts-based research might more adequately grapple with the question of how things are *already* connected and traversed by unthought modes of intelligence” (p.15) and so add depth and nuance to the reader/viewers appreciation of the everyday.

As the focus of my research question (*How is adult human cognition and epistemic formation affected by bodily movement through contemporary urban architectural spaces?*) is in the domain of experience, research-creation is the ideal methodological approach to generate theory that can articulate how commuters absorb and express the extra-linguistic pedagogies of place. I believe that arts-based modes of inquiry act as revealing agents of those intermediary aspects of experience that are easily lost in the process of translation from bodily sensation to textual description. Additionally, the results of my arts-based inquiries add a level of transparency to the work, providing proof of my process. These artworks/research function as pedagogical tools inviting viewers to become aware of and critically reflect on the knowledges para-consciously embedded in the language of movement through everyday spaces.

Rhythmanalysis

Sociologist and philosopher Henri Lefebvre believed that places are made “through the mobile flows of capital, people, objects, energy, or matter which course through and around them” (Lyon, p. 39). In what can often feel like the chaos of rush hour, these various flows and trajectories contribute to a collective rhythmic pulse that Lefebvre (2004) describes as “the music of the city, a scene that listens to itself, an image in the present of a discontinuous sum” (p. 45) or put differently, a continual polyrhythmic symphony of movements.

When swept up in the rapidity of daily labour cycles it is easy to forget that the rhythms of the city are not equally propulsive to all bodies. In terms of affect the rhythmical atmospheric conditions of the urban environment can range from hostile to pleasurable depending on one’s mobility, age, socio-economic status, identity, and appearance. The question is: What causes an urban environment to be thrilling for some and oppressive for others? Lefebvre offers rhythmanalysis as an embodied research method for analyzing the rhythms of urban spaces and the effects of those rhythms on those space’s inhabitants. It is the task of the rhythmanalyist to mediate qualitative bodily experience and quantitative data to situate the everyday within larger rhythmic structures such as capitalism or economies of information exchange (Lefebvre, 2004). A work of rhythmanalysis emphasizes the dynamic and procedural quality of space and the rhythms through which spatial order is maintained, and in so doing reminds us of our agency in the dance between body and architecture.

Phenomenological Approach to Performance Ethnography

Over the last half-century, many researchers have become increasingly critical of academic scriptocentrism in Western ethnographic traditions (Conquergood (2013),

Denzing (2003)). Ethnographers such as Conquergood (2013) and Denzing (2003) believe that text is an ineffectual tool in the detection, recording, and translation of the extralinguistic dynamics of interhuman and human-space interactions (Conquergood, p. 48, Denzing); performance ethnography challenges “textual fundamentalism” of traditional ethnographic field research in the academy (Conquergood, p. 48). The purpose of this thesis is to identify recurrent patterns, clusters, and rhythmic structures enfleshed by city dwellers to emphasize the quiet roles of space and movement in the process of knowledge production. The regular tides of heavy foot traffic combined with the distinctly procedural architecture of the Montreal underground metro system render it an optimal location to capture the processes through which the pedagogies of place are absorbed by bodies in motion.

From both Randell and Lefebvre’s definition of place as a compound quality of space activated by the kinetic energy of bodily movement, to document public place-based knowledge and pierce the “stratified hierarchy of meaningful structures” (Geertz, 1973, p. 7) which animate the city-dweller’s everyday gestures, I take a transversal approach to naturalistic observation. I utilize film photography and audio recording as these media can capture the contrasting frenetic and static energies of bodies moving through public architectural space. Through these art-based methods I: 1. Identify the rhythmic structures of the underground and 2. Trace those minor gestures[2] (Manning, 2016) through which bodies interface with these metronomic urban tides.

[2] Manning describes gestures in terms of registers with the major being general, recognizable and public and the minor as being discrete, specific, and private. Comparing the two ends of the spectrum she writes that though the minor gesture “does not have the full force or preexisting status of a given structure or predetermined metric to keep it alive, it is out of time, untimely, rhythmically inventing its own pulse” (2016, p.2). Much like how the atomized dots of a halftone image bleed together in the eye, within the context of this paper I understand the

Chapter 2. **Literature Review**

2.0 **Introduction**

Guided by the keywords from the title and primary questions of this study I draw from the work of spatial, architectural, education, and political theorists, sociologists, ethnographers, and artists. The textual and arts-based works cited in this section interrogate the inherently pedagogical nature of place (Greenwood, 2003, p. 623) within the context of contemporary North American cities. The interdisciplinary nature of my research-creation project is reflected in the diversity of the sources discussed which expound the theoretical and methodological choices of this performance ethnography.

This literature review is divided into three sections: In section 1. *City, Body, Cognition* I synthesize various theories describing the interdependent relationship between bodily movement, the built environment, experience, and learning which together form the theoretical framework for this inquiry. In section 2. *Embodied Pedagogies of Place,* I describe and analyze the methodological and theoretical frameworks of three contemporary performance-based urban pedagogical programs, their impacts and outcomes. I continue in section 3. *Historical References* to frame the human encounter with artwork as an intrinsically pedagogical event and the work of art as inherently performative concluding with an analysis of how the relationship between bodies and architectural spaces have been engaged with through photographic and filmic means by artists and early industrialists alike. The works discussed in this section have informed this project on the registers of aesthetics, method, poetics, and politics.

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minor gesture as the personal and idiosyncratic aspects of commuter movement which together form the major gestures of the metro's daily traffic flows.

2.1 **City, Body, Cognition**

Artists-turned-architects Gins and Arakawa (2002) coined the term the *Architectural Body* in their co-authored book by the same name. In line with their description of the body as “a complex organism that is always in the process of reading its surroundings [and must] be defined together with that within which it moves” (2002, p. xx), rhythmanalyst Lyon (2021) contests that “while there are varying cognitive frameworks through which practical understanding may be rendered [...] mental processes themselves cannot occur separately from the body situated in place and time” (p. 61). In the words of *Architectural Review* writer Lambert (2021), “Arakawa and Gins put architecture in the service of the mutable body” (para. 11). Believing that “architecture can aid in the structuring of the self” (Lambert, 2021, para. 11), between the 1970s to early 2000s the duo designed various domestic environments and park spaces which were meant to physically and cognitively challenge the user to adapt to irregular surfaces, unreliable geometries, and unexpected textures in the impossible yet poetic pursuit of reversing or at least slowing human mortality and mental atrophy. Though their architectural projects are somewhat antagonistic towards those with disabilities, their work has had a significant impact on furthering discourses regarding the relationship between cognition, bodily movement, and the built environment across the fields of philosophy, architecture, and fine art (Lambert, 2021; Manning, 2016).

In the same vein as Arakawa and Gins, architects and theorists Diller and Scofidio (1994) propose the body and space as “interdependent constructs, inseparable from the cultural forces that have shaped them” (p. 39). Manning (2012) refers to this mutual formation of body and environment as a “becoming body”. This is a body that is involved in

a reciprocal “reaching-toward” through which it “in-gathers” its surroundings as it forms itself (Manning, 2012, p. 6) – much like how concrete takes on the impression and form of the structure that contains it as it cures. These theoretical body-place dynamics recall the tenets of the “Extended Mind Thesis” (EMT) as put forward by cognitive scientists and philosophers Clark and Chalmers in their 1998 article by the same name. In this document they posit that the development of human cognition is in part due to a process of “active externalism” (also referred to as “external cognition”), which hinges on a “coupled system” formed between the human mind and the material world and enables us to “think through” our bodily interaction with the spaces and objects we move through and with (Clark & Chalmers, 1998).

The works considered in the following two sections, though mostly outside the academic institutional canons of arts-based research, research-creation, or place-based pedagogy, take on an enzymatic investigative approach to the mores of the city and the movements of the body within it by deconstructing, disrupting, or exaggerating the naturalized rhythms of the everyday.

2.2 **Embodied Pedagogies of Place**

The Wearable City, the Watchful City

In 2016, during my first year as an undergraduate student at the Ontario College of Art & Design University, I was fortunate enough to be a student in Dr. Sean Smith’s interdisciplinary studio arts course *The Wearable City, The Watchful City*. Smith was a co-founder of the now disbanded Department of Biological Flow, a small collective forming out of the European Graduate School in the early 2000s. The group aimed to investigate and disrupt systems of control and surveillance in the city through wearable inventions, rigorous

performance-based experiments and performance-based public interventions. This course was my first introduction to critical place-based pedagogy and research-creation. Our first outing as a class was to Yonge-Dundas Square in downtown Toronto for the purpose of "walking the grids." Like the 8-bit Centipede arcade game of the 80s but also like a sports drill, we took turns being the head of the centipede in this strange variation of follow-the-leader tracing the grid of the squares' concrete tiles. Rather than prioritizing the efficiency of the journey from point A to point B, we wandered the city lines in this formation. Through this game our perception of the space's potentiality expanded through the drift. I understand now that in participating this exercise we were exploring what Rosalind Krauss (1979) identified as the tension between the "centrifugal" (pushing out) and "centripetal" (pushing in) potentials of the grid. By disrupting our habit of taking the most efficient path of travel we were playing with and within what Ingold (1993) describes as the "taskscape," the layer of the city socially constructed by human activity. This was one of Smith's many lessons which taught us theory *through* our embodied experiences of navigating the urban environment. The movement exercises he initiated attuned us to the language of the city and together we developed an embodied form of literacy with which to read the urban environment as a text. Through his lessons we used the boundaries of the grid as a productive constraint in a mission to enliven it and skew its borders. Though never explicitly referenced by Smith, I see a direct relationship between his pedagogical approach and the Situationist International's study of psychogeography which investigates "the specific effects of the geographical environment (whether consciously organized or not) on the emotions and behavior of individuals" (Debord et al.,2006, p. 52) and their practice of

derivé, a “model of experimental behavior linked to the conditions of urban society: a technique of rapid passage through the varied ambiences” (Debord et al., p. 52).

Site, Dance and Body

Site-dance as a genre is defined by work that is performed in non-traditional spaces such as courthouse lobbies, alleyways, train tracks, abandoned swimming pools, the list goes on. The site, its history, materiality, intended function, foot traffic, and natural lighting all become significant elements of the work (Kloetzel & Pavlik, 2009). Though these choreographic practices were quite radical in terms of challenging the optical power dynamics of spectacle, many, if not most, remain in the realm of the performative rather than performance– held within the container of the fourth wall. In 2018 choreographer and scholar Dr. Victoria Hunter facilitated a workshop series titled *Site, Dance and Body* in the Raval neighborhood of Barcelona. Hunter’s work represents a novel pedagogical branch of site-dance practices. In her 2021 book she describes the body in motion and, more specifically, in the act of site dancing to operate much like the needle of a record player tracing the contours of the surfaces it travels over, translating them into an affective, extralinguistic expression (p. 16). Like how a record that holds physical traces of its production and each use, so too is the topography of the built environment constantly changing. The workshop series was designed for an immigrant population who had come to Raval as a result of various displacing socio-economic and political forces. Through various experimental mapping and site-dancing exercises, the purpose of the workshop series was to aid participants in becoming sensitive to and learning how to harness extralinguistic bodily knowledge of place in order to foster a more intimate understanding of and appreciation for their place of living as a living place. Though the emancipatory politics

of this project in relation to the demographic are somewhat dubious in assuming that participants lack sensitivity towards their environment and must therefore be trained by an outsider to develop it, I am interested in how Hunters' pedagogy frames the body in motion as both a sensing tool and as a revealing agent articulating human-nonhuman intra-actions through non-verbal forms of expression (Hunter, 2021, p.16). The collective site-dances resulting from the *Site, Dance and Body* workshops were not performed for an anticipating audience but rather as a quiet public act of attuning to and dancing with the immaterial aspects of place such as rhythm, memory, scent, sound and light for the purpose of creating a record *in* the body and an ephemeral imprint on public memory (Hunter, 2019).

What is a Waste Land?

Is this a Waste Land (2016) is a "headphoned [*sic*] live performance for disused urban spaces which offers new ways of being together" (Spencer, 2016). This site-responsive performance-based project blurs the lines between art and pedagogy in the production of an improvisational collective performance with the material and immaterial conditions of derelict urban ruins and unkept land. Guided by a shared script narrated by the artist and transmitted simultaneously through headphones, participants perform a series of tasks and collaborative movement-based exercises which demand a provisional and imaginative approach to moving and making. This practice is reminiscent of Brazilian Neo-Concrete artist Lygia Clark's participatory proposition model which she developed during her time as an instructor at the Sorbonne's Faculté d'Arts Plastiques St.Charles in Paris between 1972 and 1975. These multi-person actions/therapeutic practices were intended to extend the perceptual boundaries of the participants' body through sense-based exercises involving

the creation and activation of wearable mechanisms and other tools made of found materials (Butler et al., 2014).

2.3 **Art Historical References**

Performance Art

Walking through London's Fitzroy Square, artist Francis Alÿs holds a wooden drumstick in his right hand, dragging it across the surface of the many metal fences he encounters. Propelled by the energy of the artist's body in motion, the collision of the drumstick with each vertical post produces an audible clang. The shock of every collision causes a jerking movement of the artist's wrist– the haptic feedback from the drumstick reading the surfaces of the fences is almost like the needle of a record player. The resulting rhythmic composition manually sonifies the physical relationship between these barriers and the artist's body in motion. The at-times jarring volume and sharpness of the tone brings attention to these deceptively transparent structures which divide public space and private property that are often overlooked in their everydayness.

In *Rhythmanalysis: Research Methods* (2018) Lyon cites a grainy video of Wayne Sables' 2007 performance *Traffic* as an example of how performance-based methods can demonstrate and interface with rhythm. On a busy city street during midday, in this performance Sables dances an improvised choreography in the constantly shifting spaces between commuters in rush hour. The pace of the crowds set the tempo of his movement while the shapes his gestures are determined by the negative spaces between bodies that he can occupy while avoiding collision.

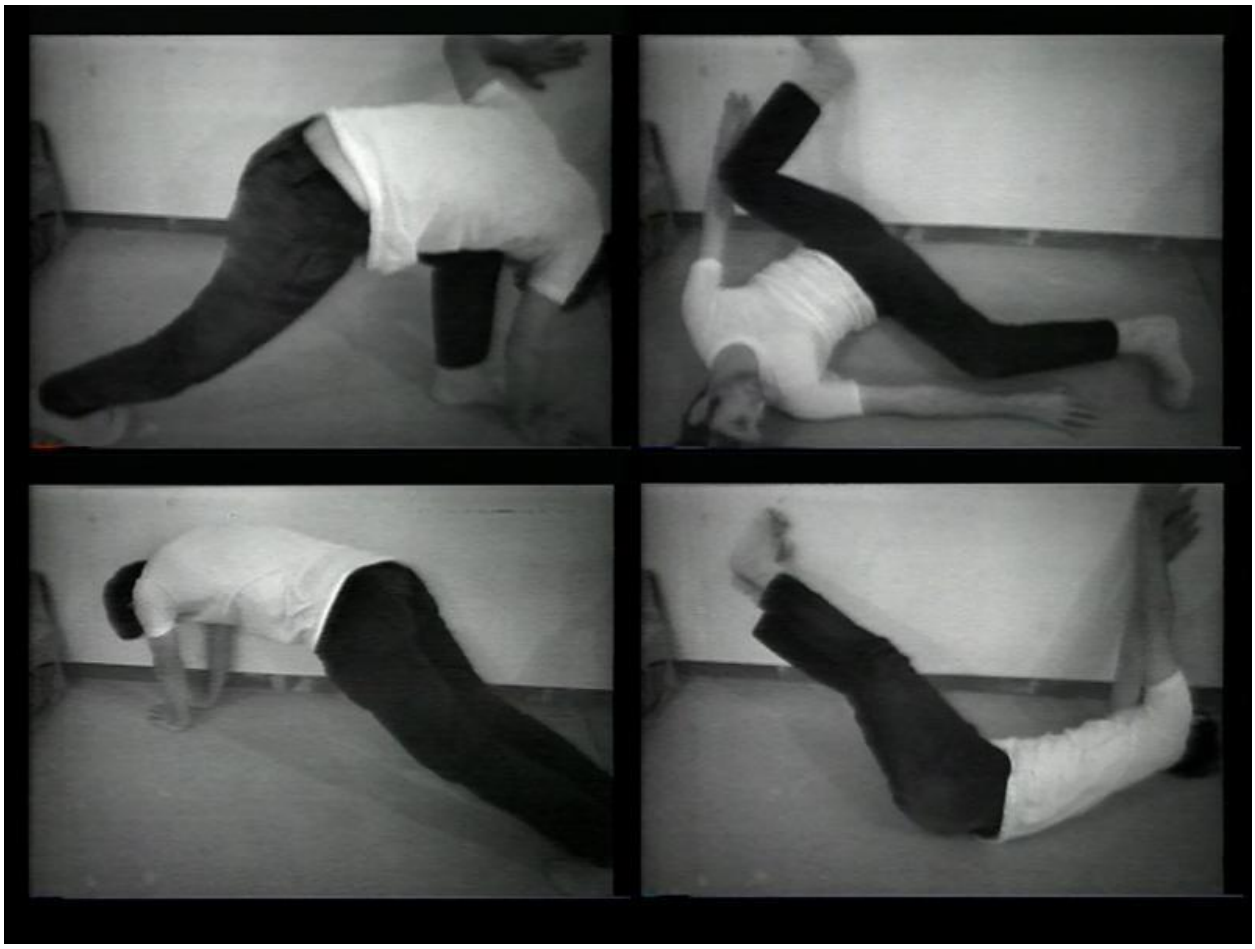
In Nauman's durational performance *Wall Floor Positions* (1968) he makes many

attempts to hold a series of sustained postures in relation to an orthogonal crevice in his studio (see fig.2). I understand this mundane yet exhausting task as an attempt to convey the discordance between the morphology of the human body and the angular spaces we inhabit. Through this work the inability of the artist to fit his body into its architectural surroundings is used as a generative dynamic to invent novel bodily compositions outside of the vernacular of everyday movement and positions of rest.

In these three works the artists utilize their bodies to interrogate nonnormative uses for negative space in everyday environments. A fence, a crowd of people, and a wall, barriers which usually arrest movement, are repurposed as tools to generate sound and choreography. As a viewer the dissonance, failure, and awkwardness of these artist's gestures inversely emphasizes how the body and mind are conditioned to anticipate a very limited vernacular of socially acceptable movement. In the context of this thesis I find these artistic models useful in reframing the hypervisibility of nonnormative movement in public spaces as a revealing agent for the vernacular and pace of movement anticipated by their architectures.

Figure 2.

Stills from Bruce Nauman's Wall Floor Positions (1968)



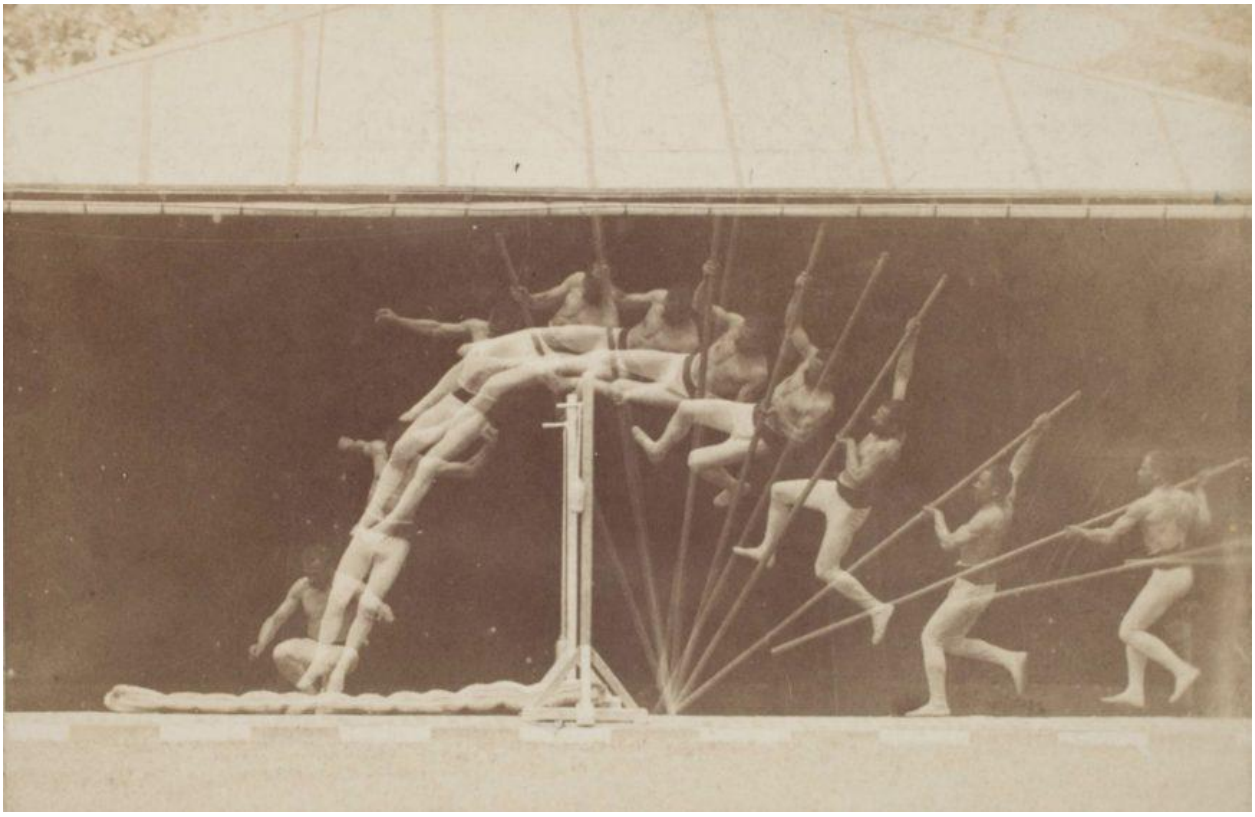
Motion studies

Etienne-Jules Marey, born 1869, was a physiologist committed to the photographic study of human and animal bodily movement. According to Manning (2009) "[h]is aim was to find quantitative modes of analysis to make us see what seeing obstructed" (p.85). The camera here extends the capacity of the eye so that it can conceive the continuity of bodily movement as it propels itself through space. Marey's composite Chronophotographs

break away from the previously established methods of early motion studies because they depict those aspects of movement which cannot be metrically divided into discrete segments. Though Marey's work retrospectively represents a pivotal turning point in motion studies, in relation to his main pursuit which was to reveal the logics of movement through precise measurement, his body of work is a series of failed attempts to reconcile the immiscibility of fluid movement and metric measurement (Manning, 2009, pp.84-102).

Figure 3.

Étienne Jules Marey, Chronophotographic Study of Man Pole Vaulting*, c. 1890*



In the early 1900's industrial engineers Lillian and Frank Gilbreth take up the project of motion studies in their pursuit to optimize the efficiency of human movement in the workplace (Mandel, 1989). Whereas Marey's approach to chronophotography in which he

captures the entire body of his subject in motion demonstrates his understanding of the body as an indivisible structure or machine for movement, the Gilbreths sought to isolate the paths of motion followed by the hands and head of workers as if their body parts were the extensions of the machines they worked with. The Gilbreths' chronocyclegraphs (or "time-motion-writing" (Mandel,1989, p.11)) studies are produced in a darkened studio called the "betterment room" (Mandel, 1989, p.10) with black walls and floors painted with a white square grid. Outfitted with small blinking lights attached to their head and wrists, the subjects are instructed to perform a specific task as efficiently as possible. The camera lens remains open for the duration of the task. In these long-exposure photographs the body of the worker is blurred while the lights leave calligraphic traces of the actions required to complete the task (see fig.4). Irregularities in the lines of the light path, like bleeding ink, indicate the hesitation or resting of the hands which the Gilbreths deem to be "waste movement" (Mandel, 1989, p.11). The purpose of this research is to minimize the movement of the arms and therefore speed up production times (Mandel, 1989, p.11). To eliminate the disruption of waste movement in the regular pace of production the Gilbreths will rearrange and/or retool the workspace to guide the worker's body along the most efficient path to complete the task at hand. Here the built environment is used as a choreographic tool to limit variances in human movement.

Because the contemporary camera functions at a mechanical rhythmic register much more rapid than that of human ocular perception, it can extract an infinite number of still images from a single fluid gesture. Akin to text's ability to "rescue meaning from perishable events" (Conquergood, 2013, p. 55), still images captured in a matter of milliseconds have utility in the quantitative analysis of movement but ultimately lack the ability to express

duration and sequence. Within the instant of a shutter's snap little to no variance in environmental rhythms can be captured. Together these two photographic approaches to motion studies demonstrate the compromises required to capture movement in a still image. Manning (2009) describes Marey's images as compositions of "holes (intervals) and wholes (pure experience and duration)" (p.85) where multiple rapid exposures are layered over of one another. In these composite images the body of the subject remains in focus but the arc of movement becomes segmented. The result is a series of vectors leaving it to the viewer to imagine the throughline. The Gilbreths are able to successfully capture the continuous trace of the arm's movement at the cost of blurring the body of the subject almost beyond recognition.

Figure 4.

Motion Efficiency Study (c. 1914) by Frank and Lilian Gilbreth

Fine Art Photography

Francesca Woodman captures fleeting but intimate moments between her body and dilapidated architectural spaces through her black and white self-portraits. Her nude body is often obscured by the blur of motion as she moves along the walls of these crumbling concrete spaces, drapes herself over their angular contours or puts her fingers in the cracks of the cement. There is a sense that she is trying to commune with these buildings in a kind of sexual synthesis. Allowing the degrading building materials to abrade her skin as she brushes up against them, she leaves a trail of her biological material on their surfaces. In the blur caused by her body disrupting the path of light through into the lens, at times the boundaries of her skin and that of the building become unclear. In “Space 2” (1975) the viewer takes on the perspective of the building as she presses herself into the corner of a glass display case— like peering through a two-way mirror we see her body contorted by this angular embrace in a futile attempt of communion between body and architecture (see fig.5).

Figure 5. *Space² (1976) by Francesca Woodman.*

Alexy Titarenko uses manual long-exposure film photography to purposely capture the blur of collective human movement within urban spaces. Utilizing a medium-format film camera with a manual shutter, Titarenko creates aesthetic compositions which double as documents of space, time, and movement (see fig. 6).

Figure 6.

1991 (1991) from Alexy Titarenko's photo series City of Shadows (1991-1994)

In Sabelo Mlangeni's *Invisible Women* series (2006), a woman's figure and facial features are blurred in motion as she performs her work as a street sweeper. As in the Gilbreth's chronocyclographs, her identity is obscured in an act of labour. This work purposely emphasizes the invisibility of the labourer which was only incidental in the Gilbreth's Chronocyclographs (see fig.7).

Figure 7.

"Invisible Woman I" from the Invisible Woman series (2006) by Sabelo Mlangeni

In the work of these three artists boundaries of the human body are obscured in motion while the still architectural containers through which they move remain sharply in focus. Together these photographic approaches reveal how the body is allowed to move in the negative spaces between the architectural structures that surround it.

Film

When posthumously published in 1992, Lefebvre's original text on rhythmanalysis was critiqued widely by the social science community for being too abstractly poetic and for its lack of actionable methodological processes through which one might be able to perform

rhythmanalytic studies (Lyon, 2021). In 2021 Lyon published *Rhythmanalysis: Research Methods* as a companion to Lefebvre's manuscript which demonstrated how rhythmanalysis can be used as a practicable method of sensually, temporally, and spatially responsive yet academically rigorous research. In this text she evaluates how cinematic methods, namely timelapse and zoom, can be utilized to extend the capacities of human perception beyond the linear timetables of everyday life (p. 29) enabling the researcher to observe the larger rhythmic patterns of place (pp. 27-34). It is in the *concatenation* (or stringing together) of time-lapses rather than their *sum* (or overlay) that rhythm will make itself known (Lefebvre, 2004, p. 8). Godfrey Reggio's experimental non-narrative documentary *Koyaanisqatsi: Life out of Balance* scored by Phillip Glass is an excellent example of the video camera can reveal how the rhythmic structures of nature, technology, and the body echo one another. Through time-lapse, slow motion, and a creative play with zoom, Reggio composes a visual tone poem with the rhythmic patterns of the city and the bodies within it.

Underpinning Lyon's critique of Lefebvre's *Rhythmanalysis* is a frustration with the mainly observational focus of his propositions that do not offer adequate analytic or interpretive tools with which one might glean meaningful conclusions. A similar frustration may be felt by viewers of *Koyaanisqatsi* which is distinct in the director's decision to forgo the inclusion of any dialog or narrative voiceover which generally defines the documentary genre.

On capturing movement

The artists and researchers discussed in this section have turned to film and photography in their attempts to capture human movement. Most have purposely "misused"

their cameras to essentially dilate time and capture that which the eye cannot register. Prolonging the closure of the camera's shutter is to sacrifice the clarity of the resulting image but reveals the continuity of the body's movement through space. This misuse of the camera in these three examples is limited to the shutter of the lens. Each of these image-makers take an impersonal perspective, the camera is still resting either on a tripod or some other flat surface. The result is a striking contrast between the frenetic motion of his human subjects and the still architectural environments they move through. Though this eye-catching contrast is a strong compositional tool, the presence of the photographer in the image is erased.

Chapter 3 **Observation & Tuning**

3.1 **Observation**

I began the first day of field research in the early morning to catch the onset of rush hour as predicted by Google Map's foot traffic forecast (see fig.8 & fig.9). Through these foot traffic histograms the macro rhythms of the city are clearly visible. When I first noticed these graphs during the preliminary phases of my research for this thesis, I was taken by the uniform bimodal distribution of traffic throughout the work week and how this contrasted with the normal distribution of the weekends. I imagine these as lung volume graphs for the stations, where Monday to Friday the breath is more rapid and shallow due to the demands of the work week. This tachypnea (rapid breath) gives way to the deep and slow breaths of rest when the weekend comes. In line with Lefebvre's project to "unwrap" the natural rhythms of the body from those of social function (Lefebvre, 2004, p.19), the purpose of my field research is to understand if and how these urban architectural spaces facilitate habits

of movement propelled by the rhythm of weekly labour cycles. As I observed the first wave of commuters spill into Berri-UQAM station that morning, I quickly became aware of how my perception of time quickened when I purposely disassociate myself from the tide. The trains arrived and departed nearly every other minute, expelling and absorbing liquid masses of commuters. Through observing this rapid pulse of movement I began to understand that the foot traffic graphs represent not only the volume of bodies in the space, but the amount of kinetic energy produced and sustained by their circulation.

Figure 8.

Foot traffic forecasts for Lionel-Groulx Station on December 14th, 2023

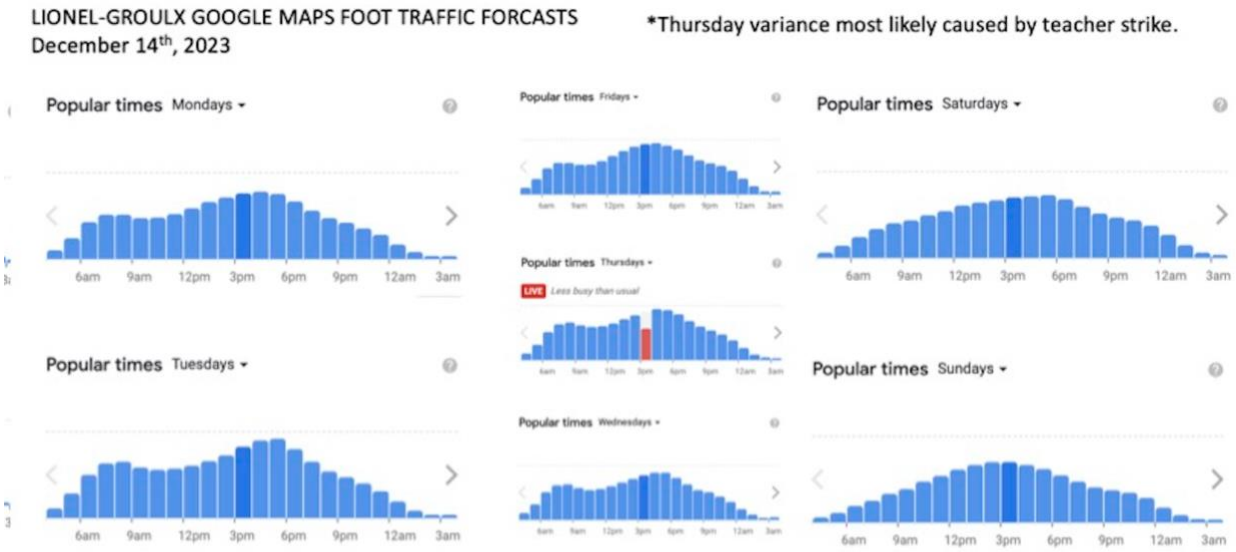
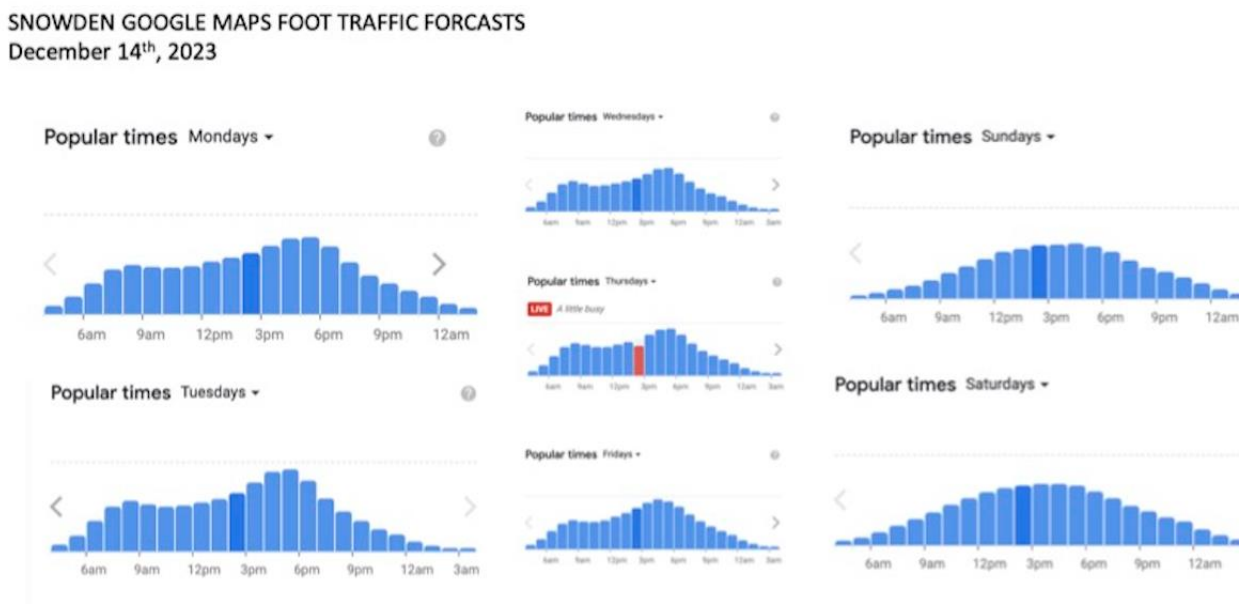


Figure 9.

Foot traffic forecasts for Lionel-Groulx Station on December 14th, 2023



Prior to beginning my fieldwork I decided my study would be limited to the metro's four transfer stations: Lionel-Groulx, Berri-UQAM, Jean Talon, and Snowden as they see the highest volume of daily foot traffic and so the rhythms of collective movement would be more easily detectable at these locations. During the first week of my field research, I explored various vantage points from which to watch the tides of morning and evening rush hours swell and empty. Lefebvre (2004) writes that while "a certain exteriority enables the analytic intellect to function" (p.37), "to grasp a rhythm it is necessary to have been grasped by it [and to] *let oneself go*, give oneself over, abandon oneself to its duration" (p.37) and so I searched for locations on the periphery of these spaces which allow me to be half in and half out of the current. Despite my best efforts to be inconspicuous, the *arrhythmia* (Lyon, 2021, p.25) I entered by disassociating from the propulsive rhythm of the crowds

made me feel hyper-visible. While taking field notes from platform benches, leaning against walls or railings, I jump from the temporal valence of the commuter to that of the buskers, people in need of shelter, and the ticket agents: those who make use of the station as a place of work or refuge. While occupying this rhythmic register I become aware of how the vastness of these cathedral-like spaces function dually to diffuse the claustrophobia of being in a crowd and to facilitate the surveillance of those out of sync with the collective pace of commuters and linger when the station empties. The contrast between the rhythm of “proper” and “improper” use of space will become a focal point of my photographic work for this thesis.

To augment my observations with felt experience and to minimize my visibility as an observer, I began to practice a sort of rhythmic *dérive*. The rules for this activity are simple;

1. Do not cross the turnstiles.
2. Do not enter the train.
3. Do not get noticed.

Adherence to rule 3 determines the duration of the observational period. On average I would run this exercise for intervals of 30-45 minutes. As I wandered through the station while allowing myself to be carried by the energetics of the crowd I observed how the orderliness of commuters’ movement seems to correlate to the narrowness of the space. While the foot traffic quickens in the open atriums which function as hinges for the tangle of transit passengers to choose their next connection point, when the space contracts to form bottlenecked hallways, corridors, doorways, or stairs, pedestrian movement combs out into

organized lines to facilitate efficient passage. I note how the choreography performed in these choke points or “movement channels” as they are referred to by urban planner Donald Appleyard (1965, p.180), mimic the rules of North American automotive traffic where vehicles always occupy the right side of the roadway. At these choke points the collective pace slows as individual paths converge into a uniform flow.

While, like Appleyard (1965), one might attribute this change in movement to an inadvertent “heightening of experiential intensity” caused by navigating a confined space (p.178), architectural theorist David Gissen (2023) argues that this subconscious impulse towards efficient travel is the result of a deeper mechanistic logic which underpins North American capitalist society. This logic manifests in “the belief that a city is an immense circulatory apparatus within which movement must be continuously extended, enhanced, and accelerated” (Gissen, 2023, pp.45-46). Gissen (2023) locates the source of this social dogma in “hydrological systems” (p.62) inherited from urban European waste management practices which prioritize maintaining the constant circulation and drainage of water understood to be paramount to sustaining bodily health (pp.62-67). These “hydro-logics” are mirrored by European city planners when designing topographies which will promote “a healthy urban circulatory system” (Gissen, 2023, p.64). As a result, North American urbanites have come to understand a healthy and able body as one capable of sustaining perpetual motion (Gissen, 2023, p.64).

3.2 **Tuning**

Lyon (2021) is clear that in the project of rhythmanalysis the body functions not only as a fundamental sensory tool but also an object of research (p.80). Derek McCormack (2014)

further articulates that it is the rhythmanalyst's aim to "understand and mobilize the body as a set of rhythmic relations through which the spatiotemporal turbulence of everyday life registers as so many intensities of feeling" (p.42). Put differently, in the context of an anthropocentric inquiry like that of this thesis, the rhythmanalyst must be attentive to how their internal physiological and cognitive rhythms are amplified, articulated, or disrupted by the polyrhythmia[3] of everyday life. It was not Lefebvre's goal to "change life" (Lefebvre, 2004, p.35) but rather to remind us of how deeply entangled our sense of self is with the external world by "reinstating the sensible [that which is perceptible by the senses] in consciousness and in *thought*" (Lefebvre, 2004, p.1).

In order to record the variations in rhythm I detected through mobile observation, I developed what I call a tuning exercise as an articulation of Pauline Oliveros's deep listening score *Rhythms (1996)* (2004). Her brief score takes the form of six questions:

> What is the meter/tempo of your normal walk?
>
> How often do you blink?
>
> What is the current tempo of your breathing?
>
> What is the current tempo of your heart rate?
>
> What other rhythms do you hear if you listen?
>
> What is your relationship to all the rhythms you can perceive at once? (p.48)

My response to her final question is and will always be: my body.

[3] In her summary of Lefebvre's vocabulary of rhythm Lyon (2021) describes polyrhthmia as a "multitude of rhythms" or "the effects of different configurations of rhythm' (p.25).

This tuning exercise is a walking practice through which I literally take the pulse of a crowd. While this practice could be used in any circumstance of collective movement, in the context of this project this practice is ideally activated while transferring train platforms.

The tools required for this practice are:

1. A smartphone,
2. A free metronome application,

   *Any metronome application will work as long as it has an adjustable meter dial.
3. Headphones compatible with your smartphone,
4. A notebook and writing implement or notes application.

The procedure is as follows:

i. Make note of the date, time and location and any other pertinent environmental factors such as weather, train delays, or large public events nearby, which may be influencing the volume of foot traffic. If transferring stations note the lines, you are connecting.
*During my field research I would wait at a platform for a train to arrive and entered the crowd as they disembarked, making my way to another platform, performing as if I had somewhere to be.

ii. While standing in place or waiting in the train prior to your arrival, put on your headphones and open the metronome application. If possible, check your pulse and set the

metronome to your current bpm. If it is not possible to get an accurate pulse reading, begin at 60bpm, an average resting heart rate for humans.

iii. Enter the crowd walking one step per-beat. There will most likely be a dissonance between your pace and that of the crowd.

iv. Continue walking one step per-beat as you adjust the metronome dial until your pace feels to be in synchronization with the crowd.

v. Continue this pace until you reach your terminus. Record the traveling BPM.

vi. (Optional), If possible, check your pulse again to see how the exertion of keeping in phase with the crowd has affected your BPM.

vii. (Optional) When you arrive at your terminus, stand still and continue listening to the traveling BPM, notice any synchronicities or dissonances with other rhythms in the space, which you can sense or observe.

By using my pulse as a benchmark measurement, I bring awareness to the relationship between my internal physiological rhythms and those I must perform in order to efficiently move through these architectural spaces. Through this practice I engage my body as a tool to access the meter of collective movement in relation to the time of day and the morphology of the space. These pulse readings articulate the macrodata of the Google

Maps foot traffic forecast with microdata derived through felt experience and provide a tangible access point from which I can begin to trace the geometry of architecture-body relationships.

3.3 **Experimental Photographic Data Collection Process**

I selected the Brownie Hawkeye camera as my photographic field instrument for its manual shutter and single-element lens[4]. This camera, which was produced between 1949 and 1961, functions much like a pinhole camera[5] in its uncomplicated mechanism and nearly infinite depth of field. To accommodate long exposure times, I opted to shoot on black and white Ilford HP 5 120 with ISO 400[6]. Like Titarenko I chose to shoot in grayscale so the focal point of the work would be light and form, rather than colour.

After some experimentation and a healthy amount of failure, I devised a formula for exposure times informed by the data collected from my tuning exercise during rush hour. The steps of this formula are as follows:

i. Determine the traveling BPM of the space you would like to photograph.

[4] In consultation with Montreal photographer Allen Bleich.

[5] Also called a camera obscura.

[6] This camera is intended to shoot of 620 film which is no longer mass-produced. As is common practice with many contemporary photographers shooting with this Brownie model, I inserted an alternative uptake spool compatible with 120 film.

ii. Through observation, identify a space where there is a collective change in pace or direction such as the threshold of a movement channel, a sharp corner, or a choke point such as a door or gate.

iii. Determine the length in steps that this change in pace or direction occurs. For example, perhaps it takes 10 steps to travel from the train doors to the exit stairs. Usually, you want to focus in on an area which takes 5-15 steps to cover.

iv. Determine an inconspicuous place to capture your focal area where you will not disrupt traffic.

v. To calculate the fraction of a minute it will take to capture the duration of the gesture, divide the traveling BPM by the number of steps needed to cover the focal area. To determine the exposure time in seconds, divide 60 by the result.

Eg.

Traveling BPM = 110
Steps to cover focal area = 10

110/10 = 11 (fraction of a minute)
60/11 = 5.45 seconds

Exposure time > 5.5 seconds (round up to the nearest half or whole second)

vi. Using the camera's viewfinder, frame the image and expose the film for the determined amount of time. Count the seconds out loud "one one thousand, two one thousand" etc.

Because the Hawkeye has a hand-held shutter release, the calculated exposure time should act as a guideline rather than a strict rule. Though the manual nature of the camera has some limitations when it comes to accuracy, it conversely leaves room for improvisation. For example, should an interesting event occur in my frame during an exposure, I can choose to leave the shutter open longer to catch a trace of it. Improvisations such as this should be executed with caution and focus. If the film is over-exposed, the light reflected from the architectural container will essentially paint over any trace of the bodies moving within it. This phenomenon will cause even the most crowded room to appear empty in the final still (see fig.10).

Figure 10.

Example of the empty space phenomena cause by over-exposure

Note. A crowd of people walk towards the camera from the train platform, but only faint traces of their presence are recorded on the film. By Eija Loponen-Stephenson.

Outcomes and Reflections

This photographic approach demands a great amount of attention, attunement, and informed guesswork. More often than not, the “people shadows” (Titarenko, 2005) evaded being captured through my lens. Out of 3 rolls of 12 frames each, only about ⅙ of the photographs were successful. Because the film must be developed in a lab, I could not immediately reflect on the effectiveness of my methods. As a result of processing these extended processing times, calibrating to this camera was a slow and tentative process.

Through this method I use rhythm as a tool to reveal the duration and form of the collective bodily movement performed within these architectural spaces. In this formula I understand the traveling BPM to function as the tempo for the dance, the architecture as choreographic instruction, and the traces of movement as records of the commuters’ interpretation of it. As I am implicated in the contingency of the moment being captured, I opted to keep my camera hand-held and therefore allow the natural tremors of my body to become part of the document.

Figure 11.

Jean-Talon Station, 11.08.23, 14:46hr. Traveling BPM 120, 15 step gesture, 7.5 second exposure

Note. Commuters exit escalator spread out as the move towards the train platform. By Eija Loponen-Stephenson.

Figure 12.

Berri-UQAM Station, 28.07.23, 14:20h. Traveling BPM 110, 20 step gesture, approximately 11 second exposure

Note. According to the rules of local automotive traffic the cluster of bodies on the right of the image indicate that the crowd of people entering the train. By Eija Loponen-Stephenson.

Figure 13.

Jean-Talon Station, 11.08.23,14:36h. Traveling BPM 120, 20 step gesture, 10 second exposure

Note. The cluster of three figures on the left of the image are fairly in focus compared to those walking through the tunnel indicating that they are standing still, perhaps in conversation. The wispy movement indicates a quickening of pace as the crowd moves toward their connecting platform. By Eija Loponen-Stephenson.

Figure 14.

Berri-UQAM Station, 28.08.23, 14:36h. Traveling BPM 125, 30 step gesture, 14 second exposure.

Note. A busy moment during rush hour. The crowd of bodies move quickly from the train platform organizing themselves into lines to mount descending escalators to connecting platforms.

As a motion study my photographic methodology more closely resembles that of the Gilbreth's chronocyclegraphs than Marey's segmented composites. However, like Marey, it is important that I capture the entire bodies of my subjects rather than focus on the movement of only certain appendages. Whereas chronocyclograph studies were designed to reveal inefficiencies and irregularities in human movement, my approach is inversely intended to emphasize the uniformity of movements adopted by users in public space. After receiving the negative for *Jean-Talon Station, 11.08.23,14:36h.* (see fig.13) (in which a small cluster of three commuters engage in conversation in front of a rapidly moving crowd) I realized the potential for my camera to capture bodies moving at multiple rhythmic registers in one photograph. This image is a pivotal turning point in my understanding of the relationship between rhythm and the visibility of certain individuals in public space. In this photograph it is impossible to determine the boundaries of the bodies of those moving in-step with the traveling BPM of the space while those engaged in conversation are in much clearer focus. Reflecting on this phenomena in relationship to my lived experience as a public transportation user I realize that the faces I remember most in my daily commute are those who are dissociated from the propulsive tides of foot traffic, those who are resting, reading, working or using the station as a place of refuge. Conversely, my fellow commuters rushing to or from work maintain their anonymity due to the momentary nature of our encounter. Through this rhythmanalytic lens I have come to suspect that there may be a connection between rhythmic variances of foot traffic, visibility and social class divisions.

3.4 **Sounding and Figuring Ground**

Justification

Following Illich's evocative text *Deschooling Society* (1971) in which he critiques the social utility of schools as secluded places of learning within the context of midcentury urbanity and the age of the television, Marshall McLuhan**,** Kathryn Hutchon, and Eric McLuhan (1977) developed a practice-based method called "figure/ground analysis" in their co-authored experimental high school textbook *City as Classroom: Understanding Language and Media*. Using the logics of rudimentary image analysis, McLuhan and his co-authors (1977) propose a series of practical exercises which challenge students to train their "configuring" habits of mind to hold themselves, their teachers, their built and social environment in equal focus as integral actors or *figures* in the *ground* of their local educative ecology. McLuhan et al. (1977) describe figure and ground as interdependent territories with shared borders that "create and define each other" (p.10). If one manages to *figure the ground* they find themselves in, the boundaries defining individual figures become "just outlines and interfaces, just structure" (McLuhan et al., 1977, p.10). Much like the fixed lens of the Brownie Hawkeye camera, this sort of perceptual unfiguring does not flatten but rather has the potential to extend our perceptual depth of field by allowing us to hold background and foreground in equal focus (McLuhan et al., 1977). To better understand the impact of extra-ocular senses in knowledge creation is to cease imposing "visual values to all situations" (McLuhan, et al., 1977, p.13). This is also the project of the performance ethnographer and research-creation practitioner who rather than striving to create novel thought, instead toils to exhume that which has become sedimented beneath the givenness of the everyday.

If the semiconscious absorption of place-based pedagogy is facilitated by the learner's bodily movement through space, how can the body/space relationship be recorded?

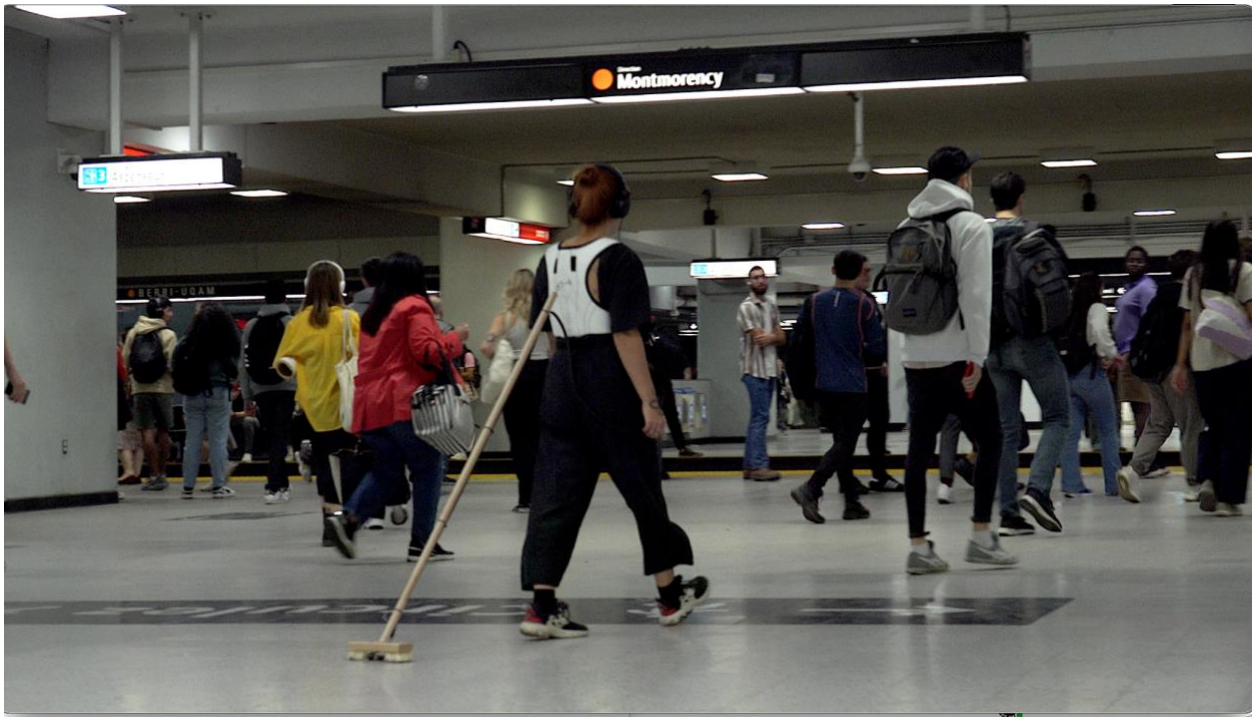
Process

In his 1919 essay *Primal Sound*, Rainer Rilke notes the morphological relationship between the grooves of a wax cylinder phonograph and the skull's coronal suture. While musing on what sort of strange music would be released if a phonograph needle were to trace those boney crevices, he deliberates on how this technology could be applied to any material surface and thus "make itself felt [...] in another field of sense" (p.5). Following Rilke's propositions, I designed the Wearable Surface Reader and Monitoring (WSRM) System with the engineering assistance of sound artist Alastair Cavanagh. This mechanism, which is essentially a wearable phonograph, is intended to sonify the morphology of the ground and therefore emphasize the intricacy of the kinetic interactions between commuters' bodies and the architectural surfaces of the Montreal metro. The mechanism is composed of rudimentary phonographic technology: A turntable cartridge is attached to a metal plate on the underside of a push broom; depending on the roughness of the tile texture, the distance between the needle and the floor can be adjusted by loosening or tightening the bolts on the screws which hold the metal plate in place. Rubber washers threaded on the screws are secured on either side of the metal plate and function as shock absorbers (see fig.16). The bristles of the broom head ensure smooth and level movement of the needle. The sounds detected by the needle are sent up the broom handle through audio wires plugged into a small zoom recorder attached to the front of the adjustable vest which is the control center of the WSRM System. Two interlocking steel rings attach the broom to the vest allowing the device to follow the movements of the

wearer. Over-the-ear headphones are plugged directly into the zoom recorder which also functions as a preamp so the wearer can immediately hear the input from the needle. As the wearer walks the needle of the WSRM System is pulled across the varying textures of the floor, directly translating them into sound, allowing the wearer to *hear* their path (see fig.15).

Figure 15.

Still from WSRM System demonstration video.



Note. Eija Loponen-Stephenson is pictured performing with the WSRM System at Berri-UQAM station.

A few weeks into my underground field work I begin to notice a relationship between the choreography of commuter movement and the tile patterns on the floors of the transfer

stations. For example, in the corridors where movement is organized much like bidirectional roadways, the tiles are generally laid in uniform, linear patterns. In Jean Talon Station the concentric circle motifs at the terminals of each corridor and staircase emphasize the points where commuters pivot away from orderly foot traffic to make their individual connections (see fig.11 & fig.13). Through my observations I come to understand these tile patterns as a form of choreographic notation roughly instructing the forward movement of the body below the waist. I return to my walking tuning practice to find the tempo with which to dance these floors with the WSRM System. With a Bluetooth earbud in one ear I walk one step per-beat according to the traveling BPM of the space while following the flows of the crowds. As I walk the WSRM System picks up a secondary rhythmic structure from the varying tile patterns[7]. The resulting audio functions as both a score for the choreography of this walking dance and a sonic record of the path walked.

[7] As the focus of this sound study is to amplify those ground textures which go unfelt underfoot, the warning blocks of tactile paving indicating the edge of the train platform have been omitted from consideration in this study because their raised offset blister pattern are singularly intended to provide kinetic feedback to visually impaired commuters through their feet or a white cane (Katsumi, 2008). Though there are formal similarities between the tile patterns being read by the WSRM System and these tactile paving blocks, the channels between grouted tiles cannot be reliably detected through the feet or a white cane and therefore disqualifying it as tactile paving (Katsumi, 2008). Additionally, the raised texture of these surfaces are not compatible with the sensitivity of the WSRM System stylus.

Figure 16.

Underside of the WSRM System Broom Head

Note. Image by Mike Gontmakher

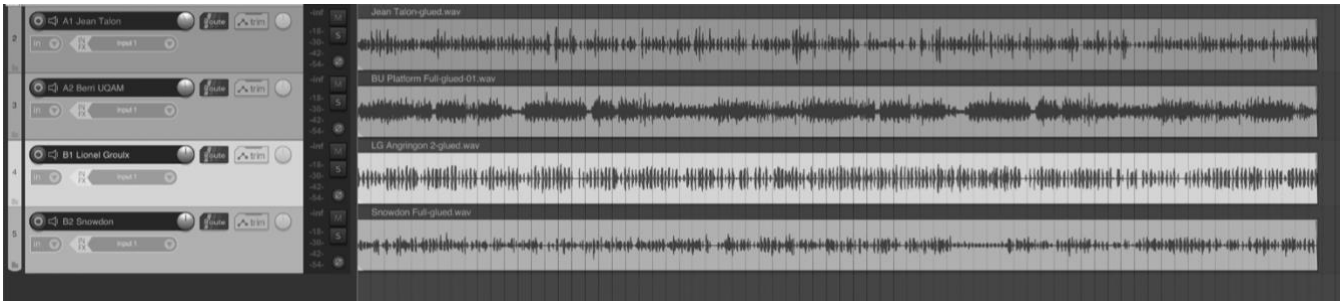
Outcomes and Reflections

The abstract and at times abrasive field recordings taken with the WSRM System are not melodic compositions, nor are they intended to be. Importing the audio files into Reaper, a digital audio workstation, the waveforms of each recording are graphically rendered, illustrating the unique rhythmic microstructures of each tiled surface the WSRM System's stylus passed over (see fig.17). These recordings are not only sonic but kinetic records of a body's movement through space. I understand these waveforms to function much like the readings of a seismograph where the peaks and valleys of the soundwaves

document the actual movement of the system's stylus over the textured floors.

Figure 17.

"Line Studies" field recordings waveforms reveal the variation in the rhythmic microstructures of the tiling



Note. From top to bottom: Jean Talon, Berri-UQAM, Lionel Groulx, Snowdon

Rather than picking up the ambient noises of a place and its users, as is the usual function of field recordings in ethnographic research, the recordings produced with the WSRM System isolate and document the topography of the user's path through space. The dissonance of the field recording audio files can be attributed to the misuse of the phonograph needle cartridge as a sound recording rather than transmitting device as it is intended.

The productive misuse of phonographic technology to sonify the morphology of materiality is a concern of many contemporary sound artists working in the noise music genre[8]. Peruvian abstract turntableist Maria Chavez has spent over two decades

[8] Noise music is an ever-changing genre with roots in early post-structuralist movements such as Dada and Futurism (Van Nort, 2006). The genre as it is known today was heralded by experimental sound artists such as Pauline Oliveros, David Tudor, and Masami Akita (aka Merzbow) who seek to "sonify[] the

interrogating the mechanics of turntables and the materiality of vinyl records. In her live performances she will often play shards of broken records, using the audio stored on the random shapes to create samples and their irregular edges to produce rhythmic patterns. Her book *Of Technique: Chance Procedure on Turntable* (2012) is described as both a sound sculpture and a conceptual sound art album which invites the reader to perform a series of gestures activating the microtextures of vinyl records using various parts of the turntable apparatus (Chavez, 2012). This text is used as a pedagogical resource internationally to teach improvisation and sound art (Chavez, 2012). Chavez's 2018 exhibition *Topography of Sound: Peaks and Valleys Series* explores the visual relationship between microscopic images of record grooves and the topography of mountainous terrains. This collection of ink drawings and watercolour paintings blur the lines between cartography and audio recordings- but only hypothetically. With the WSRM System I am responding to the prompt of Chavez's exhibition literally by using the turntable cartridge as a cartographic drafting tool.

It is pertinent to mention that the project of using phonographic technology to map the topography of Montreal has been taken up previously by local sound artist Douglas Moffat. With this project Moffat intended to capture a "rough approximation of how the island of Montréal might sound if played on a vast turntable" (Moffat, 2013). To create his sonic map of the city the artist designed a "rough-hewn, but sensitive, all-terrain stylus" (Moffat, 2013) made of landscaping tools, plumbing parts, and lumberrigged with a pair of contact microphones (which functionally differentiate it from a turntable cartridge). Moffat's twenty-five track vinyl LP *Montréal Phonographe* (2013) contains a series of one-minute

processes of technological systems", their failures, glitches, and mechanistic capacities (Van Nort, 2006, p.176).

recordings of various surfaces in the city's built and natural environment as read by the wheel-mounted stylus which he drags behind or pushes in front of his body. The sites selected follow a vaguely spiral-shaped trajectory mimicking the inwardly spiraling path of vinyl record grooves.

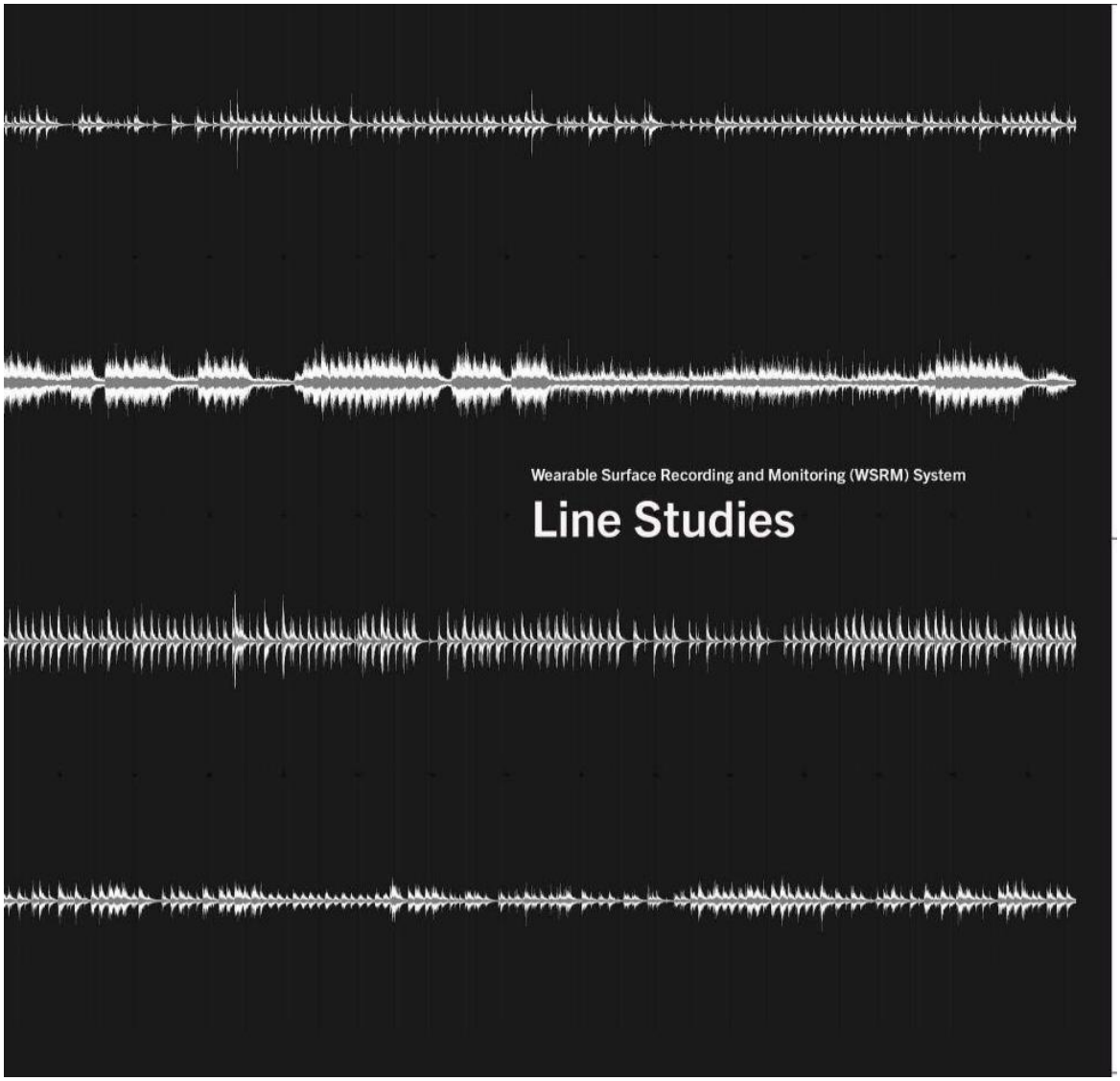
Evaluating the viability of Moffat's methodology in relation to the goals of this study, which is to interrogate the relationship between movement, architectural structures, and thought, I am able to recognize the poetic value of the works overarching gesture, but the imprecision of the artist's approach ultimately disqualifies it as a usable approach to data collection due to the following reasons:

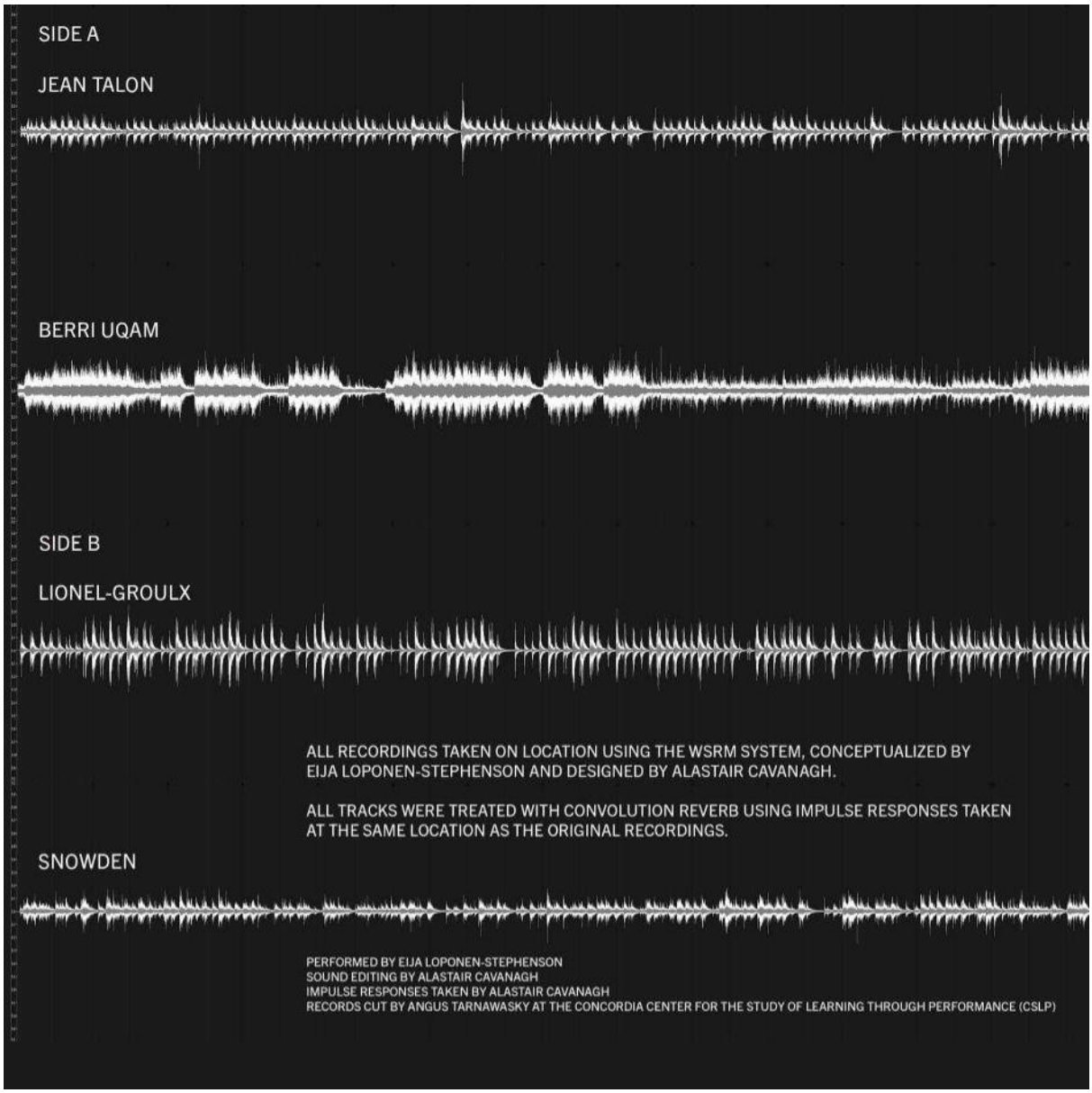
1. Besides the names of the general areas where the readings were taken Moffat does not include any information regarding the length or precise location of paths traveled nor does he include any environmental information besides that the tracks were recorded in the month of November. This leaves the listener to imagine the source materials for the audio, a missed pedagogical opportunity for his audience to connect these strange sounds to familiar textures.
2. As a line occupies only an infinitesimal amount of space it is impossible that the sonic samples taken from these sites accurately represent even the general topological character of the large areas from which they were taken, though the vague titles of the tracks imply otherwise.

These critiques are not to discount the artistic merits of this interesting performative approach to phonographic mapping but rather are considerations to keep in mind as I continue to refine my own techniques.

3.5 **Line Studies**

Figure 18. *Front and back of Line Studies album cover*





Note. Album cover designed by Eija Loponen-Stephenson and Alastair Cavanagh. The small text on the bottom of the back cover reads: *“Performed by Eija Loponen-Stephenson. Sound editing by Alasitair Cavanagh. Impulse responses taken by Alastair Cavanagh. Records cut by Angus Turnawasky at the Concordia Centre for the Study of Learning through Performance (CSLP)”.*

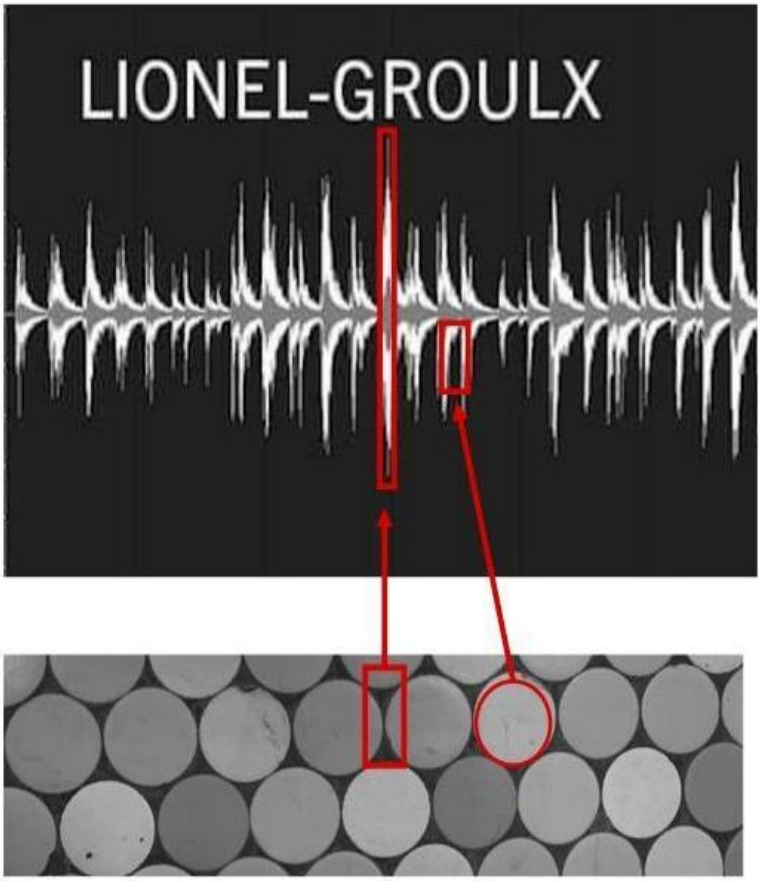
Line Studies (2024) is a seven-inch lathe-cut acrylic record containing a collection of four field recordings captured with the WSRM System, one from each transfer station. The format of this work takes inspiration from Sol Lewitt's book *Photo Grids* (1977), a typological study of various grid patterns found in the built environment. The over four hundred film photographs in Lewitt's book are organized into 3 x 3 square grids reflecting the base structure of the subject matter; the uniform dimensions of the samples allow the variation in texture to become the focal point of the material. Walking to a traveling BPM of 110 (the average BPM for a weekday afternoon), each sample is a record of a straight line I walked through the stations for the duration of 2 minutes and 32 seconds[9], an approximate distance of 152 steps or 317ft[10]. The locations of the line walks within the stations were selected to demonstrate the rhythm of each station's most common tile pattern and examples of when their regularity is disrupted either by a change in the pattern (usually indicating the mouth of a branching passage see fig.11 & fig.13) or instructional floor stickers (see fig.20). In future iterations I would like to more precisely record the location of the paths walked so they could be followed by others. Despite this oversight, when I listen to these tracks back-to-back, I am still able to detect the unique rhythmic and textural character of each station's floors due to the repeated tile patterns (see fig.18). The tracks begin with Jean-Talon, the northern-most transfer station and move clockwise around the map.

[9] Each side of the 7-inch record can hold about five and a half minutes of sonic data. The track length was therefore determined by the capacity of the disk, an allowance of half a minute had to be left to allow for the space between tracks.

[10] These calculations are made according to the average stride length statistics presented by the Marathon Handbook website: https://marathonhandbook.com/average-stride-length/

Figure 19.

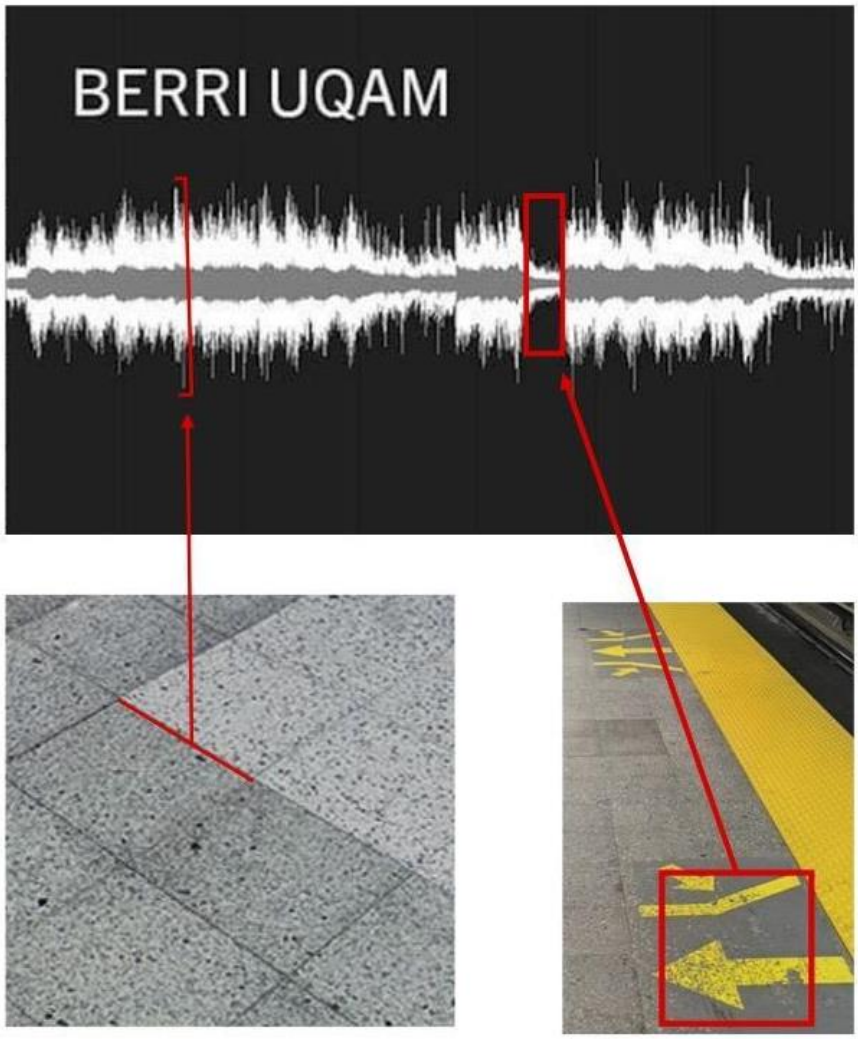
Diagram illustrating the relationship between the tile patterns at Lionel-Groulx station and resulting audio waveform



Note. The roughness of the grouting creates a loud scratching sound while the smooth enamel of the tiles is almost silent.

Figure 20.

Diagram illustrating the relationship the tile patterns at Lionel-Groulx station and resulting audio waveform



Note. Compared to Lionel-Groulx station the grouted channels between tiles are much shallower and the intervals between them are much larger, creating a slower and softer rhythmic structure. The vinyl stickers on the floor indicate the location of the train doors. Their smooth surfaces create breaks in the rhythm.

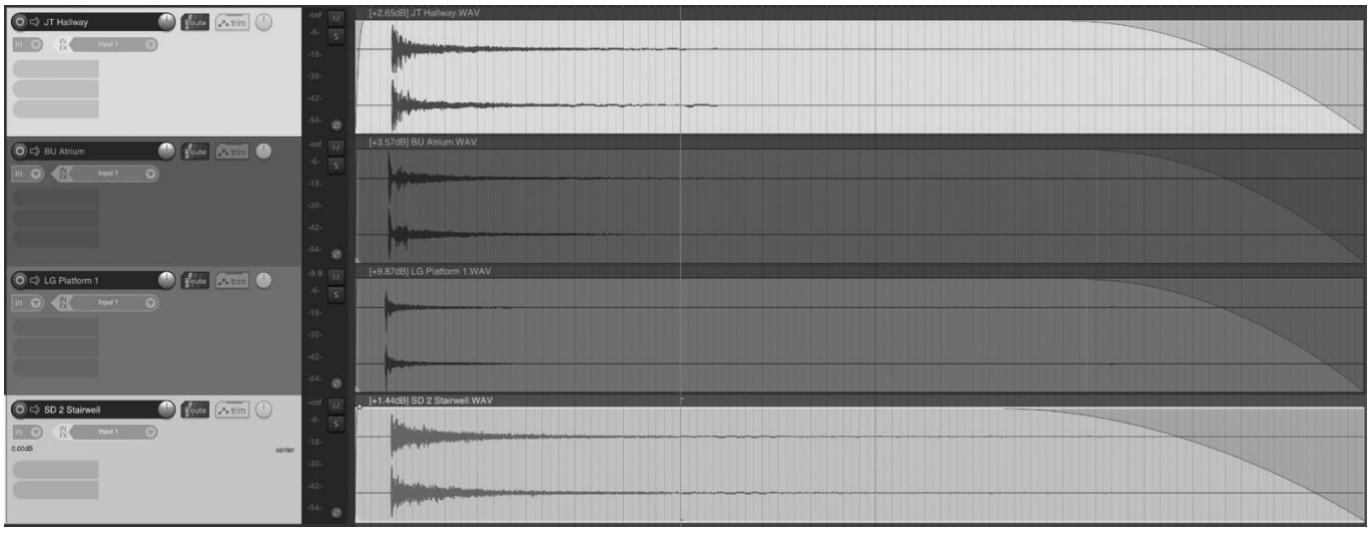
The raw audio files recorded with the WSRM System contained no ambient environmental sounds, as the device only records the sound of the stylus moving across the floor. These kinds of isolated sounds are difficult for the human ear to listen to, and sound unnatural, because the human ear is accustomed to hearing sounds in the context of a larger, more complex acoustic environment (the sound of a room or space) (see fig.21). Alastair Cavanagh, whose knowledge of sound engineering was integral to the creation of this work, treated each track with convolution reverb programmed with carefully collected impulse responses[11] to make the tracks more listenable. He describes this process as follows:

> Impulse responses are essentially sonic impressions of an acoustic space, usually a short recording of a loud transient sound which decays rapidly, allowing the echoes of the space to be captured in the recording. This ‘snapshot’ of the space can then be applied to other audio tracks via convolution reverb software, which imports this ‘snapshot’ as information and uses an algorithm to simulate how they would sound if they were amplified in that space. In this case, the impulses were taken at the same locations as the initial floor recordings, using a Zoom recorder to record the sound of a balloon popping and then echoing throughout the space (Alastair Cavanagh, personal communication, March 2024).

[11] Through convolution reverb an audio track can assume the qualities of another acoustic space than the one it was recorded in.

Figure 21.

Wave forms of impulse responses for reverb



Note. From top to bottom: Jean Talon, Berri-UQAM, Lionel Groulx, Snowdon.

The mixed tracks were transposed onto the surface of a 7” x 7” polycarbonate plastic square at Concordia’s Center for the Study of Learning and Performance (CSLP) by sound artist and researcher Angus Turnawasky using a Presto 8N record lathe. The stylus of the lathe debosses the soundwaves of the files onto the surface of the plastic in real time, reenacting the path of the WSRM System stylus as it followed me on my line walks through the stations. The resulting object can be played on any record player like a traditional vinyl disk despite its square shape and unconventional material (see fig.22). Alastair and I co-designed the Line Studies album cover to function as both an art object and a pedagogical device; the graphically rendered waveforms of the four recordings are the focal point of the

layout, inviting the listener to consider the unique calligraphic character of each vibrational pattern as they engage with the recordings (See fig.18)

Figure 22.

The WSRM System Line Studies (2024) record on a turntable

Note. Two copies of the field recordings were cut, one for use in the exhibition and one for archival purposes. Image by Misha Gontmakher.

Chapter 4: Exhibition Tactics

In his book *Performance Ethnography: Critical Pedagogy and the Politics of Culture* (2003) sociologist Norman Denzin (paraphrasing performance studies scholar Bryant Keith Alexander) writes that “[p]erformance becomes public pedagogy when it uses the aesthetic

[and] the performative to foreground the intersection of politics, institutional sites, and embodied experience" (p.9). As an answer to this provocation and a supplement to this text, I selected to exhibit the findings of my research in a public exhibition titled *Urban Choreographics* which was on view at Produit Rien gallery in Montreal from February 1st to February 5th 2024. Though I maintain that critical analysis and written reflection are integral aspects of academia, like Denzin (2003), I believe that it is vital to challenge the "analytic distance or detachment" of the "textual and positivist paradigms" (p.9) pervasive in traditional art history and ethnography practices. I approached the task of curating this exhibition as a pedagogical project. Rather than have the audience encounter the artworks as finished products, I wanted to invite the viewers to enter into my research-creation process. To achieve this the accessibility of the work both physically and theoretically was a primary concern. In this chapter I will briefly reflect on the exhibition tactics I used to organize the viewer's encounter with my research.

I selected Prodiut Rien because it is a ground-floor gallery with ramp access and has a gender-neutral washroom on site. The exhibition was mounted according to the accessibility exhibition standards defined by Accessibility Canada (2018) so that all would feel welcome in the space independent of their physical abilities. To theoretically frame this exhibition for the public I asked arts writer and curator Ally Rosilio to write an exhibition text which interprets this body of work through descriptive and poetic analysis (see Appendix. A). Copies of the text were available for those who visited the exhibition to take and read at their leisure. Accompanying the exhibition text was a small instructional pamphlet I authored titled *How to Determine the Meter of Collective Movement: A walking practice* which describes the procedures for determining the traveling BPM of place, the rhythmic

core of this work (see fig.23). Though these texts are useful guides for interpreting the exhibition, it is my hope that the display tactics I have deployed will facilitate viewers finding meaning in the work without their assistance. The texts are intended as a supplementary rather than an integral component of the exhibition.

Figure 23.

Exhibition essay and instructional pamphlet hang below the exhibition map

Note. Image by Paul Litherland.

Taking cues from local museological and archival display practices of the Canadian Center for Architecture (CCA) and Artexte, I built a large open vitrine to display some the research materials which were fundamental to the development of this work. Viewers were welcome to handle and browse these resources at their own volition. The books and images on display function as interpretive tools for the viewer and as a physical form of citation (see fig. 24 & fig.25). Like the steel remesh of *Grid Variations*, the focal sculptural element of this exhibition, the vitrines in this space are composed of materials commonly used for the internal support structure of buildings. These stripped-down structures show an architecture laid bare, a subtle reminder that those smooth and seemingly imporous surfaces which choreograph our everyday movements are far from free-standing.

Figure 24.

Detail of research material vitrine display

Note. Image by Mike Gontmakher

Figure 25.

Detail of research material vitrine display

Note. Image by Paul Litherland.

The four large-scale photographs included in this exhibition were selected from the catalog of stills I took during my field research because they best exhibit the choreographies collectively danced by commuters in transit (see figures 11-14). The date, time, place, traveling BPM, length of the gesture (in steps), and exposure time of each photograph is listed on the exhibition map (see Appendix B). I chose to include this information as it indicates the significance of these photographs as a form of data.

Smaller photographs are lacquered to ceramic tiles attached to the two steel remesh

structures of *Grid Variations*. When entering the gallery, viewers are immediately confronted by these two pseudo-architectural structures. Like stanchions, the grids organize the viewer's movement through the space, demonstrating the choreographic nature of architecture. The tiles reference the floor surfaces recorded by the WSRM System and the grid alludes to the square matrix of the draftsman's net, a tool used to make early perspectival drawings (see fig. 26). Segments of my field notes and research are graffitied on the back of each tile offering the viewer a glimpse into my writing practice (see fig.28). Depending on the viewer's orientation in relations to the work, various compositions are visible through the see-through grids.

Figure 26.

Grid Variations (2024) (installation view)

Note. Image by Mike Gontmakher.

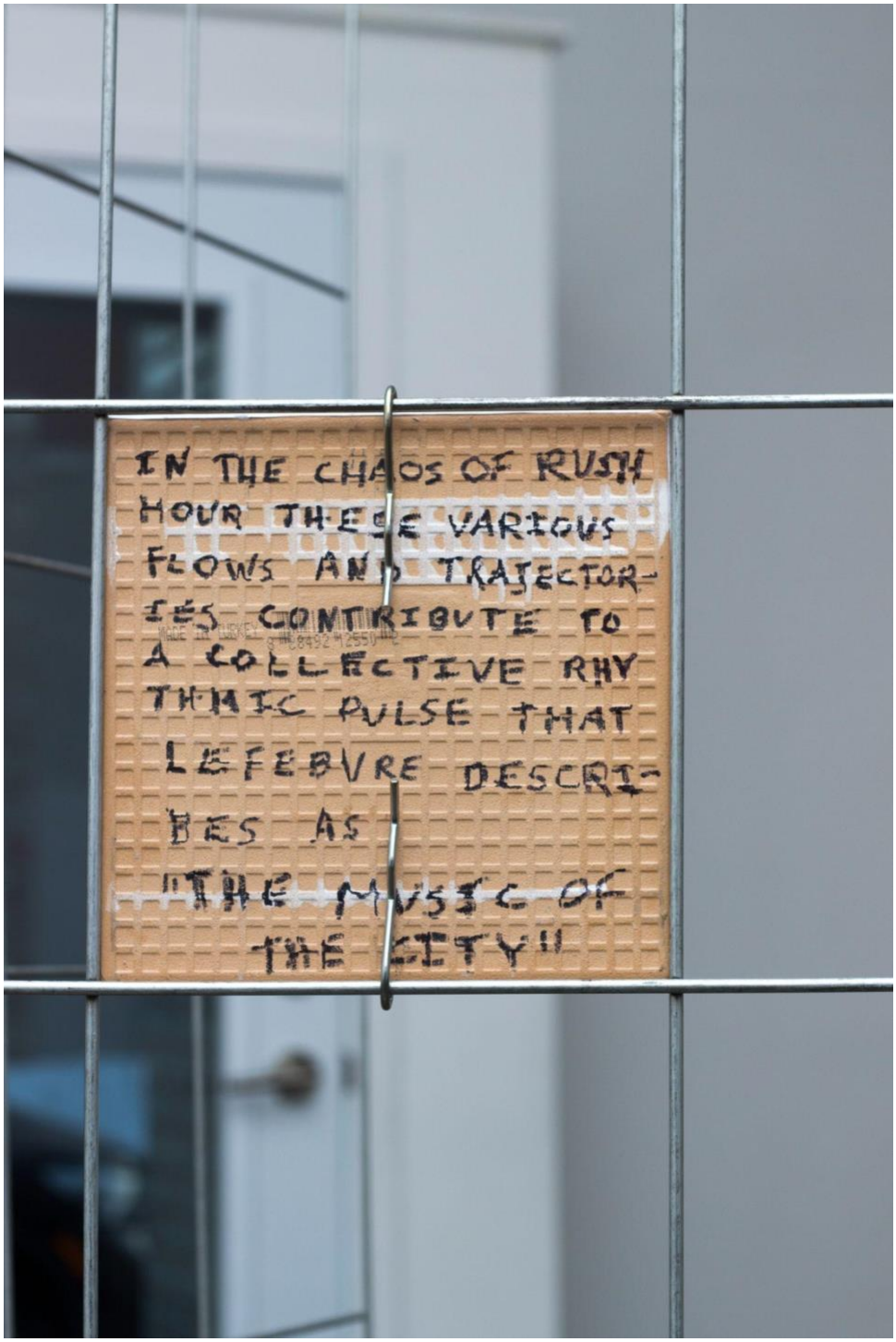
Figure 27.

Grid Variations (2024) (detail)

Note. Image by Mike Gontmakher.

Figure 28.

Grid Variations (2024) (detail)

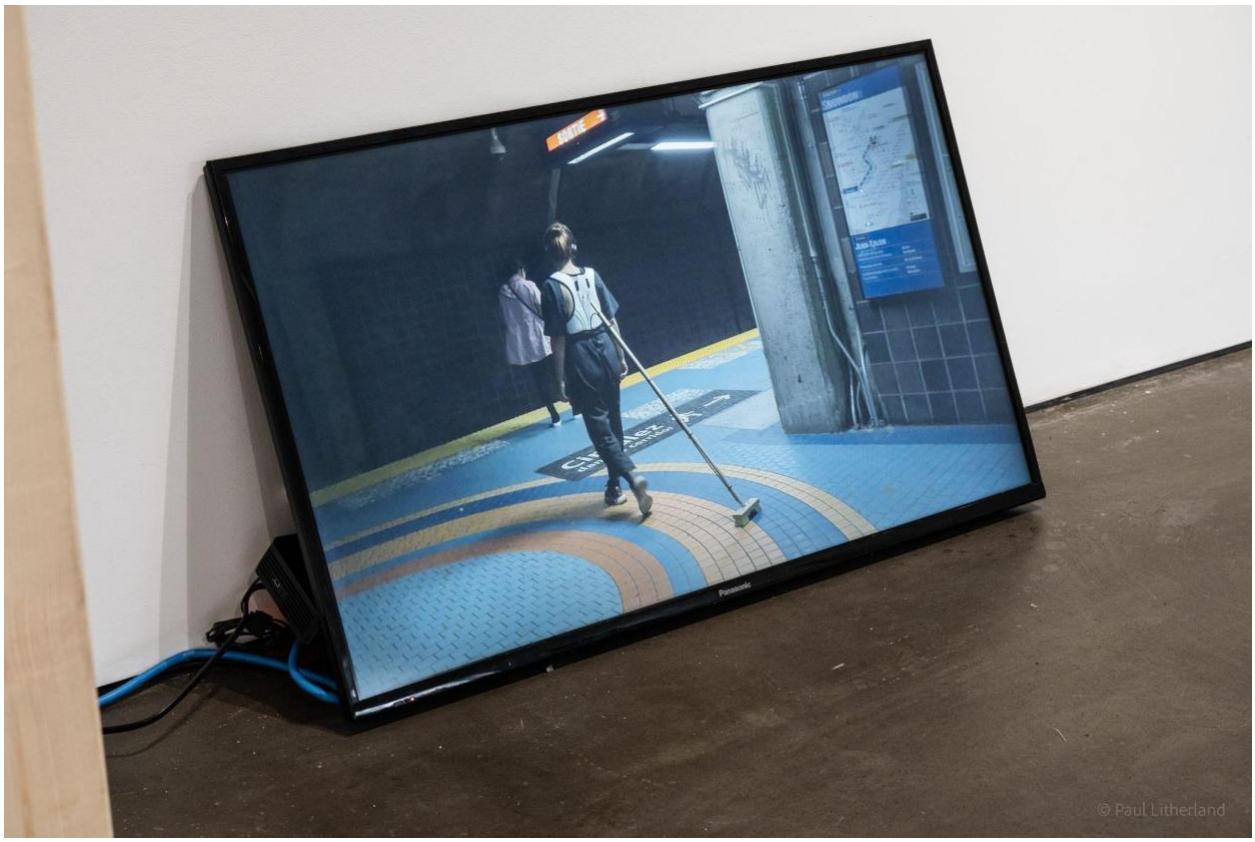


Note. Image by Mike Gontmakher.

On the floor next to the vitrine holding the broom component of the WSRM system, a TV is on the floor leaning against the wall. A video is silently playing on repeat (see fig. 29). The short film follows me as I walk with the WSRM System through the four transfer stations. The stations appear in the same order as the track list of the Line Studies record and are edited in such a way to make it appear that I am walking in a continuous loop through the stations.

Figure 29.

WSRM System demonstration video (2024)

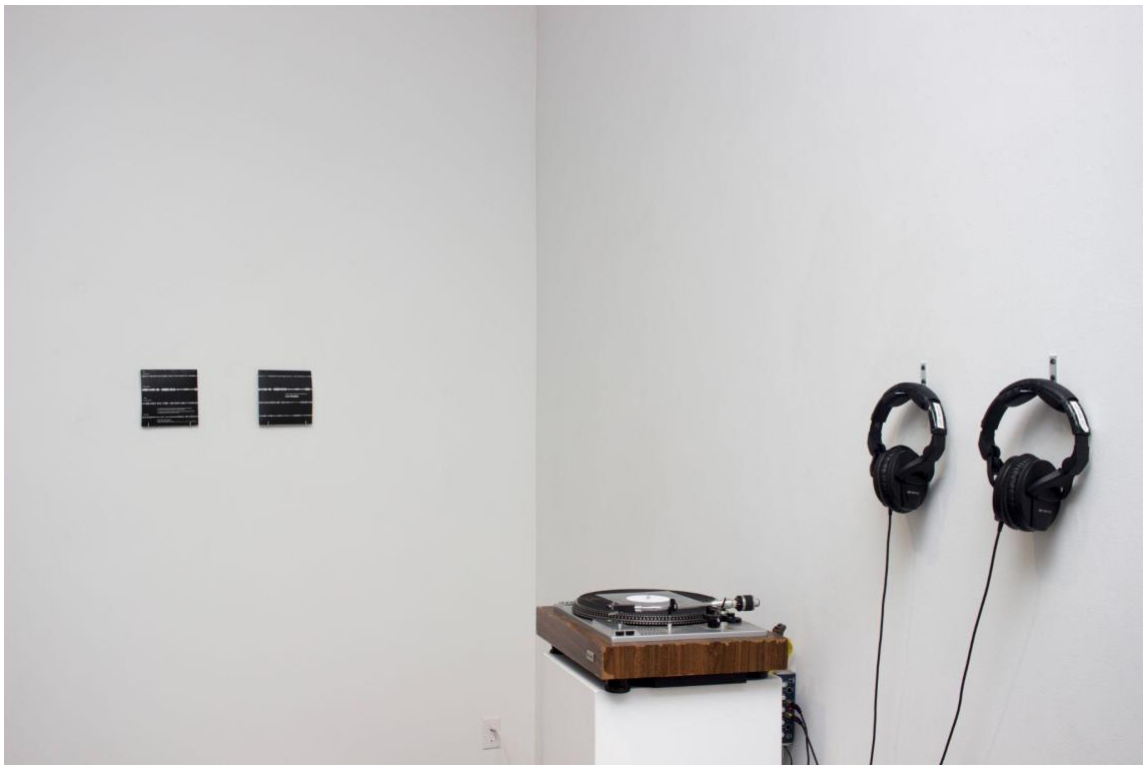


Note. Videography by Avery Mikolič-O'Rourke, Image by Paul Litherland.

At the listening station viewers are invited to use the record player to listen to the Line Studies album through a set of over-ear headphones much like those which are part of the WSMR System (see fig.30). Each intimate sonic encounter is a performative reenactment of the data collection process. By listening to the recordings through headphones rather than through a loudspeaker ensures that the tracks don't take on any of the ambient sonic qualities of the gallery space and maintain only the reverberations of the location of their collection. The front and back of the album cover are on display next to the record player, an open invitation for the listeners to follow along the waveforms as they engage with this sonic data.

Figure 30.

Line Studies listening station



Note. Image by Mike Gontmakher.

Designing this exhibition and sharing it with the public has easily been the most rewarding aspect of this project. In many ways this exhibition felt much like the process of peer review: To have other's eyes, ears, hands and minds engaged with my research yielded many insightful interpretations, observations, and suggestions which I would not have arrived at on my own. If this research paper is like the body of a tree, the *Urban Choreographics* exhibition is the fruit.

Chapter 5. Conclusion

The intention behind working with and through the extralinguistic media of performance, photography, and sound is to capture those aspects of experience which evade metric evaluation or textual description. I understand the outcomes of my field work as both data and works of art (the research as creation and the creation as research). The text in this document describes only my own interpretation of these artworks and is far from definitive or final. The project of this thesis is not to offer a decisive answer to the question of how adult human cognition and epistemic formation is affected by bodily movement through contemporary urban landscapes but rather to create a theoretical and methodological framework which positions the architectural structure as a choreographic device and movement as a legitimate form of learning. Through these artworks I have attempted to identify and emphasize how the built environment affects our perception of what normative movement looks, sounds, and feels like. The camera and the WSRM System function as prosthetic extensions of the eyes and ears, exaggerating the capacities of those organ's senses, defamiliarizing those quotidian gestures which we have committed to habit.

Rhythm is the transversal thread which activates this multimodal work and keeps it together. To find the rhythm of place gives a quantitative value to sensation, allowing one to measure the intensity of experience. A change in pace can sharpen your awareness of some details and blur others.

Rhythm here also reveals the hypervisibility of the bodies of those who move at a pace dissonant with the dominant rhythms of public spaces, dissociated from the daily dilations of pedestrian foot traffic: those who wander, who are seeking refuge, who are the custodians of these places, who vend or busk, who use mobility aids. If space and human movement are requisite components of place, then rhythm is a product of this sum. McLuhan et al. write: “When we concentrate on the structure of a situation, we can assess problems more realistically and change the situation or our response to it” (p.14). It is my hope that the content of this thesis provides some insight into the structures which scaffold the pedagogies of place embedded in the motions of our daily commutes. My aim is to leave the reader/viewer/listener of this work with some tools to generate further creative and critical analysis of the givenness of the everyday by interfacing with its multitude of rhythms through body and/or technology.

Performance ethnography deals with “approaches to knowing [which] insist on immediacy and involvement [consisting] of partial, plural, incomplete, and contingent understandings” (Conquergood, 1998, p.26 referenced in Denzin p. 9) therefore necessitating an embodied approach to conducting research. My methods of naturalistic observation and performance-based research are contingent on my immersion in the underground public spaces which are the focus of this study. Though it would be easy to say that this work could have been taken up by any body, I must acknowledge how my

social privileges as an able bodied, white-passing, middle class cis-gender woman cause me to go fairly unnoticed in public space and therefore allowed me to conduct this research with little friction or suspicion from commuters and the STM. Naturalistic observation is a form of surveillance, as are photography and videography. Though to enter public spaces such as the metro is to consent to being surveilled, I attempt to mitigate the extractive and invasive nature of my often-clandestine research tactics by obscuring or cropping any identifying features of my subjects whenever possible. My methods are inherently low-risk for users of the metro as the anonymity of the crowd inherently offers subjects a standard measure of protection. This approach holds its own problematics as it objectifies the subjects of study into abstract data and masses. There is no perfectly ethical solution but I hope that through making my findings accessible to the public through Concordia University's archive, public exhibition, and my own website that I am engaging in some sort of reciprocal exchange.

This small-scale study is far from finished or conclusive but represents a concerted effort to disturb the sediment of the everyday and generate material to stimulate curiosities about how the seemingly neutral material conditions of public spaces effect the movement of our bodies and habits of mind. This thesis is the beginning of building a theory and practice of urban choreographics which I am dedicated to further articulating as I continue my academic and artistic career. I am just beginning to learn this dance.

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Appendices

Appendix A

Urban Choreographics exhibition text by Ally Rosilio, February 2024.

"Travelling between the intervals of the street's in the city's gridded plan, I learned to move at a measured pace in synchronization with crowds of strangers—just as the metronome trains the musician's body to absorb tempo in muscle memory."

—— Eija Loponen-Stephenson, Urban Choreographics: Tracing the Extralinguistic Pedagogies of the Montreal Underground (p. 2)

In landscape architect Lawrence Halprin's "Cities" from 1963, movements of city-dwellers are scored across the map like musical notations. Defying the gridded structure of the staff, as bodies often defy the angular confines of the metropolis, Halprin's approach to designing public spaces through movement scores positions the built environment as *a container to facilitate the fluid circulation of bodily movement*. In "Urban Choreographics", Eija Loponen-Stephenson's research considers the relationships between spatial rhythms and the vocabulary of everyday movements collectively performed by commuters. Interested in the inherent dissonance experienced between the fluidity of bodily movement and the metric structuring of the cityscape, she asks: what forms of movement do public architectures anticipate from us? How do our bodies negotiate and deviate from the prescribed pathways of urban landscapes?

This collection of photographic, sculptural, textual, and sonic works is the result of a two-month self-directed residency performed by Loponen-Stephenson in the Montreal underground. In transfer stations, amid peak movement periods, she traced the paths, volume, texture, pace, and patterns of transiting bodies. Immersed in the underbelly of the city structure, she moved at a measured pace in synchronization with the crowd, her metronomic pulse tuned to the current of foot traffic. Loponen-Stephenson employs her body as a sensing tool, an approach which allows her both to perceive and actively participate in the programmed uniformity of spatial rhythm. Attached to her body through a harness, her Wearable Surface Recording and Monitoring (WSRM) mechanism sprawls down the vertebrae like some bionic membrane, extending the nervous system. Wires unfurl along the broomstick like tendrils, through which the spatiotemporal textures of urban space make themselves known to the body.

The sounds of the surfaces traced by the WSRM System stylus are lathe-cut onto archival plastic, grooves mapped out onto their surface as an aural landscape. At the listening station, the needle retraces the original paths of movement performed by Loponen-Stephenson in each transfer station, preserving the memory of the body's trajectory through urban space. Ambient rhythms emerge from the needle tracking over the contours of stickers, signage, floor tiling and pathway marks. Biological materials—micro-fragments of skin, hair, and textiles—accumulated on the platform floor as dust, are also detected by the stylus and embedded in the surface of the

plastic record, the unseen byproduct of human occupancy. These unexpected, dissonant textures make up the discontinuous sum of spatial rhythm.

Anchored to the floor with concrete, the gridded pathways installed in the centre of the gallery import the architecture of the subway system into the exhibition space. Black-and-white photographs documenting the frenetic motion of commuting bodies at each transfer station are wheat-pasted to the ceramic tiles embedded into the mesh of these structures. Excerpts from Loponen-Stephenson's site-writings are graffitied on the back side of these tiles, inviting viewers to engage with the poetics of her sense-based research. Employing the technique of long-exposure film photography, the images included in this exhibition preserve the temporal qualities of place by capturing movement in such a way that it takes on an almost tangible form. Fleshy bodies, like beams of light, morph into streams of continuous and forward motion. These images of movement, haunting in their resemblance to the force of transit infrastructure, serve as a reminder of the unrelenting pace of capitalism and the speed-time of the production economy to which our bodies are indelibly inscribed. The users of public spaces whose trajectories deviate from the prescribed pathways of worker-commuters gather on the periphery of perpetual motion. Visible within the uniform pace of capitalist temporality, these subjects adopt a dissonance in their stillness.

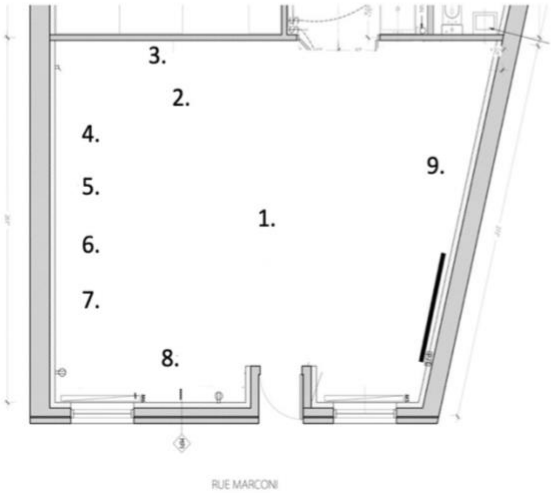
This embodied approach to studying public space goes beyond viewing the body as a mere tool for optimization; instead, it considers the body as a complex organism constantly engaged in the process of reading and emerging within its surroundings. Unfolding asynchronously, Stephenson's exhibition delves into the temporal, durational, and sensual dimensions of the cityscape. Together, these devices actively work to kinetically stimulate a remembrance of how connected built environments are with our own corporeality—that, they too, are bodies.

Appendix B

Urban Choreographics exhibition map

An Art Education masters thesis by **Eija Loponen-Stephenson**

Urban Choreographics



1. Grid Variations
Steel remesh, ceramic tiles, printed images, wheat paste, steel r-clips

2. Wearable Surface Recording and Monitoring (WSRM) System
Wooden push broom, record player stilus, steel screws, rubber washers, steel plate, super glue, steel screw eye

3. WSRM System Line Studies Performance
Single channel video on flatscreen TV

4. Movement Study Jean Talon Station 11.08.23 14:36h
-traveling BPM 120, 20 step gesture, 10 sec exposure
Film photograph digitally printed on medium-weight paper, steel hooks

5. . Movement Study Berri- UQAM Station 28.08.23 16:52h
-traveling BPM 125, 30 step gesture, 14 sec exposure
Film photograph digitally printed on medium-weight paper, steel hooks

6. Movement Study Jean Talon Station 11.08.23 14:46h
-traveling BPM 120, 15 step gesture, 7.5 sec exposure
Film photograph digitally printed on medium-weight paper, steel hooks

7. Movement Study Berri- UQAM Station 28.07.23 14:20h
-traveling BPM 110, 20 step gesture,approx 11 sec exposure
Film photograph digitally printed on medium-weight paper, steel hooks

8. Research Vitrine
Various research and process materials

9. WSRM System Line Studies Listenting Station
Lathe-cut polyurethane, paper record sleeves, record player, headphones