THE ARCHITECT AS CHOREOGRAPHER

A Movement-Centered Approach to Designing Spaces

Meghan MacBeath

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Cover image: Peter Raper, MHC Senior Capstone Concert “Between Thresholds” by Meghan MacBeath, 2025

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Meghan MacBeath
Architectural Studies Senior Thesis
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ABSTRACT

The kinesthetic experience of architecture is an integral element of how we experience and relate to the built environment. Dance as an embodied practice highlights the kinesthetic experience of moving through space, and therefore can provide insight into how movement through architectural spaces can be designed with the kinesthetic experience in mind by translating choreographic methods into the architectural design process. This research analyzes methods used by postmodern dance choreographers to direct movement pathways: positive and negative space, lighting, imposed geometries, and the movement of other people. A comparative analysis demonstrates how these methods appear in the processes and performances of prominent postmodern dance choreographers, and how they can be translated into an architectural context to enhance the kinesthetic experience. In addition to the analysis of choreographic and architectural precedents, I use my own choreographic process for my dance piece *Between Thresholds* as an extended research space to experiment with these methods.

My design proposal implements these choreographic strategies in the design of a series of interactive play structures for the Mount Holyoke College campus, located at intervals around the Upper Lake Loop Trail and designed to facilitate full-bodied recreational movement. Using diagrammatic methods synthesized from choreographic and architectural strategies for representing movement, my process begins by designing movement pathways within each site, then builds around these pathways to create dynamic structures that encourage movement at multiple scales. Each structure encourages specific types of bodily movements, while allowing space for movement variation and exploration. My goal for this design project is to create an environment for students and community members to engage in full-bodied movements outside of average everyday motions in an exploratory setting, as well as to model a movement-centered design process, crafting movement pathways at multiple scales to enhance the kinesthetic experience of architectural space.

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One of the roles of the architect when designing an architectural space is to direct the pathways of movement that the users will take through the space. This orchestration of spatial patterns of movement can be likened to the role of the dance choreographer, who similarly takes on the task of directing the pathways of movement that the dancers will take in a choreographic work. Examining the relationship between the dance choreographic process and the architectural design process brings to light these shared responsibilities, and the methods that can be used by each to direct pathways of movement through space.

The role of the architect is to design spaces for people to inhabit. Architecture is not meant merely to be looked at, or simply to be used, but to be lived in. Architects have the responsibility of shaping the human experience through the way that they shape space with their designs. This includes an orchestration and balance of the function of spaces, the aesthetic of forms, the practicality of structures, the experience of environments, and the movement that connects it all. The role of dance choreographers is to design a movement experience, orchestrating the relationships between bodies and movements both spatially and temporally. They must consider the movement possibilities of the human body, and use them as the foundational elements of their craft. While there is much variation across dance forms in terms of relationship to audience, sound, meaning or narrative, or a particular desired aesthetic, the choreographer ultimately shapes the nature of the dance through their orchestration of movement.

In this comparison between the choreographer and the architect, the additional roles at play are the dancers who perform the work and the users of an architectural space. In a similar way that dancers are given direction by the choreographer as to where they will travel or be situated in space and what their bodily movements will be, the users of an architectural space are also directed in their movements by the architect, although in

this case indirectly. The main difference in this comparison is that the dancers are given explicit instructions and are most often trained to move in the manner in which they are being directed, while the users of an architectural space do not consciously know the architect's intent except through their own kinesthetic instincts as they move through the space. Because of this nuance, it is important for the architect to understand the kinesthetic experience of the user and center it in their design in order to craft movement pathways within architectural spaces.

Dance as an embodied practice highlights the kinesthetic experience of moving through space, and therefore can provide insight into how movement through architectural spaces can be designed with the kinesthetic experience in mind. This research aims to create an approach to architectural design that is movement-first, prioritizing the way that people move through architectural spaces as an integral element of how we experience and relate to the built environment.

01

MOVEMENT AS PERCEPTION

THE KINESTHETIC SENSE

Our movement through space is a critical aspect of the way that we experience the spaces we inhabit. Architecture is not just meant to be perceived visually, but to be experienced kinesthetically. The way that we move through an architectural space influences how we perceive it through our other senses, and movement itself is a part of how we perceive our environment. In addition to the commonly referenced five senses of sight, sound, smell, taste, and touch, there is also what is known as the kinesthetic sense, which includes both proprioception and kinesthesia. Proprioception refers to our ability to sense our own body moving through space, as well as the relative spatial relationships between parts of the body either during dynamic movement or in static positions. Proprioception is also related to one's sense of balance.[1] While similar and sometimes used interchangeably, kinesthesia refers to our ability to sense movement in our joints and muscles. As we move through space, we receive kinesthetic feedback through our muscular exertion and relaxation, which builds our awareness of where we are in relation to our physical environment.[2] For the purpose of this research, the term "kinesthetic sense" refers to the combined understanding we receive from proprioception and kinesthesia.

Psychologist Leela C. Zion describes the importance of the kinesthetic sense to the way that we perceive ourselves and our environment: "We know very little about our body unless we move it. We know very little about the world around us unless we move in it."[3] Our sense of where we are and how we are moving directly influences the way that we understand and perceive what is around us and the environment through which we are moving. As an embodied practice that is centered around movement, dance is a valuable context for examining the kinesthetic experience. Dance is often cited as a method of further developing one's kinesthetic sense, as it builds spatial awareness and familiarity with the movement of the body through space.[4] The dancer, through the bodily experience of moving and learning movements, employs a particular

kinesthetic mode of attention that makes one more aware of the sensations and perceptions of the body. This sense can be thought of as a kind of bodily "listening," and as the dancer exercises this mode of attention, awareness of the body and its relationship to space becomes heightened beyond the typical experience of non-dancers.[5]

The kinesthetic sense can be defined at two scales: the position of our body in space relative to our physical surroundings, and the movement of our body within the space immediately around us. These two scales of the kinesthetic sense translate to the two scales of movement with which the dance choreographer is concerned. The choreographer orchestrates the spatial patterns and trajectories of movement within a space, or where the pathways of movement are taking the dancers, as well as the individual bodily movements of the dancers, or how they are moving along those pathways.

Architecture is perceived and experienced through this kinesthetic sense as well. The kinesthetic experience of architecture relates to our ability to comprehend three-dimensional space through movement, and to understand our spatial and physical relationship to our surroundings. In Juhani Pallasmaa's *The Eyes of the Skin: Architecture and the Senses*, the author posits that much of Western modern architecture emphasizes the visual experience over that of the other senses, and argues for a rethinking of architectural experience as an interaction of our various senses. He explains that we understand our surroundings by how our own body relates to what is around us, making the relationship of body to space essential to our experience of both the natural and built world.[6] Professor of Architecture Esen Ozdamar similarly advocates for the kinesthetic experience, framing architecture as a way of regulating our somatic experience through built environments by creating an experiential atmosphere that we perceive through our kinesthetic sense. She encourages a focus on kinesthetic perception in design and design education, in order to create a holistic understanding of the experience of architectural spaces.[7]

While, as Pallasmaa and Ozdamar claim, there has been a tendency to neglect stimulation of the kinesthetic sense in modern architectural design, there has also been a responsive movement by some postmodern

architects to focus on the relationship of body to space, and a "determination to make the human body feel 'at home' in its structures."[8] In their book *Body, Memory, and Architecture*, Kent C. Bloomer and Charles W. Moore describe the human body as the foundation from which architectural form and spatiality are derived. The authors explain how the mechanization of architecture stemming from Enlightenment ideals and modern technological developments resulted in a focus on the function of buildings over their identity and the human experience. This has resulted in a diminishing of our repertoire of movement, or in other words, the typical actions that we perform in our daily lives have become less varied. The authors argue that this is in part due to the built environment that we inhabit: "All architecture functions as a potential stimulus for movement, real or imagined. A building is an incitement to action, a stage for movement and interaction. It is one partner in a dialogue with the body."[9] Bloomer and Moore refer to dancers and their understanding of the body and space to highlight and advocate for an increased attention toward the human body and its relationship to architecture, emphasizing how our movement and our understanding of ourselves influences our experience of architectural spaces.[10] Because movement is so integral to the way that we experience architecture, it should be considered central to the design of the spaces that we inhabit. Taking lessons from dance choreographers can help architects approach the design of movement in a manner that centers the human body and the experiential aspect of movement.

AN ARCHITECTURAL UNDERSTANDING OF MOVEMENT

The concept of movement in architecture can be considered in various capacities and contexts, but for the purpose of this research the focus is on the movement of people within and into or out of an architectural space. Much like the larger scale and smaller scale of the kinesthetic sense, the movement of people in architecture can be considered at both the scale of circulation pathways through space and the bodily movements of the users. In this context, a movement pathway refers to the trajectory of the user in terms of their spatial position or coordinates within a given area. This pathway may or may not be physically or visually distinguishable, but is created by the movement of the user as they travel through space, behind them as an invisible "trail" of previously occupied space and ahead of them as an intended trajectory. The bodily movements of the user refer to the movement of their joints and muscles as they perform certain actions — this can be as simple as walking or as small as turning the head. These bodily movements are constantly occurring along the larger movement pathways through space, and also occur even when the larger trajectory of movement is at a stationary point.

Circulation in architecture refers to the pattern of movement taken by people through space, and how this movement interacts with the surrounding built environment. Often the term "circulation space" refers to the connection spaces between different programmatic areas in a structure, such as hallways, corridors, and staircases — however, circulation does not just connect the dots between spaces, but rather weaves its way into and amongst all of the used spaces within a building or structure.[11] Circulation pathways exist and are designed within the space of one room, one floor, an entire building, and relating a structure to its surrounding context.

In terms of the bodily movements of the users, they are primarily determined by the programmatic elements

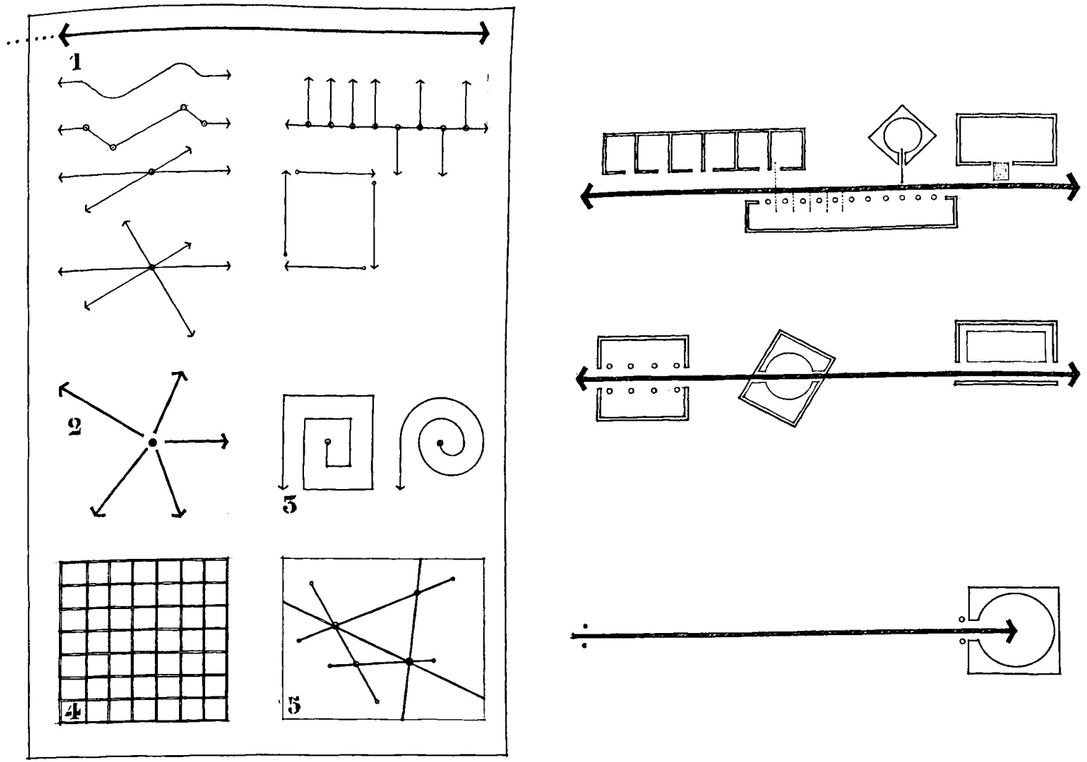

Figure 1.1 - Francis Ching's diagrams of configurations of circulation paths (left) and path-space relationships (right)

of the structure. The activities and actions that take place within a building are what determine the bodily movements of the users as they inhabit it — for example, a library contains the movements of walking, standing, sitting, reading, pulling books off of shelves, etc., while a restaurant contains the movements of eating, serving food, cleaning tables, cooking, washing dishes, etc. Whatever the anticipated actions associated with the program are, the design of the architecture must be responsive and conducive to these bodily movements.

An alternate understanding of movement in architecture is in the form of the structure itself, which can sometimes be designed to invoke a sense of movement through visual geometries and volumes that give a sense of motion while remaining static. This context of movement in architecture is often related to a physical movement response in the eyes, which follow the implied movement of the architecture and therefore activate the ocular muscles.[12] While this understanding of movement in architecture primarily relates to the visual experience of architecture rather than the kinesthetic, visually dynamic forms can sometimes prompt a kinesthetic response from the viewer, and therefore can still relate to the movement of people within a space.

At both the larger scale and smaller scale of the kinesthetic sense, designers should be cognizant of creating an atmosphere that is kinesthetically stimulating for the user to enhance their experience of architecture. Circulation pathways and bodily actions, while on the one hand functional, are also integral to the way that users relate to and experience architectural spaces.

POSTMODERN DANCE AND THE KINESTHETIC EXPERIENCE

Postmodern dance as a genre arose in the early 1960s as a rebellious response to modern dance, which was in turn a rebellious response to classical ballet. While modern dance sought to break from the strictness of ballet and find more freedom in the body's movement, postmodern dance sought to break even more from the structure that still existed within modern dance, pushing the boundaries of movement even further. Frequently identified as having its start with the Judson Dance Theater in New York City, the form is often characterized as a questioning of what movement can be considered "dance."[13] Although there is a wide range of approaches to this idea, postmodern dance often incorporates elements of pedestrian or "found" movement, integrating gestural movements and choreographic tasks that create a non-narrative and non-symbolic presentation of movement for the sake of movement itself.[14]

Additionally, one of the characteristics of postmodern dance is the incorporation of improvisation into the choreographic process and performance. Improvisation invites a sense of spontaneity along with curiosity, playfulness, and discovery. While not necessarily devoid of aesthetic value or attention, improvisation as an intuitive form of dance often emphasizes following how a movement feels in the body over how it looks to an outside observer.[15] This aspect of the postmodern choreographic process often manifests in the form of improvisational scores, which refers to a framework or prompt provided by the choreographer that guides the improvisation of the dancers, without giving specific set movements but used to shape the nature of the dance. This allows the dancers to move in a spontaneous and intuitive way within the structure provided by the choreographer, and results in variation within the work each time it is performed.

In this same vein, there is a particular emphasis in postmodern dance on the lived experience of the body in space, not just looking at choreography from the perspective of the audience but from the perspective

of the dancer. In many traditional forms of dance, such as classical ballet, the primary value is placed on the aesthetic of the movement and how it is perceived by the audience — the dance is largely for the outside spectator. In postmodern dance, value is placed more heavily on the movement itself from the inside of the work, or movement for the sake of movement rather than for a particular expressive or narrative purpose.[16] For this reason, postmodern dance is a helpful lens for understanding the experiential aspect of movement and its relationship to the kinesthetic sense.

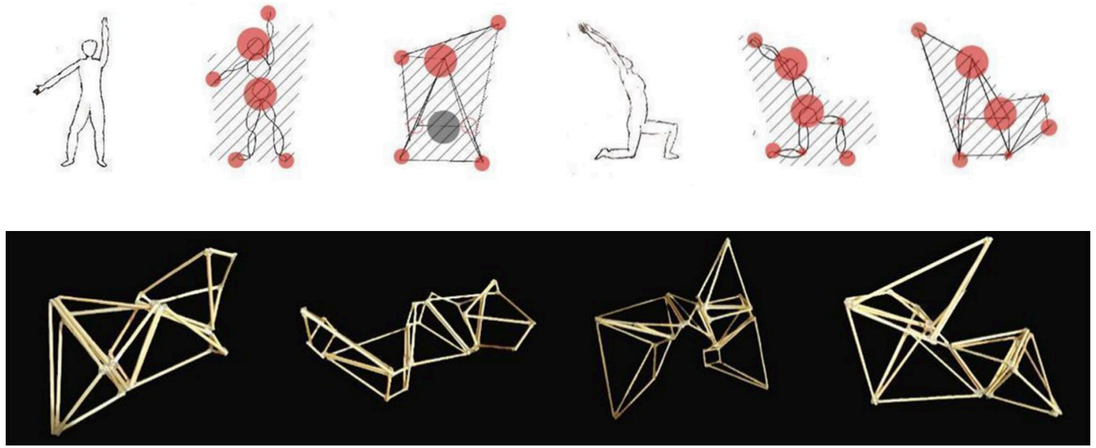

Figure 1.2 - student work from research study by Serkan Can Hatipoglu et al. demonstrating the process of abstracting the structure and movement of the body to develop structural module combinations

DANCE IN THE DESIGN PROCESS

Dance is a practice that is deeply rooted in its relationship to space and how the human body interacts with space, and therefore has significant potential to help designers better understand how to design with the kinesthetic experience in mind. In a recent academic study, researchers examined the effect of movement and abstraction exercises in a first-year design studio course in terms of the students' understanding of space and structure throughout the design process. The students followed a five step design process over the course of the study: (1) creating a short phrase of dance choreography (15-20 seconds) based on an analysis of movements from dance videos of their choice, (2) producing abstract sketches based on their own body movements from their choreography, (3) developing these abstract sketches into three dimensional units as wood models, (4) producing modules as combinations of units, and (5) designing a structure for bodily experience using the modules developed from their initial choreography. The researchers found that students who demonstrated a higher understanding of bodily relationship to space and volume through the initial dance choreography assignment later demonstrated a more successful result in terms of the spatiality and fluidity of their final structures.[17] Through the lens of dance and choreographic processes, architects can improve the spatial awareness of their designs to create spaces that prioritize the kinesthetic experience.

Figure 1.3 - "Between Thresholds," Meghan MacBeath

BETWEEN THRESHOLDS: CHOREOGRAPHIC RESEARCH

As a part of my research into the overlapping roles of the choreographer and the architect in respect to directing movement through space, I have used my own choreographic process for my work *Between Thresholds* as an extended research space for these ideas. This dance piece was performed in the Mount Holyoke College 2025 Senior Capstone Concert in the Kendall Sports & Dance Complex Studio Theater, after a seven month rehearsal process with four dancers. Using dance as an embodied form of research, I experimented with different modes of research including the exploration of the physical space of the studio theater, the use of drawings and diagrams to visualize movement and process, improvisational exercises focused on movement through space and spatial relationships, and compositional exercises that related these different elements to generate movement. Throughout my process, I utilized the methods of directing movement through space taken from postmodern dance choreography as outlined in the next section to craft movement pathways and spatial interactions.

My research through this choreographic process involved both the time spent in rehearsals over the course of their duration, as well as how the concepts explored in rehearsals manifested in the final performed work. In this process, some of the improvisational and compositional exercises that we did in rehearsals directly influenced movement in the work, while others did not correlate specifically to a section of choreography that was performed, but the ideas that they experimented with helped inform my approach to generating movement phrases and crafting the work as a whole.

The work as performed in the concert demonstrates these research concepts in the overall arc of the piece's 12-minute duration. The first half of the work begins by establishing standard geometric movement pathways and structure through the movement of the dancers in space and the lighting of the stage. The second half

of the work begins to disrupt the expectations established in the first section, diverting movement pathways into more organic geometries and manipulating the existing curtains within the theater space to shift the way that the space is moved through by the dancers and perceived by the audience. Throughout the work, I explore relationships between dancers and their interactions with their surroundings, experimenting with how the dancers' movements are shaped by the space around them and how their movements shape the space itself.

Through this choreographic process, I have attempted to use my experience of taking on the role of the choreographer to further research methods of directing movement, in order to better understand how to translate them into the architectural design process. My goal was to make discoveries regarding the overlapping roles of the choreographer and the architect through firsthand experience with both processes, in order to make connections between the two disciplines to enhance each of their approaches to crafting movement pathways and their attention to the kinesthetic experience.

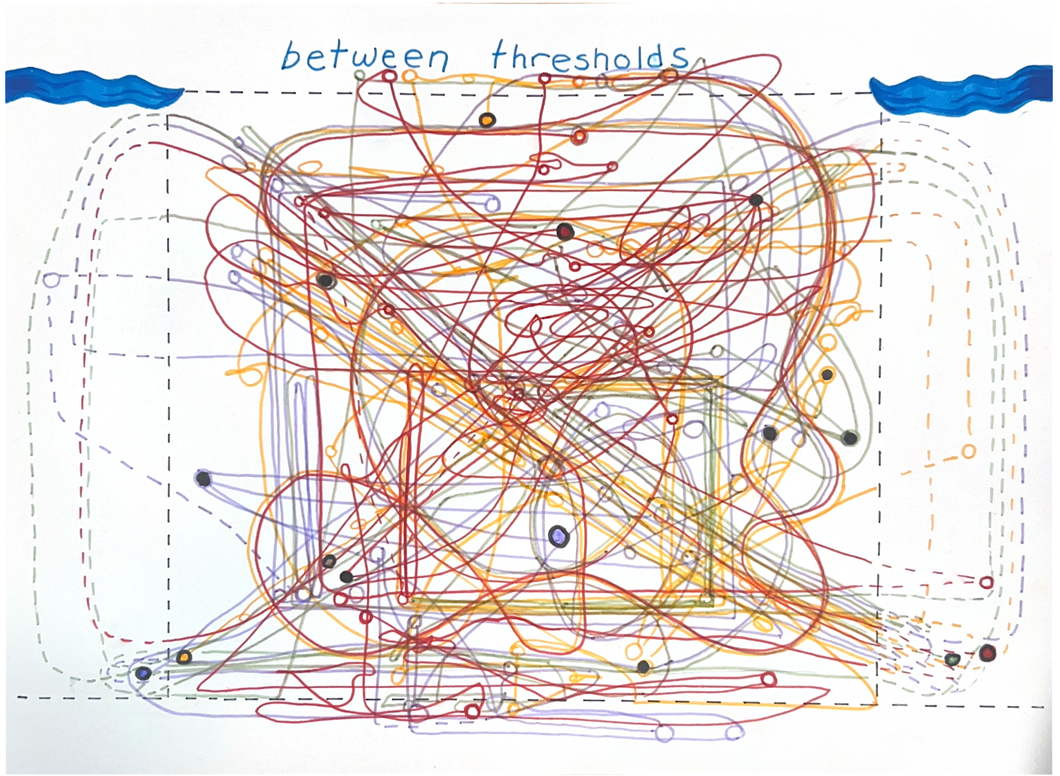

Figure 1.4 - Diagram of overlaid movement pathways in "Between Thresholds," drawn by the dancers

01 ENDNOTES

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01 FIGURE SOURCES

Figure 1.1: Francis D. K. Ching, *[Configuration of the path]* and *[Path-space relationships]*, drawings, in *Architecture: form, space, & order* by Francis D. K. Ching, New Jersey: John Wiley & Sons, 2007: 265, 278.

Figure 1.2: *[Student work from research study on body, dance, and abstraction]*, drawings and photograph, in "Body, dance and abstraction for spatial and structural comprehension in the first year of design education" by Serkan Can Hatipoglu et al., *International Journal of Technology and Design Education*, 22 February 2023: 11, 14.

Figure 1.3: Peter Raper, *[MHC Senior Capstone Concert "Between Thresholds"]*, photograph, *Flickr*, 2025, https://www.flickr.com/photos/111040228@N03/albums/72177720324734391/.

Figure 1.4: Abby Chan, Wilsie Ferris, Helena McGowan, and Lucy Richards, *between thresholds*, drawing, 2025.

02

METHODS OF DIRECTING MOVEMENT THROUGH SPACE

METHODS OF DIRECTING MOVEMENT THROUGH SPACE

The role of the architect can be framed similarly to the role of the choreographer: to not only design the form and aesthetic of a piece of architecture, but also the movement that the users will take through the spaces and how they will interact with it. Methods used to direct movement through space in postmodern dance choreography can help inform an approach to architectural design that is movement-centered and prioritizes the kinesthetic experience. This research outlines four such methods: positive and negative space, lighting, imposed geometry, and the movement of other people. These methods were selected based on their prevalence in my experience of dance spaces and in examples of prominent postmodern choreographers who utilize these methods in their work. They were also selected due to their use of different elements of performance as resources for movement orchestration, such as physical surroundings or objects, lighting design, and the other dancers in the space. These methods are outlined here as four distinct categories, but in practice they are interconnected and often coexist.

POSITIVE AND NEGATIVE SPACE

Postmodern choreographers often use the concept of positive and negative space when determining pathways of movement. Positive space refers to physical elements that have mass and volume, while negative space refers to the empty space around and between these physical elements. In her compositional handbook *Standing in Space: The Six Viewpoints in Theory & Practice*, choreographer and theorist Mary Overlie identifies six Viewpoints for approaching dance choreography: Space, Shape, Time, Emotions, Movement, and Story. In her discussion of the Viewpoint of Space, Overlie describes the use of space as a material that can be physically manipulated through movement: "When you add observation of distances between yourself and fellow performers, and pay attention to the spatial patterns you make together, you will develop an awareness of Space as a unifying effect."[1] Space both separates and connects, creating physical relationships based on distance, density, and the flow between positions. Positive and negative space is constantly being shifted by the movement of people in space, and their spatial relationships shape the context of what space is available to be moved into and through.

Positive space in a dance context often refers to the other dancers who are in the space. The choreographer has to take into consideration where pathways of different dancers overlap in space and time, orchestrating and diverting pathways for each dancer as an individual and a collective. Positive space can also be considered in the form of physical obstacles and boundaries that determine the pathways of dancers across the stage or within the space where the dance takes place. These can be objects within the space such as props or set pieces, as well as elements of the space itself, such as the stage curtains or the boundary walls of the space. Negative space refers to all of the empty space around the positive space, or anywhere that is not filled with a tangible physical object or person. Negative space improvisation or composition occurs when the movement of a dancer or dancers fills in the negative space created by the positive space in the room — often, this takes the form of moving in between and around the empty spaces created by the shape of another dancer's body or position in space.[2]

An example of this concept in a postmodern choreographic work is William Forsythe's *One Flat Thing*, first performed in 2000 and later reproduced in 2008 as a dance film. This work features 14 dancers and 20 identical tables laid out in a grid throughout the space (Figure 2.1). Over the course of the work, the dancers move between, under, and over the tables, and at times move the tables themselves around the space. In this piece, the negative space of the corridors between the tables and the spaces underneath the tables between the legs are used to direct the movement that the dancers take around the performance area, as well as the bodily movements of the dancers as they move to accommodate the physical obstacles of the tables and of each other. William Forsythe and film director Thierry de Mey also collaborated on *Thematic Variations on One Flat Thing, reproduced*, experimenting with camera angles and moving shots to allow this use of space to be viewed from a variety of perspectives.[3]

Figure 2.1 - "One Flat Thing, reproduced," William Forsythe

In my own choreographic process for my piece *Between Thresholds*, I explored this concept of positive and negative space through various improvisational and compositional exercises. One such exercise explored the interaction with and manipulation of the physical space of the studio theater in the Kendall Sports & Dance Complex at Mount Holyoke College, where our rehearsals took place and where the work was ultimately performed. The curtains in the studio theater, most notably the legs which make up the wings on the side of the stage area, create a structure within the space that is often viewed and treated as fixed when they are set up for a performance. However, in this piece I explored how the adaptability of the fabric allows it to shift and create new spaces, passageways, and obstacles for movement pathways to interact with.

Early on in the process, I and the dancers in the cast of this work explored the different ways that we could shift and interact with the curtains in the studio theater space, holding and moving the curtains in various ways to create visual images, three dimensional spaces, or new openings for movement (Figure 2.2). We experimented with different techniques for holding or moving the curtains, such as bunching and twisting, or holding from the corner versus the edge. Based on our experimentation with these various configurations, I then came back at a later rehearsal and created a set sequence of interactions, organized as a peeling back of layers as time progressed throughout this section of the choreographic work. This section of the piece explores how positive and negative space directs the pathway that dancers take by creating new opportunities and spaces for movement to occur and drawing movement towards the shifting physical elements of the theater.



Figure 2.2 - manipulating curtains in the studio theater, rehearsals for "Between Thresholds"



Figure 2.3 - "Between Thresholds," Meghan MacBeath

At the smaller scale of bodily movements, we also experimented with positive and negative space as a way of creating movements and shapes based on the other dancers. In an improvisational exercise in the rehearsal process, dancers were put in pairs and instructed to dance one and then the other across the room. The first dancer in the pair improvised with the prompt of making shapes with their body and with their movements as they made their way across; the second partner then followed behind their partner, imagining that they were filling in and around the shapes that were just made by their partner with their own movements. This exercise was then repeated several times, with the time delay between the two partners becoming smaller each time, until they were both dancing simultaneously, one making shapes and the other moving around those shapes. In this situation, the bodily movements of the second partner were directly influenced by the negative space around the first partner. A similar strategy was used to create the static shapes that the dancers move between in one section of the work; these stationary shapes were created by filling in the negative space around each other, so that even though the dancers are separated and standing in a spaced out line, the shapes that they are each making with their bodies are influenced by one another (Figure 2.4).

Figure 2.4 - rehearsal and performance of "Between Thresholds," Meghan MacBeath

In architecture, this concept of positive and negative space can be applied to the way that designers consider materials and boundaries. Similar to Mary Overlie's approach to space as a manipulable material, Steen Eiler Rasmussen discusses solids and cavities in architectural forms in his book *Experiencing Architecture*: "Instead of letting his imagination work with structural forms, with the solids of a building, the architect can work with the empty space — the cavity — between the solids, and consider the forming of that space as the real meaning of architecture."[4] The physically built structure of the architecture — the solids — is the positive space, while the empty space enclosed by these elements — the cavities — is the negative space. Essentially, architecture is about using positive space to shape negative space. This includes the physical boundaries of a built space, such as walls, floors, and ceilings, as well as the gaps within these physical elements, such as doorways and windows. The shaping of negative space provides the possibility of movement — as Bloomer and Moore describe it, a path is created by "a void ready to receive human movement."[5] Creating these voids invites movement to occur, while physical barriers in space can be used to direct pathways by blocking access in one direction to divert movement in another direction. Points of entry and exit within these boundaries are significant determinants of the pathway that movement takes, not just into the space but often influencing the path within the space as well based on where the pathway starts. Similar to the choreographer coordinating the intersecting pathways of different dancers on stage, the architect also has to consider the various pathways of movement through a space and how they may overlap, intersect, or converge.[6]

One way that architects think about positive and negative space is through the use of figure-ground diagrams. These drawings represent the relationship between the built and the unbuilt through solid and void. The built spaces in a project or area are represented by a solid infill or poché, while the unbuilt or in-between spaces are left as open white space. These diagrams help designers visualize the relationship between the built and the unbuilt, as well as the continuity or discontinuity of the negative space between elements of the physical environment. Figure-ground diagrams can also be used to represent the relationship between public and private spaces, such as Giambattista Nolli's "Pianta Grande di Roma" (Figure 2.5). In this context, the negative space is not only the unbuilt spaces but the accessible spaces, or which spaces are open to receive movement.[7]

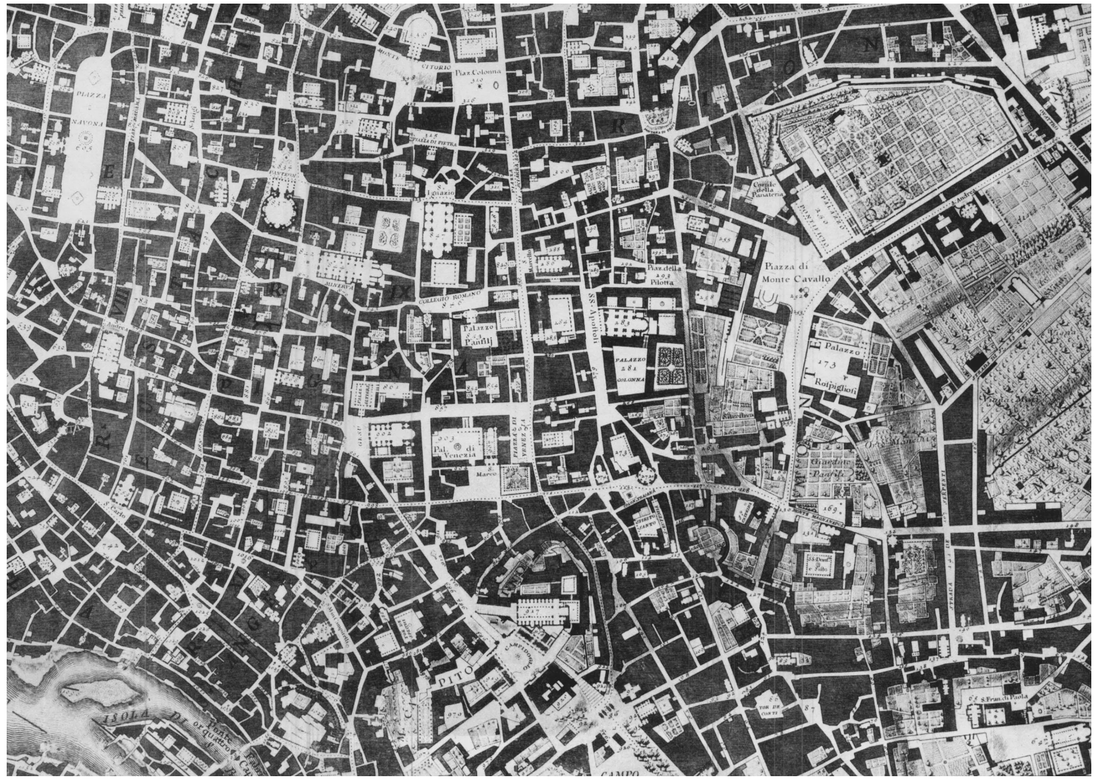


Figure 2.5 - Giambattista Nolli's map of Rome

The concept of positive and negative space can also be employed as a carving out of space from built forms, creating negative spaces to draw movement towards or through. Designed by Atelier Schwimmer, the Lakeside Chalet located by Lake Brome in Quebec uses this concept of carving out negative space (Figures 2.6 - 2.7). From the exterior, the building appears to have begun as a solid rectangular form, with sections of space carved out to create an entrance loggia and covered terrace. This concept is accentuated by the contrast in the treatment of the material used for the exterior cladding, with the exterior-facing surfaces composed of dark charred planks while the negative space sections that are recessed are treated with natural oils to give them a lighter shade. The interior of the cabin uses similar language of positive and negative space in the composition of the central atrium. The form of the central fireplace similarly appears as a solid block that has had sections removed to create negative space, and the position of the fireplace within the surrounding area serves to divide the open space into various spatial qualities, and divert movement around and through these spaces.[8] The variation in ceiling height continues this theme, drawing movement through the more enclosed spaces towards the more open space. In this way, the building's form invites movement towards and through the negative spaces that are created through this language of carving away from the built form.

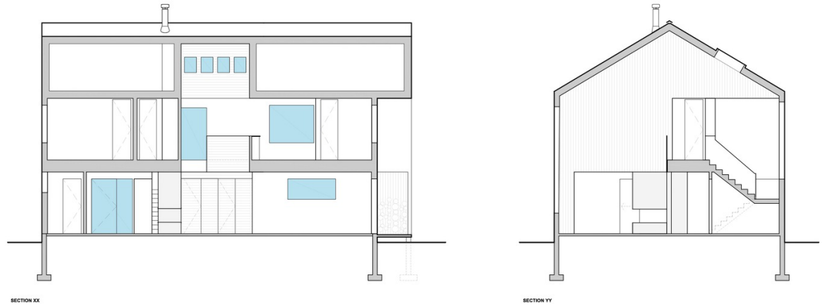


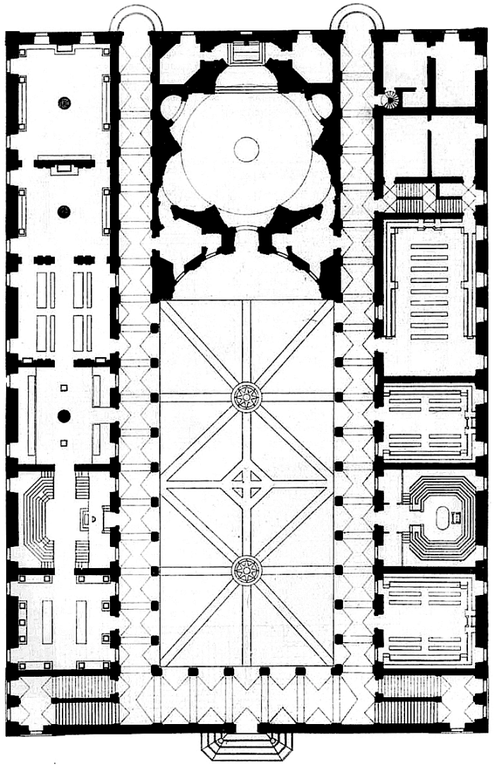
Figure 2.6 - Lakeside Chalet, Atelier Shcwimmer

Figure 2.7 - Lakeside Chalet, Atelier Shcwimmer

Architect Francesco Borromini often employed a similar use of negative space, as seen in his design of the Church of Sant'Ivo alla Sapienza in Rome (Figures 2.8 - 2.9). In this example, the interplay of positive and negative space can be seen within the building's floor plan as well as its relationship to the surrounding pre-existing context. The church was inserted into the existing arcaded courtyard, creating an interplay between the exterior walls of the new building and the open space of the courtyard. The concave front wall of the building creates a negative space between the edge of the rectangular courtyard and the physical border of the church's façade that draws movement towards the front entrance. In the plan of the building itself, the thickness of the walls allows for a sculptural approach to the interior spaces, shaping the negative spaces as though carved out of the thick stone walls. The negative spaces of the corner chapels are embedded into the walls of the central dome, and the series of niches around the edge of the central space create a dialogue between positive and negative space that encourages movement around the perimeter of the room.[9]

Considering space itself as a material and working with the negative spaces between physical elements helps direct the designer's focus towards how the space will be experienced by its users. Approaching this idea from a choreographic perspective can help create an approach to the shaping of spaces that invites movement and stimulates the body's kinesthetic sense in relation to its surroundings.

Figure 2.8 - Church of Sant'Ivo all Sapienza, Francesco Borromini



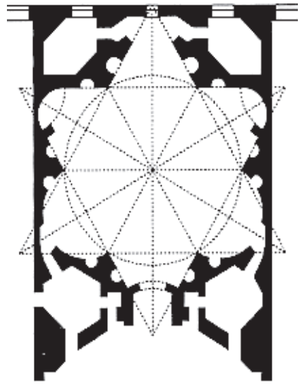


Figure 2.9 - Church of Sant'Ivo all Sapienza, Francesco Borromini

LIGHTING

Dance choreographers can use the lighting design of a performance piece to direct or enhance the movement of the dancers on stage. Lighting can be used to draw the movement of dancers towards a certain illuminated area or towards the source of the light. It can also be used to create pathways by the shapes or patterns created on the floor by the light. Most often, the dancers are positioned on stage such that they are lit by the stage lights so that their movement (or stillness) can be seen by the audience — or alternatively, the lights are designed and set such that they are illuminating the dancers. In either case, the movement occurs where the light is. Lighting can be used to confine movement to a particular area of the stage, which can limit the movements of the dancers both in terms of spatial positioning and bodily movement. In general, the lighting design of a work can be used to shape the space of the stage, dictating how the audience perceives the space and how the dancers move within it.[10]

In postmodern choreographer Bill T. Jones's work *Spent Days Out Yonder*, the lighting is simple yet effective in its defining of the spaces and movement of the work. In this piece, there is a unison phrase of movement that occurs in the main central area of the stage, from the outset to the conclusion of the piece, and this movement material exists within the confines of a box of light clearly defined on the stage floor (Figure 2.10). The dancers enter and exit this box of light, as well as the movement material itself, throughout the duration of the piece. As dancers enter and exit, the spatial relationships between where dancers are located while performing this unison phrase are constantly fluctuating, but regardless of how many dancers there are in the space or where they are at any given moment, they remain within the confines of the box of light. As this is occurring, an improvisational score begins to travel along the upstage edge of the stage, illuminated by a pathway of light. The movement in this score occurs in one direction, from upstage right to upstage left, moving along this light pathway as the score repeats on loop. Dancers move between this pathway of light

and the light box in the center, and whichever of these spaces they exist in determines the movement they perform — either the unison phrase, or the improvisational score. In this example, lighting is used to define the boundaries of movement and create a pathway for movement to follow, and to spatially distinguish the two different elements of the piece that are occurring simultaneously.

Figure 2.10 - "Spent Days Out Yonder," Bill T. Jones

In my choreographic work *Between Thresholds*, I experimented with some of these different methods of directing movement using stage lighting design. In one section of the piece, a soloist dances within a circle of light that slowly decreases in diameter over the course of the solo, reducing the area available for her movement to occur (Figure 2.11). The dancer's movement trajectory does not always follow a circular path, but rather the light is used to confine the boundaries of her movement. In this context, the light serves not only to define the space available for the dancer's movement pathway within the space of the stage, but also influences her bodily movements as the solo progresses. At first the dancer's movement is large and expansive, but as the circle decreases in size, her movements become smaller and more internally focused.

Figure 2.11 - "Between Thresholds," Meghan MacBeath

In another section of the work, rectangular boxes of light projected onto the floor create pathways of movement for the dancers to follow and move within (Figure 2.12). The section begins with four parallel rectangular boxes or "corridors" of light, one for each of the four dancers on stage. The boxes individually switch on and off in different combinations, and the dancers move along the boxes that are illuminated while remaining still when they are in darkness. The boxes then switch to being laid out in a square shape, creating a perimeter of light with the center left dark. Each side of the square is able to turn on and off independently as well, such that different configurations are made as the dancers again move through the illuminated boxes. In this section of the work, the lighting serves to create pathways within the space of the stage, prompting the dancers' movement as they turn on and off — the dancers move when their light switches on, and their direction is determined by which box in the configuration turns on next.

After this section concludes, a strong light is directed along the diagonal of the space from the downstage left corner, creating a pathway of light. The dancers' movement is pulled towards and away from the source of the light as they travel back and forth along this diagonal pathway. Here, the light directs the movement of the dancers at both the larger scale of their position on the stage and their bodily movements. The light draws the dancers along the diagonal pathway towards the corner, and as they get close to the source of the light, they reach towards it before being pulled back in the opposite direction (Figure 2.13).

Figure 2.12 - "Between Thresholds," Meghan MacBeath

Figure 2.13 - "Between Thresholds," Meghan MacBeath

These uses of lighting to guide and influence movement pathways can be translated into the context of architectural design. Light often draws the movement of people towards a particular point or area of space that is illuminated, or where the source of light is coming from. In an experimental study conducted by Lyle H. Taylor and Eugene W. Socov, the researchers found that when faced with two otherwise equivalent path options, people are more likely to move towards the side that is more brightly lit.[11] Light can also be used to create illuminated shapes or shadows on the floor or ground surface to act as pathways for movement. Much like on a stage, most movement in architectural spaces occurs in areas that are illuminated. This illumination not only allows for visibility, but also creates a more appealing environment that invites movement, whether it be the warmth it provides or the sense of openness that welcomes movement towards it. These factors can be used to direct the pathway that the circulation of movement takes by creating specific contrasts or qualities of lighting that are inviting.

Architect Tadao Ando is known for his intentional and creative use of natural lighting in many of his projects. In his design for the Vitra Conference Pavilion, he uses lighting to craft an atmosphere as well as to direct the movement of the users through the space. The strong contrast between the light and shadows created by the openings in the concrete walls and ceilings serves to illuminate surfaces and spaces that draw movement towards them (Figure 2.15).[12]

Another example is the Magdalene College Library designed by Niall McLaughlin Architects. The central hall of the library is illuminated by triangular clerestory windows, bringing light into the central open space as well as the adjacent spaces on each level as the light emanates down (Figure 2.14). The architects describe the circulation of the building as "...a journey that gradually [rises] up towards the light."[13] Here the light again serves to both create an atmosphere through the visual experience as well as the kinesthetic experience, as movement is drawn upward towards the source of the light. In the case of Tadao Ando's Vitra Conference Pavilion, the illuminated surfaces draw human movement towards what is illuminated, which occurs at the scale of individual spaces and pathways of movement. In comparison, the Magdalene College Library draws movement towards the source of the light itself, and the movement patterns are at a broader and more general scale of moving up from level to level guided by the light itself and the atmosphere it creates.

Figure 2.14 - Magdalene College Library, Niall McLaughlin Architects

Figure 2.15 - Vitra Conference Pavilion, Tadao Ando

Figure 2.16 - Tate Modern Turbine Hall

As in the context of stage lighting design in dance choreographic works, lighting can also be shaped to illuminate patterns on the floor or walls of an architectural space to create pathways for movement to travel along. For example, in the Turbine Hall of the Tate Modern museum in London, the tall, thin rectangular windows on the west-facing façade project long rectangular pathways of light onto the floor in the middle of the space, giving spatial structure to an otherwise open area and guiding movement in the direction of their orientation (Figure 2.16). While photographing the space, photographer Alan Frost observed how "perhaps subconsciously [visitors] would walk along the 'light stripes' as if they were being guided to the door."[14] This visual element that adds definition to the space acts much like the upstage lane of light in Bill T. Jones's *Spent Days Out Yonder*, or the light box configurations in my own choreographic work *Between Thresholds*.

Another example of this concept of light projections is seen in the Jewish Museum in Berlin, designed by Daniel Libeskind (Figure 2.17). Here, voids in the museum's exterior wall create angular shapes of light on the walls and floor on the interior, contributing to the atmosphere of the space and creating a sense of movement along the path of the exhibition space.[15] Although these light projections do not create a literal pathway like the rectangular boxes seen in the Tate Modern Turbine Hall, they nevertheless serve to guide the movement of the users through the space by contributing to the sense of direction and motion within the room. In another area of the museum, the light coming through the voids in the ceiling helps give a sense of direction to the space in a more subtle manner, providing a visual cue that prompts a kinesthetic response.

The design of lighting in both a dance and architectural context plays a significant role in the experience of the work, not only crafting movement pathways but also the atmosphere of the space in which this movement takes place. Though light is a highly visual element, using techniques such as those described in this section can help create dynamic spaces that bring forward the kinesthetic experience, stimulating a kinesthetic response to the environments that are crafted through the lighting strategies used.

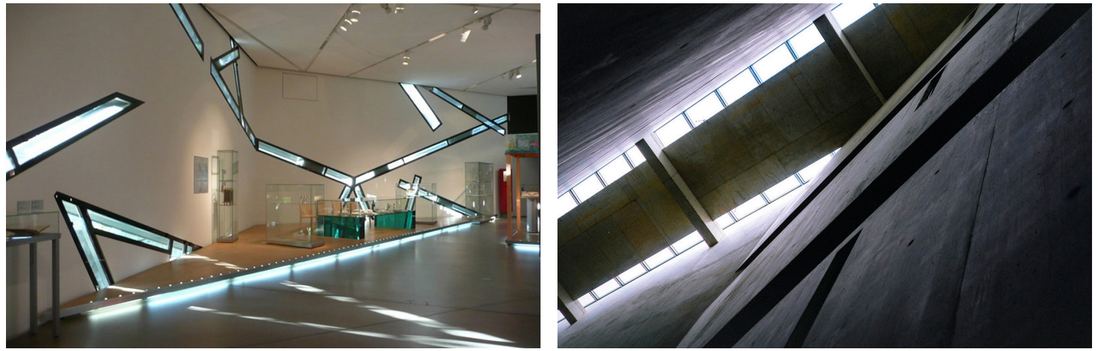


Figure 2.17 - Jewish Museum Berlin, Daniel Lieskind

IMPOSED GEOMETRY

In a choreographic setting, often choreographers work with a blank stage or open space as their canvas. Through the movement and relative spatial position of the dancers in the space, they create geometries within this space that are not otherwise physically or visually indicated. The dancers follow or are arranged in a pattern within the space, despite there being no tangible indication of that shape or pathway existing prior. The dancers themselves create the geometry with their movement and position in space. This can take many forms, but some standard geometries often used include diagonal lines from corner to corner, straight lines in the horizontal or vertical direction, or circles and arcs. These movement patterns can be used in isolation in their simplest form, but can also be arranged, overlapped, and reoriented to create more complex patterns. Beyond these standard geometries, more organic pathways can emerge as well and be imposed onto the space, giving the dancers a pathway as if following a map through the open space.

An example of this idea is the work of postmodern choreographer Lucinda Childs, who often uses drawn movement trajectories as scores for her choreographic works. A primary example of this is her work *Melody Excerpt*, which is performed by five dancers and consists of 158 movement phrases, each one 10 counts in length. For each phrase, the dancers individually follow one of four possible movement trajectories: a straight line, an arc, a looping return line that doubles back on its path, or remaining in place. These pathways are overlaid on an imaginary grid that is imposed onto the stage, and there are twenty possible points on this grid at which the dancers' trajectories can initiate or terminate. As the work progresses, the overlapping configurations of these pathways become increasingly complex.[16] The bodily movements of the dancers are kept simple and repetitive, so that the attention can be primarily focused on their trajectories through space. Figure 2.18 depicts the trajectories of one movement phrase, with each dancer's trajectory represented by a single arrow, each in their own color. At the start of the line is a letter L or R indicating whether the dancer is

executing the phrase beginning with the left or right side, and the ending point of their trajectory is indicated by the arrowhead. In this work, the geometry of the grid and movement trajectories are not physically or visually represented in the space or on the stage in any way, but the dancers follow these imposed pathways and in doing so create a sense of the geometries used to construct the work through their movement.

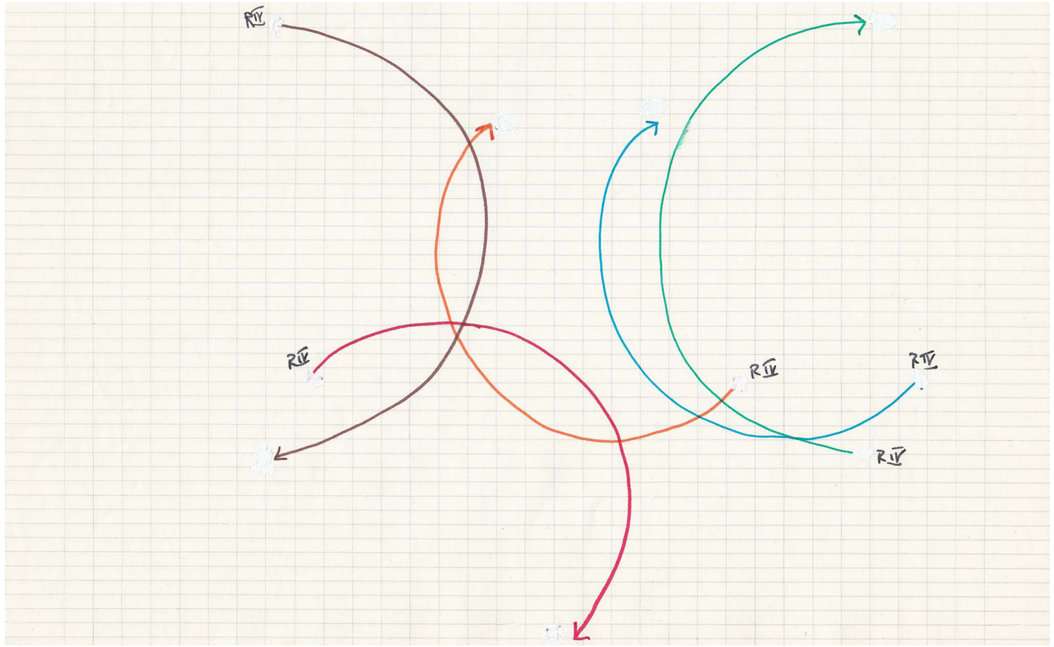


Figure 2.18 - score for "Melody Excerpt," Lucinda Childs

At the smaller scale of bodily movements, the geometric relationships within the body, as well as relative to the surrounding space, are extremely influential in the formation of movements and shapes created by the dancer's body. Postmodern dancer and choreographer William Forsythe created an educational CD-ROM tool known as "Improvisation Technologies" meant to assist in the communication of choreographic principles based on geometric relationships. In this program, Forsythe describes various ways that geometries appear and can be used in the movement of the body, describing techniques of creating or analyzing movement based on geometries and spatial relationships. As demonstrated in Figure 2.19, some of these concepts include: constructing lines with body parts or between points within the body (A); rotating or reorienting shapes and lines in space; the movement of a shape relative to the rest of the body or relative to the space around the dancer; geometries existing either within the body or existing in the space around the dancer to be interacted with (B); using body parts to draw lines and shapes in the space around the dancer (C); creating isometries of shape or of movement within space or in different parts of the body; and forming volumes in the three-dimensional space of the body's spatial relationships (D). These concepts are presented as strategies for creating movement, exploring the geometric possibilities of the human body and how the body relates to its immediate surrounding space.[17]

In my choreographic work *Between Thresholds*, I employ some of these strategies to create movement pathways and spatial relationships over the course of the work. One example is in the opening of the piece: each dancer has their own choreographic phrase that they use to travel across the space, starting from the diagonals and then moving to horizontal lines across the stage. As this section of the piece progresses, the intervals between each dancer's crossing become increasingly smaller, so that the movements and pathways begin to overlap more as the piece continues. The orientation of their movement also shifts from forward facing to side facing, so that as their movement repeats it is altered slightly in its direction and relationship with the other dancers. The goal of this section at the opening of the piece is to establish these standard geometries of diagonals and straight lines, so that the audience has them as context for when they are later shifted and disrupted to create less conventional patterns of movement in the latter half of the work. Figure 2.20 depicts a diagram of this section of the work, in the style of Lucinda Childs' movement scores.

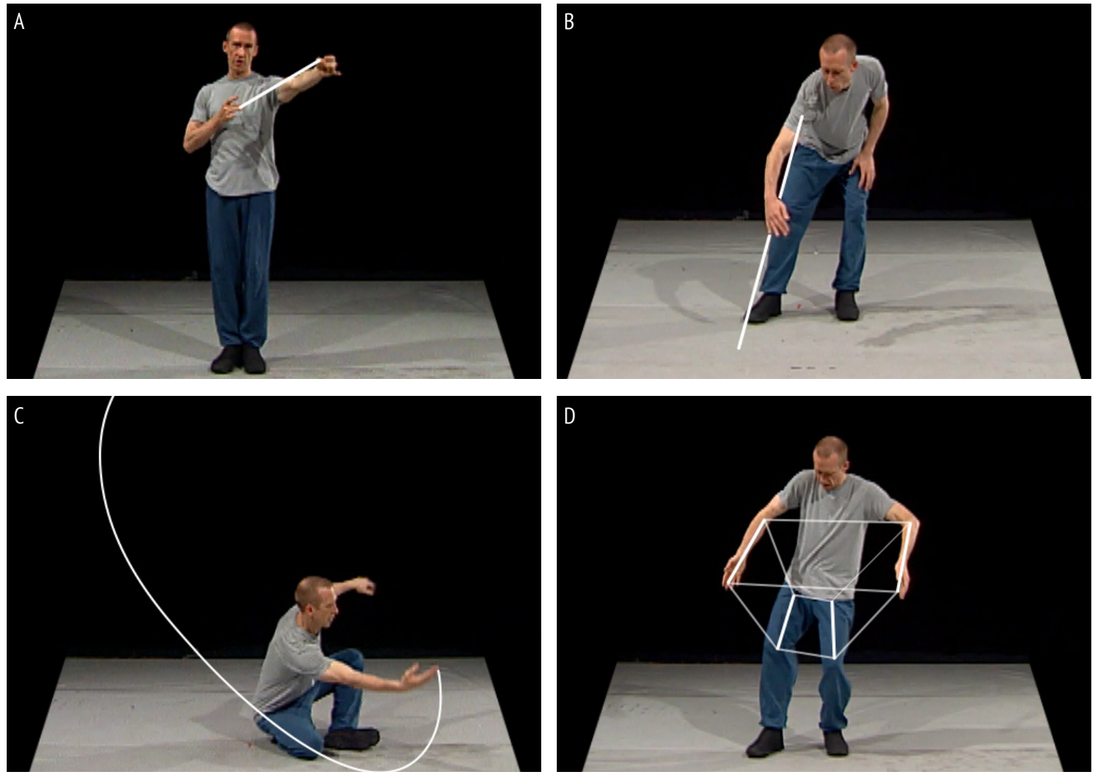


Figure 2.19 - William Forsythe's Improvisation Technologies

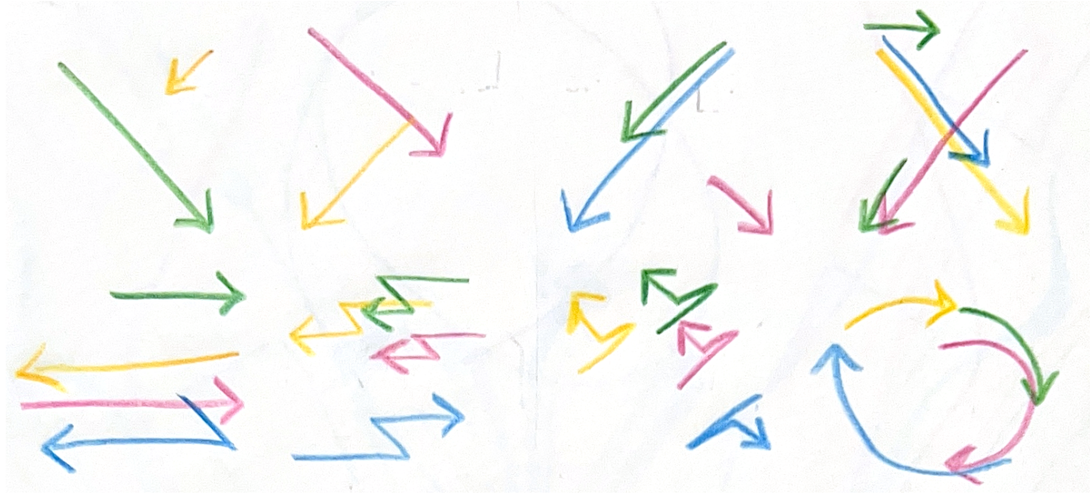


Figure 2.20 - diagram of "Between Thresholds," Meghan MacBeath

When translating this idea into an architectural context, the imposed geometries must become more explicit, since the users of the space are not given instructions in the way that the dancers are directed by their choreographer. These geometries can be indicated in various ways, whether it be physical forms or visual indications that stimulate a kinesthetic response to move along the desired pathway. In a broad sense, often the geometries of the physical built structures in an architectural space are reflected in the circulation of movement through the space — for example, a round building is likely to have a circular circulation pattern.[18] The materiality of the architecture can also be an indication of movement, imposing patterns on the floor, walls, or ceiling to encourage movement along a particular pathway within the space.

The Solomon R. Guggenheim Museum in New York City designed by Frank Lloyd Wright (Figure 2.21) is a prominent example of the geometric form of a building directly relating to its circulation pattern. The museum is laid out as a spiral ramp with an open atrium at the center. The intention is for users to view the artwork on display as a progression as they travel along the continuous spiral.[19] The geometry of the building directly determines the pathway that is taken through space — or alternatively, the circulation pathway directly determines the building's geometry. This simple spiral geometry determines how the users interact with and experience the space kinesthetically, moving along a continuous curve and constantly shifting their orientation within the space, both in plan and elevation.

Similar to the overlapping geometries of Lucinda Childs's movement trajectories, simple geometric shapes or configurations can be overlapped and intersected to create more complex forms and movement pathways in architectural spaces. Returning to the example of Tadao Ando's Vitra Conference Pavilion, the floorplan shows the combination of geometries that makes up the overall form of the building (Figure 2.22). The main form is composed of intersecting rectangular spaces, with a central circular space superimposed. The entrance walkway also adds to this geometric complexity, with a sharp line that turns at a right angle to approach the building. These geometries likewise determine the circulation of movement through the space, with the flow of movement following the structure of the intersecting geometries.[20]

Figure 2.21 - Solomon R. Guggenheim Museum New York, Frank Lloyd Wright

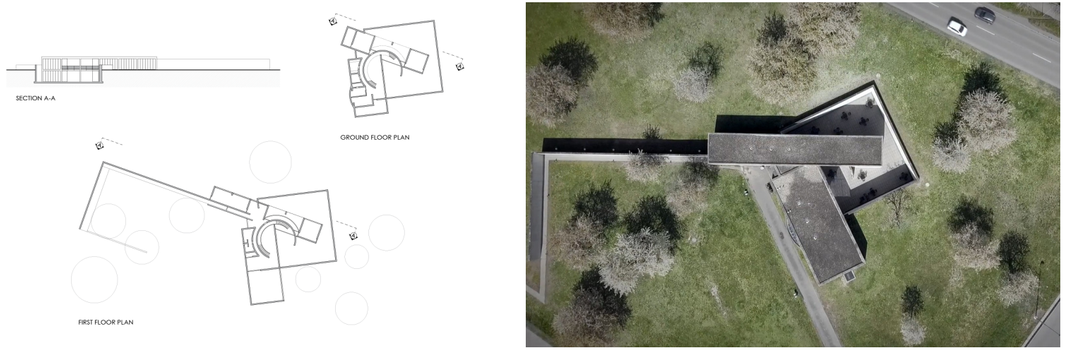


Figure 2.22 - Vitra Conference Pavilion, Tadao Ando

Another example of imposed geometry in an architectural context is Grace Farms in New Canaan, Connecticut, designed by SANAA and Handel Architects. This cultural and community center consists of two buildings: the original barn, which was renovated to include classrooms, an art studio, a rehearsal space, and a lecture hall, and the building known colloquially as The River, which includes an indoor amphitheater, library, community dining space, and multi-purpose recreational space. The River is nicknamed such due to its flowing curvilinear form which spills down the gentle slope of the landscape, "pooling" into five pond-like volumes for the main programmatic elements (Figure 2.23 - 2.24). The goal of the design was to complement the landscape with the building's form, while also providing the users with an immersive experience of the surrounding environment.[21] The design takes the organic geometry of a river and imposes it onto the landscape, creating an undulating pathway that would not have otherwise existed on the site but which is still responsive to the site and its topography. The glass walls direct the users' attention out toward the landscape, and the meandering pathway provides variation in the direction and orientation of movement such that the user feels fully immersed in the surrounding environment.

Figure 2.23 - Grace Farms, SANAA and Handel Architects

Figure 2.24 - Grace Farms, SANAA and Handel Architects

Furthermore, geometry can be imposed in space through the use of materials to draw pathways of movement. In the Peabody Essex Museum designed by Safdie Architects, one transition area of the museum uses a contrast in the coloring of the floor tiles to draw a pathway on the floor and direct the users around the corner to the door that leads to the outdoor Museum Garden. This quite literal pathway guides movement in an obvious way, which then upon entering the garden space transitions into the geometry of the outdoor space, switching between a continuation of the imposed pathway from the interior and the defining boundaries of the space itself (Figure 2.25). In this example, the materiality is used to visually create a pathway of movement, as well as at moments create a physical boundary to confine the movement within a specific space.

Intentionally shaping the geometry of pathways of movement can create a kinesthetically stimulating experience within a space, guiding the users' spatial relationships to their surroundings, their orientation in space, and the trajectory of their movement. Strategies of imposing geometries can be used to invite movement through open spaces and provide opportunities for users to interact with their surroundings as they move along these pathways.

Figure 2.25 - Peabody Essex Museum, Safdie Architects

THE MOVEMENT OF OTHER PEOPLE

Following the movement of other people who are also moving in the space can influence the pathways that movement takes. In the context of postmodern choreography, this can mean both the pathways of movement through space or across the stage, as well as the bodily movements of the dancers. In terms of the smaller scale bodily movements, it is a common practice of group improvisation to be aware of the other dancers' movements and to "borrow" some of their movements or qualities in your own dancing. In a common improvisation exercise known as flocking, the dancers are arranged in a group all facing the same direction. Whoever is spatially at the front of the group is the leader, and all the other dancers mimic their movements. Whenever the movement shifts the dancers' orientation in space, whoever is now spatially in front becomes the new leader. In this case, bodily movement and orientation is directed by the movements of other people.[22]

On a larger scale, a dancer's position and movement through space can be influenced by that of the other dancers, as seen within postmodern choreographer Trisha Brown's work *Set and Reset*. In one section of the work, the dancers all begin in a straight line spanning from upstage to downstage. The dancers then move in and out of the line, their departure and arrival influencing and influenced by each other such that a fluid scattering through space emerges while the structure of the line continues to be maintained (Figure 2.26). As this section of the work progresses, the orientation of the line rotates in space, but still the constant, fluid arrival and departure is kept.[23] In this example, the dancers' movement into and out of the line is influenced by the movement of the other dancers, all of which are responding to one another in a reciprocal manner.

The movement of other people can also direct pathways through the literal moving of other dancers through space via physical interactions between dancers. The push, pull, or lifting of another dancer can be used

Figure 2.26 - "Set and Reset," Trisha Brown

to redirect their pathway or encourage them along their current trajectory. Often these interactions are reciprocal in that both dancers involved contribute to some extent to the movement of the other, and both are affected by the interaction in their resulting movement afterwards. An example of this physical relationship between dancers is Trisha Brown's work *L'Amour au théâtre*. Composed of a cast of eight dancers who are continually changing in their combinations and partnerings throughout the work, this piece includes many lifts and counterbalance relationships, such that there is hardly a moment where no dancer is in contact with another.[24] In these partnerings, the dancers' movements are often defined or influenced by one another, and their movement through space is also impacted by the movements of the other dancers with whom they are interacting. Projected on the screen behind the dancers is a drawing by Brown herself, a series of abstract lines that are reminiscent of the movement being performed by the dancers (Figure 2.27).[25] Here, the movement of the other dancers in space is a key determinant of the spatial pathways and bodily movements of the dancers in the work.

In my choreographic process for *Between Thresholds*, I explored how the movement of the dancers in the work impacted one another in different ways. In one improvisational exercise, each dancer took turns being the leader, moving around the space in any pathway they chose and improvising their own bodily movements. Meanwhile, the other dancers followed their trajectory in space and mimicked their bodily movements — much like the flocking exercise described above but with the added element of following the larger scale

Figure 2.27 - "L'Amour au théâtre," Trisha Brown

pathway through space as well. At any point, the leader could decide to stop; then whoever was second in line became the new leader. This exercise explored how the movement of the dancers was influenced by each other through imitation. This improvisational exercise became a part of the choreography of the work, which was kept as an improvisational score in the performance in order to allow the dancers to be truly influenced by one another in their movements. Figure 2.28 depicts a diagram of the dancers' movement pathways in this section, indicating the transitions of which dancer is leading through different colors and line types.

There are also moments in *Between Thresholds* of physical interaction between dancers that serve to assist or redirect each other's movement pathways. In one section of the work, described previously as involving a strong light source directed along the diagonal from the downstage left corner, the movement of the dancers along this pathway is influenced not only by the light source but also by each other. The dancers move back and forth along this diagonal pathway at staggered intervals, and as they pass each other they interact in various partnerships, sometimes furthering one another's progress along their current trajectory and at other times redirecting their momentum to turn their pathway back towards the direction from which they came. This section of the work explores the way that physical interactions between dancers can impact their movements at the larger scale of trajectories through space and at the smaller scale of their individual bodily movements.

Figure 2.28 - diagram for "Between Thresholds," Meghan MacBeath

Figure 2.29 - "Between Thresholds," Meghan MacBeath

Figure 2.30 - "Between Thresholds," Meghan MacBeath

In an architectural context, the movement of other people within a space can influence movement pathways based on the nature of the space available and the density of people within the space. As illustrated in Figure 2.31, the amount of space that is available to be occupied impacts the way that people will move within the space relative to one another. This is also influenced by the activity or function of the space — in this example, people mingling in a lobby space will move between and around each other, leaving more space between pairings and groups of people; once the doors are opened, the movement of people towards the narrow opening will congregate into a closer crowd.[26]

Additionally, there is often a tendency for people to follow the movement of other people or join in with a passing crowd. Usually, people will follow the pathway of the majority; or, if diverging off of an established path, will be more likely to do so if someone else already has. In a 2022 study by researchers at Brown University, participants wearing virtual reality headsets were asked to walk with a crowd of people in the virtual space while the researchers tracked their movement patterns. The study demonstrated the idea of human flocking, much like the dance improvisation exercise described previously — people tended to match the average direction and speed of the crowd based on their proximity and field of vision.[27] When encountering an established movement pattern, people tend to follow the pathway that is already in motion according to the movement of others around them.

This concept is important to the design of architectural spaces when considering the intersection of pathways of movement in a space. An example of this is the redesign of the lobby of the Guggenheim Museum Bilbao in Spain by Local Projects and Partners (Figure 2.32). The number of visitors coming to the museum is much larger now than when the museum first opened in 1997, and there has also been an increase in online ticket sales in recent years. The flow of visitors in the lobby space was redesigned to avoid confusion and congestion concerning the different directions of movement pathways in the space, separating the access pathway of those with online tickets from those purchasing general admission tickets on-site.[28] In this scenario, the congestion of people in the lobby was alleviated by the splitting of overlapping movement pathways, as well as the opening up of more available space for this movement to occur with a higher density of people.

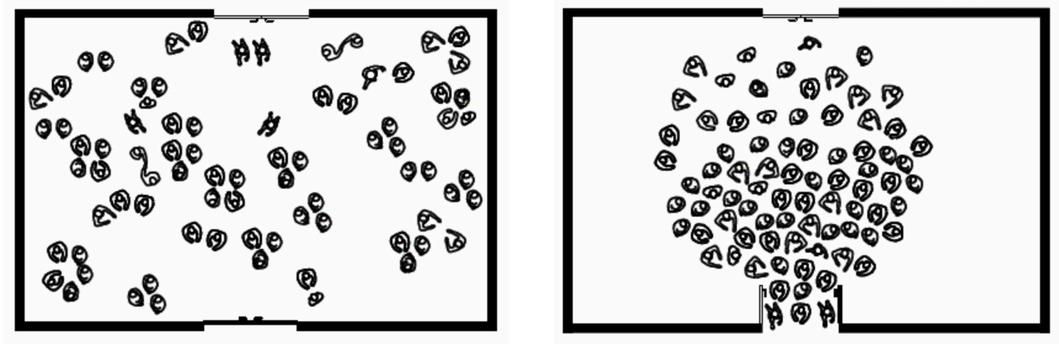


Figure 2.31 - crowd movement diagrams, Bert Bielefeld

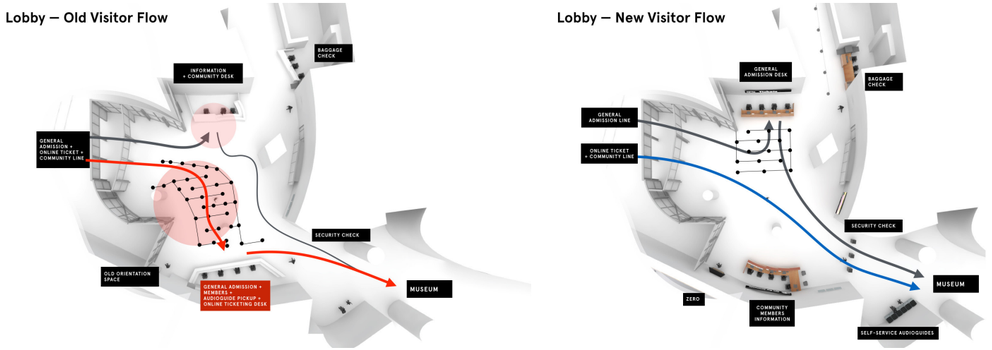


Figure 2.32 - redesign of Guggenheim Museum Bilbao lobby, Local Projects and Partners

Figure 2.33 - Trondheim Central Station, Arkitema

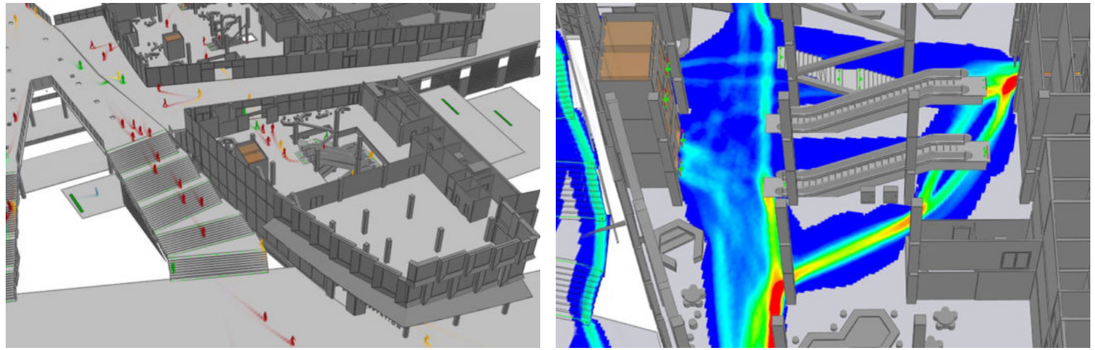


Figure 2.34 - Oasys MassMotion pedestrian flow analysis for Trondheim Central Station

Another example of this concept at work can be seen in Arkitema's design for Trondheim Central Station in Norway (Figure 2.33). This transportation hub is at the intersection of pedestrians, cyclists, buses, trains, boats, and cars; with all of these movement pathways intersecting and overlapping at once, it was important to organize the movement through the space in an efficient and intuitive manner. This project is still underway, and the designers are also dedicated to not disrupting the flow of train services at the current station while this new hub is being built.[29] In order to help achieve all of this, the firm used a pedestrian simulator software called Oasys MassMotion to analyze and predict the movement of people through the space. The software was used to measure crowd capacity and to project for the future based on forecasted pedestrian flow pattern data and the existing arrival and departure schedules of the various forms of transportation. The software produced graphical and video-based visualizations of crowd density and flow patterns throughout time (Figure 2.34). The architects were able to use this resulting data and movement analysis to make revisions that optimize the flow of movement within the station.[30] With this project, the movement pathways within the space were influenced by the density of the movement of people within the space as well as the interaction of the various intersecting pathways of movement.

In designing for the movement of other people, it is not always possible to predict exactly how users will interact with a space. However, considering the potential interactions between the different users can help craft movement pathways based on the movement of the other people in the space.

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03

REPRESENTING MOVEMENT IN DRAWINGS & DIAGRAMS

REPRESENTING MOVEMENT IN DRAWINGS & DIAGRAMS

Drawing and visualizing concepts and forms is a significant aspect of the architectural design process, therefore it is helpful for a movement-centered design approach to incorporate visual representations of movement pathways and bodily actions. Movement inherently requires the passage of time, whether this be for an extended period or just a short moment; however, drawings and diagrams are static mediums. Many designers and artists have attempted to address the dilemma of representing dynamic movement in a still image or snapshot. Understanding some of these strategies can help with visualizing movement to inform a movement-centered design process.

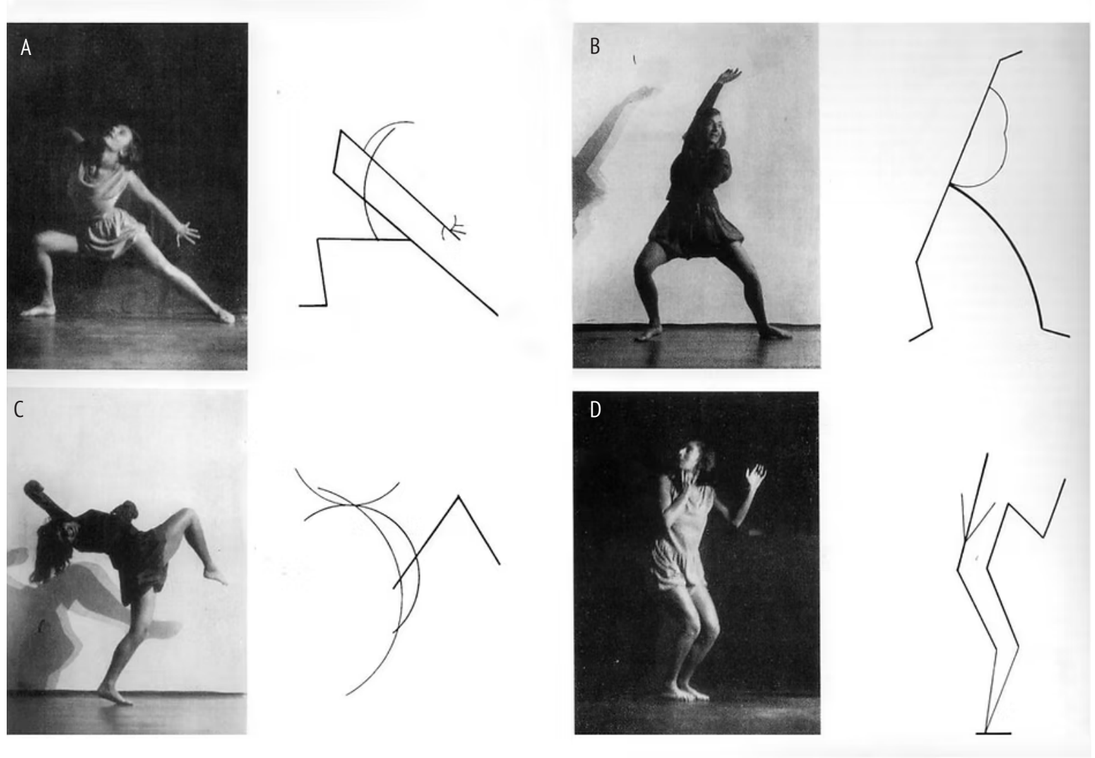


Figure 3.1 - "Dance Curves," Wassily Kandinsky

ARTISTIC DEPICTIONS OF MOTION

Visual artist Wassily Kandinsky, known for his abstract paintings featuring compositions of geometric shapes and colors, created a series of abstract drawings in tandem with his essay "Dance Curves" based on the movement of modern dancer Gret Palucca (Figure 3.1). Beginning with four photographs taken of Palucca by Charlotte Rudolph, Kandinsky created abstractions of her body's structure and implied movement, using combinations of straight lines and arcs. When viewed separately from the reference photographs, the drawings are not necessarily recognizable as depictions of the human body, but the compositions of the lines imply movement, tension, and direction.[1] The four drawings, and the four photographs from which they are derived, vary in the solidity or fluidity of the movements represented: for example, representation (C) appears to be caught mid-movement, while representation (D) appears to be a solid position that the dancer could remain in for a sustained period of time. In these abstract depictions, Kandinsky uses angular lines to indicate more static structures and shapes in the body, while using curves to represent dynamic elements within the movements that are depicted. In his treatise *Point and Line to Plane*, he posits that a line is the trail left by a point in motion, and a curve is a straight line in motion.[2] These concepts can be seen in the series of drawings in "Dance Curves," in that when the photographs of Palucca's movements are viewed as a progression from more static to more dynamic, Kandinsky's responsive drawings contain more curved geometries.

Kandinsky's "Dance Curves" is an example of bodily movement represented visually through the abstraction of the body's shapes and structure in space. The drawings depict the contrast and relationship between the static and dynamic elements within the body in the four different movements that are abstracted. The composition of geometric elements as well as Kandinsky's use of line weight help to indicate the direction and orientation of movement in space. However, while some of the drawings imply the three-dimensional nature of the dancer's body, the abstraction of the body's lines at times leads to a flattening of the movement

into a two-dimensional plane — for example, drawing (B) appears to be a very two-dimensional drawing with a few simple lines, not indicating much depth, while the photograph it is based on demonstrates more three-dimensionality in Palucca's movement in regards to the rotation in her torso and the angle of the bend in her legs in three-dimensional space. In addition, the intermediary step of photography in Kandinsky's process distances the drawings from the live movement of the body in space. Kandinsky himself critiqued the use of photography as a way of representing the movement of dance, claiming that its way of freezing movement in a stiff form gives a limited perspective of the nature of the movement.[3]

One response to this common notion of photography as an isolating method of the depiction of movement is the method known as chronophotography. Invented by Étienne-Jules Marey, this technique uses a sequence of successive images taken at close, regular intervals to depict the motion of the subject over time. These images can be overlaid to visualize the progression of movement through space and time in regards to the subject relative to the camera or viewer (Figure 3.2). Marey's development of this technique was primarily focused on the scientific study of animal movement, but was also applied to human movement, and this method became the predecessor of moving film cinematography.[4] In addition to the superimposition of images in sequence, Marey also created geometric chronophotographs that derived an abstract geometric analysis of movement from the series of photographs. These diagrams depict the sequential movement of the body's structure through time and space, focusing on motion at certain major joints and the rhythm of the body's movement.

This method of chronophotography attempts to address the element of time in the dilemma of representing movement in a static, two-dimensional depiction. The overlay of images gives a sense of where the subject came from and is going in relation to a particular moment along its path, and the close succession of images in sequence helps capture the small details of bodily movements along the way. However, the method is limited to a two-dimensional plane of movement. The subject's motion can only be captured when oriented parallel to the plane of the camera's position, and can only move in a straight line along this plane in one direction.

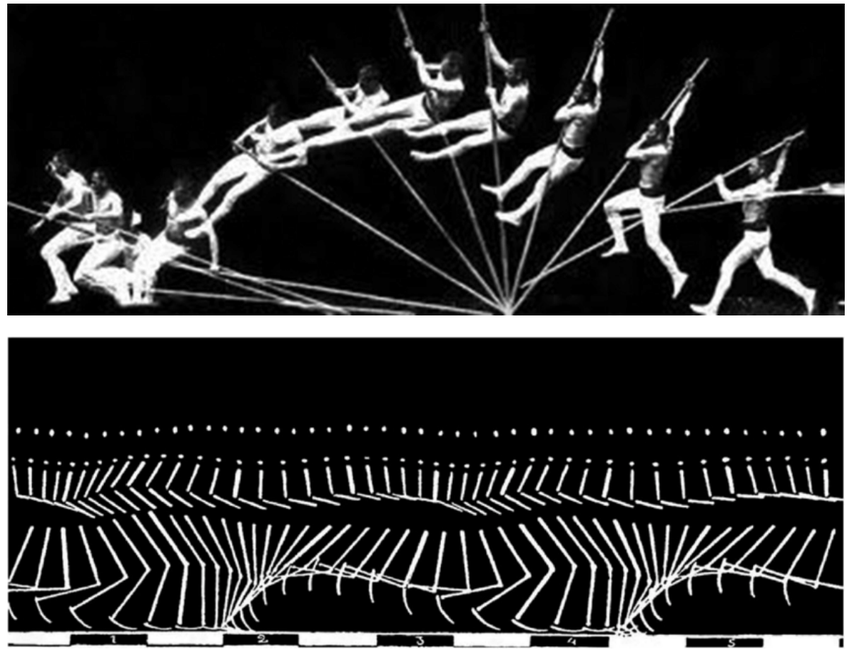


Figure 3.2 - Chronophotographs by Étienne-Jules Marey

These examples of artistic depictions of movement attempt to use abstraction as a way of representing the structure of the human body as well as its motion through space, and while both methods capture the individual geometries of the body and smaller bodily movements, they do not represent movement patterns taken through space at a larger scale.

DIAGRAMMING DANCE

Dance as a transient art form has often faced the dilemma of how to best be recorded or archived. Since the invention of the camera, filming and photographing dance works has become a common method of documentation, but before this choreographers used different methods of writing or diagramming movements to record their works — and many still do today. In the early 20th century, Rudolf von Laban developed a method of notating dance choreography known as Labanotation. As a choreographer and movement theorist, Laban noticed a lack of terminology and written theory in contemporary dance and set out to standardize a method of analyzing and recording movement that could be applied to any form of dance. In his analysis of the movement potentials of the human body, he coined the term "kinesphere," referring to the 3-dimensional space within reach immediately surrounding the body, and he experimented with how the body's movements could be mapped within crystalline forms constructed based on movements between positions in this kinesphere (Figure 3.3).[5] Drawing from this concept, Laban developed a movement notation method which uses shapes, symbols, and hatches written on a staff to indicate the bodily movement of the dancers in relation to spatial orientation, level, direction of movement, location in the body that the movement occurs, and the timing and duration of the movement or stillness; it can also be accompanied by a map of the dancer's movement pathway through space (Figures 3.4 - 3.5). Labanotation is both archival and compositional — it was developed as a way to record choreography so that it could endure past the moment of performance, but also as a means of generating movement as a part of the choreographic process.[6]

While Labanotation is a quite comprehensive method for notating dance, it is also fairly complex to use and learn, and therefore is no longer the most widespread strategy for recording dance works. However, many choreographers still use diagrams for themselves or for their dancers as a part of the process of creating and learning movement. For example, postmodern choreographer Lucinda Childs often uses diagrams

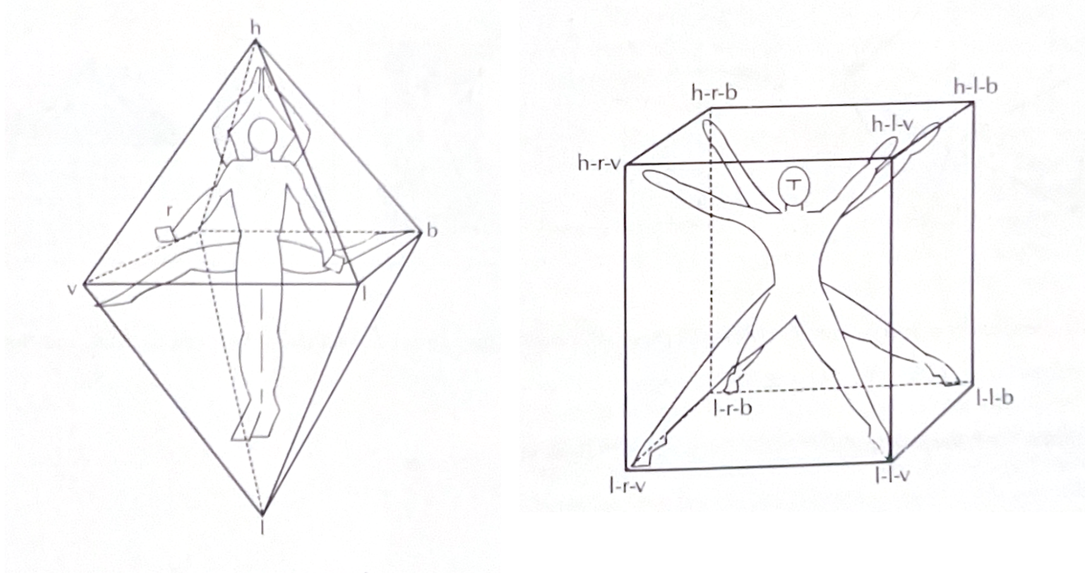


Figure 3.3 - Diagrams of the body's kinesphere within crystalline forms

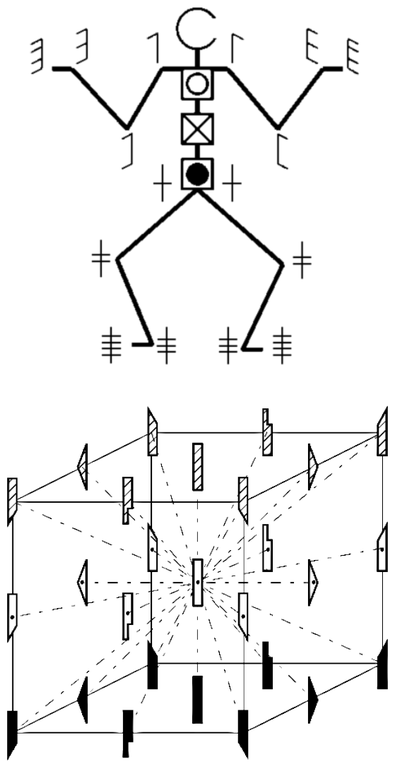


Figure 3.4 - Labanotation diagram keys

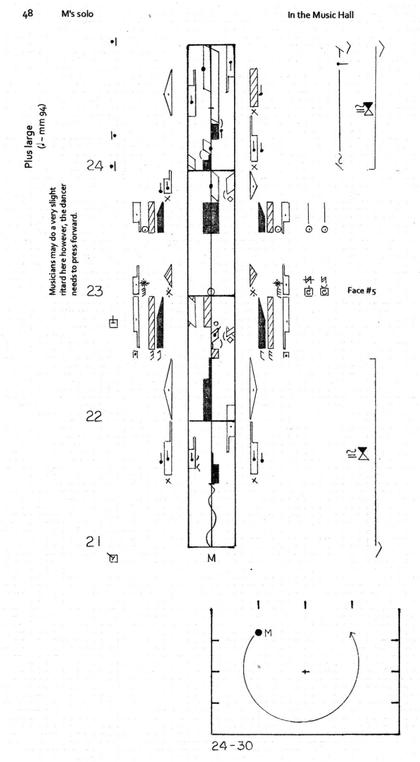


Figure 3.5 - Labanotation staff of "Septet," Merce Cunningham

and drawings to visually represent and analyze the movement trajectories taken by the dancers throughout the piece. In her work *Melody Excerpt*, diagrammed movement pathways are used as the score for the piece, both for Childs herself to plan and visualize the work and for the dancers themselves to reference when learning and practicing the choreography. The lines indicate the start and end points of the dancers' trajectory of movement, with a different color used for each dancer. These trajectories are broken up into separate diagrams for each 10-count movement progression. A large-scale drawing lays out each of these trajectory groupings in a grid, giving an overview of the entire work (Figure 3.7), while individual diagrams of each phrase are drawn separately at a more detailed scale, indicating start and end points and movement pathways through space (Figure 3.6).[7] This diagramming strategy addresses the element of time by breaking up the overall pathways of the dancers through space into consistent units or modules.

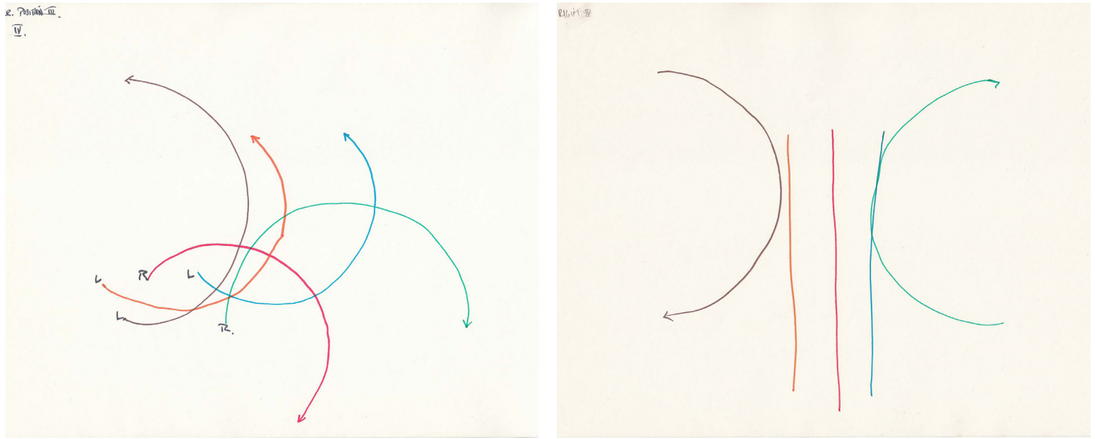


Figure 3.6 - scores for "Melody Excerpt," Lucinda Childs

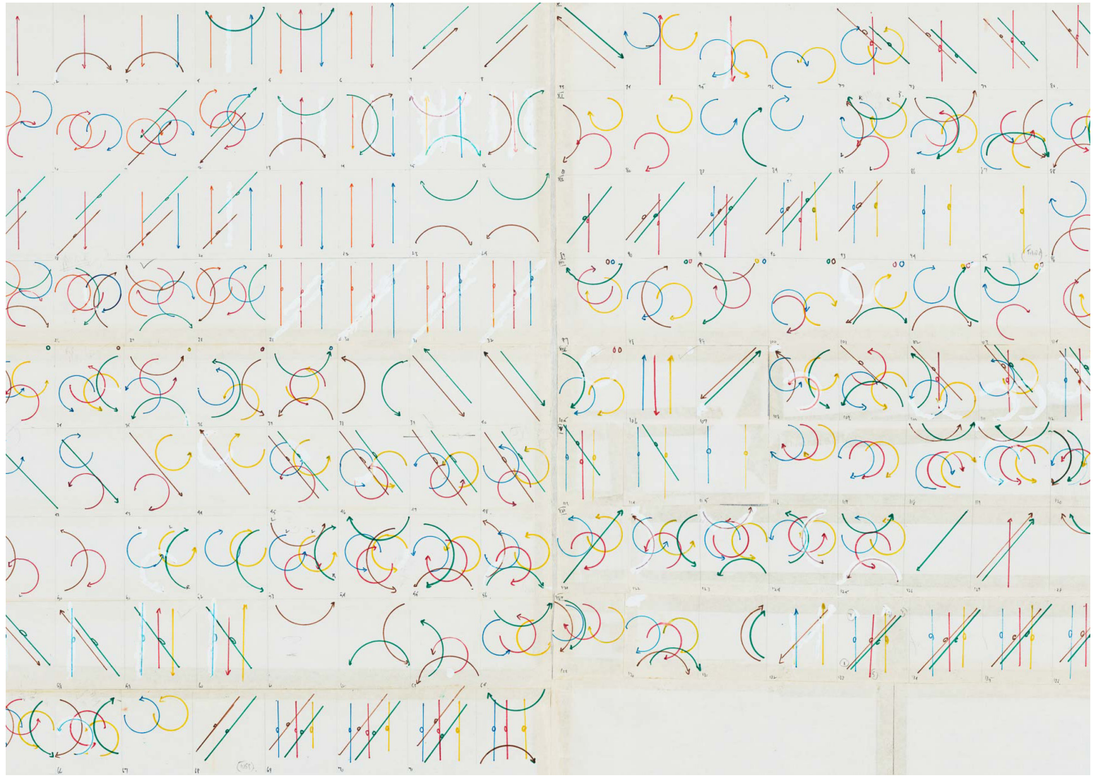


Figure 3.7 - score for "Melody Excerpt," Lucinda Childs

Trisha Brown also often used drawings as a part of her choreographic process in various ways. Her sketches demonstrate a systematic approach to designing movement based on line, gesture, and geometry. For example, in her work *Locus*, Brown used diagrams of the geometric possibilities of the human body mapped onto the points of an imaginary cube to create movement, a concept inspired by Laban's analysis of the body's kinesphere. Figure 3.8 depicts the drawings she made when conducting her analysis of the body's geometric movement possibilities, which she then inscribed into a cube as shown in Figure 3.9. She then assigned a letter of the alphabet to different points within the cube, and spelled out words to create movements that shifted between these points. This is one instance in which Brown used diagrammatic methods to visually represent her movement concepts, and as a compositional tool.[8] Another example of Trisha Brown's use of sketches in her choreographic process is from her work *Pyramid*, as seen in Figure 3.10. This diagram takes a more abstract approach, representing the overall rise and fall of the piece rather than a literal geometric representation or analysis. The piece is an accumulation of 30 movements, each adding on to the end of the sequence and then one by one dropping off from the beginning. Her diagrams represent this accumulation and decumulation through shading within a numerical grid.[9]

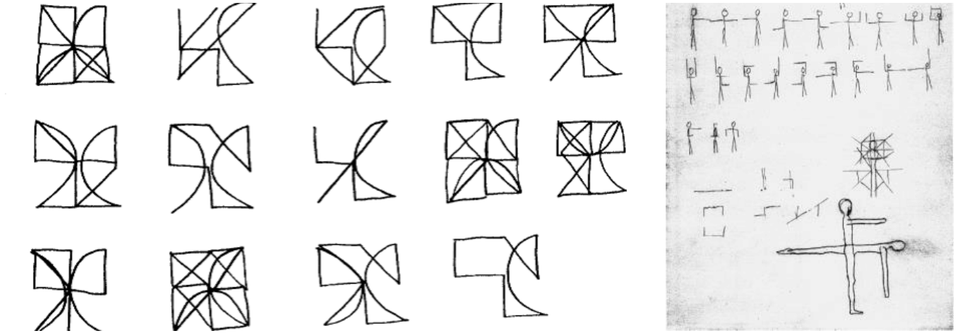


Figure 3.8 - Trisha Brown's sketches for her work "Locus"

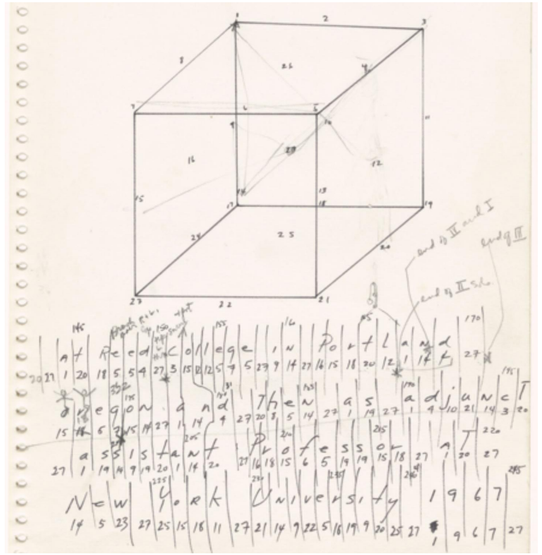


Figure 3.9 - Trisha Brown's sketch for her work "Locus"

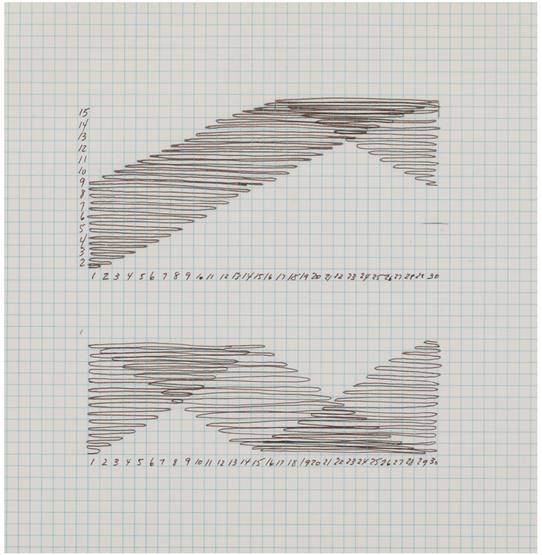


Figure 3.10 - Trisha Brown's sketch for her work "Pyramid"

In my own choreographic process for my work *Between Thresholds*, I used drawings and diagrams as a way of planning movement and as a documentation and spatial analysis of the work. In one exercise about halfway through the process, each dancer was instructed to draw the pathway of their movement through the piece up to that point from start to finish, indicating the time spent onstage or seen by the audience with a solid line and the time spent out of sight with a dashed or dotted line. Some chose to color code their drawings according to different sections of the piece, or add notes at key moments (Figure 3.11). The dancers then redrew these diagrams overlaid on top of one another, with each dancer's line a different consistent color, indicating prolonged moments of stillness with a solid point (Figure 3.12). This was used as a spatial analysis of the work to visualize the distribution and concentration of movement through the space. We then repeated this activity at the end of the process when the choreography was finished, as a complete picture of the pathways taken over the course of the work as a whole.

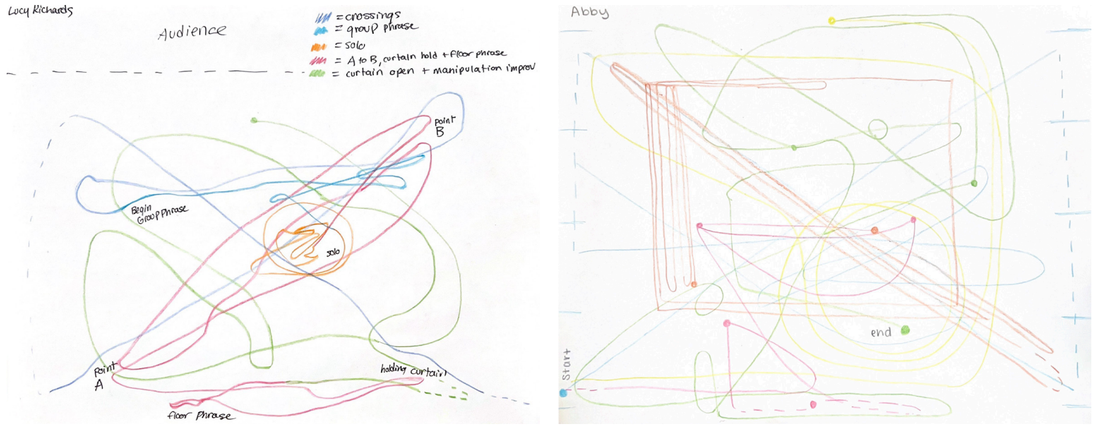


Figure 3.11 - pathway drawings for "Between Thresholds"

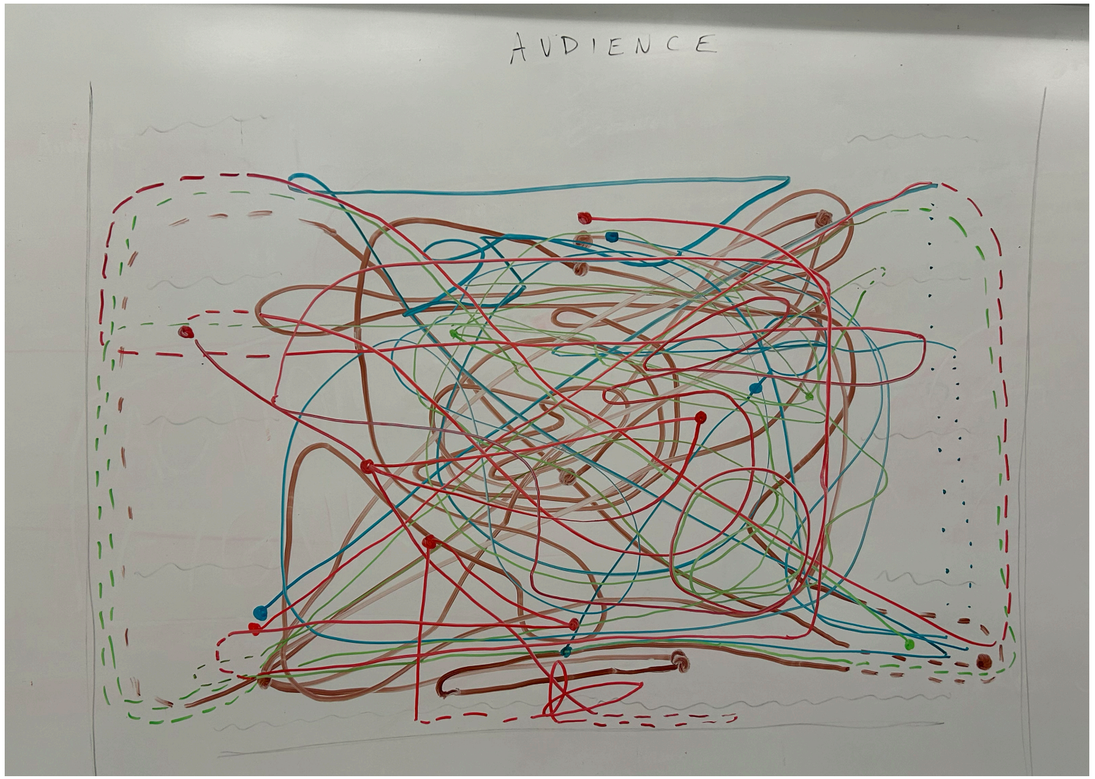


Figure 3.12 - overlaid pathway drawings for "Between Thresholds"

Throughout the process, I also drew diagrams for my own use when creating and teaching choreography. Figure 3.13 shows my diagram indicating the timing of the opening section of the piece, where each dancer has their own individual crossing phrase that they repeat at staggered intervals, with the overlap between crossings becoming increasingly more dense. This diagram was an attempt to represent both time and space side by side, and how the trajectory and timing of each dancer interacted with one another.

Figure 3.14 shows my diagram for the section of the piece in which a solo dancer is moving within a circle of light that is progressively getting smaller. The diagram indicates the concentric circles, becoming smaller in diameter as time progresses, and the pathway of the dancer as it spirals in, not following a circular path but existing within the confines of the circle as it shrinks. The diagram utilizes simple stick figures to call out moments where the dancer reaches the edge of the light and "bounces" in another direction. A version of this diagram was used to help communicate to the dancer the concept behind the solo, since she was not able to practice with the lighting until shortly before the performance.

Figure 3.15 depicts a series of diagrams for another section of the work developed from an exercise done in rehearsal early in the process. Dancers selected at random a "point A" and a "point B" within the space of the studio theater, then traveled between their two points, at first following the most direct path possible to their destination. We then randomly placed objects around the space, then the dancers again traveled between their point A and point B, but this time modifying their pathways to avoid the obstacles in their way. In the context of the piece, the dancers follow the altered pathway as if the physical obstacles were in the space even though they no longer are. The third diagram in the series indicates points along these pathways where dancers synchronize their movements, as they are dancing in duets with similar movements arranged in a different order. This diagram helped me to see the spatial and temporal relationships between dancers' movements in these duets and along these pathways.

Figure 3.16 shows my notebook sketches when orchestrating the movement of the curtains in the middle section of the work. Here, I selected a few of the ideas we had worked with together in rehearsal about how

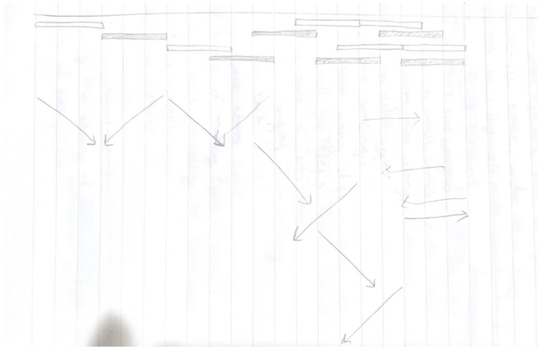


Figure 3.13 - “Between Thresholds” planning diagram

Figure 3.14 - “Between Thresholds” planning diagram

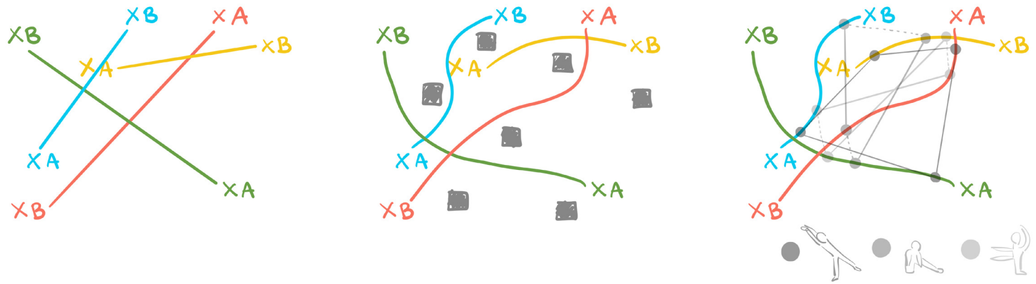


Figure 3.15 - “Between Thresholds” spatial analysis diagrams

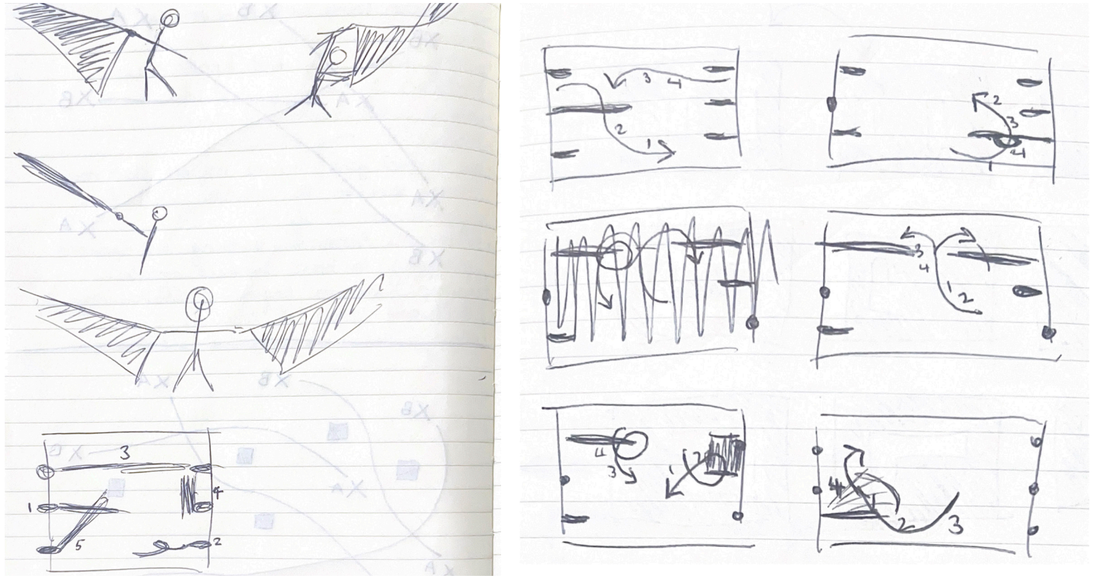


Figure 3.16 - “Between Thresholds” planning sketches

we could move and shape the curtains in the studio theater in various ways, breaking the structure of the typical theater setup by pulling the curtains first further into and then out of the space. I then took these selections and ordered them into a sequence, the progression of which came from a desire for the dancers to move around a large portion of the stage within this section of the work, as well as the practical element of giving time for the people moving the curtains to move from one to the next while having the sequence overlap temporally. The pathway of the dancers was then created based on the timing and spacing of the curtain sequence.

Throughout this choreographic process, I created more visual diagrams of the work than I typically do when choreographing, which made me think more clearly and intentionally about spatial relationships. I also found it interesting to think about one dancer's trajectory over the course of the work, and what that can demonstrate about what their role is throughout the piece, as well as how their movement relates to the overall space of the theater throughout the work. Most of these sketches — other than the diagrams that the dancers were directly involved in creating — were for myself to visualize spatial relationships and pathways and to remember sequences in order to teach them in rehearsal, but at times I showed them to the dancers as well to help them visualize what was happening from a bigger picture perspective.

REPRESENTING MOVEMENT IN ARCHITECTURE

The most standard way that architects represent movement in drawings is through the circulation diagram. These diagrams indicate the movement pathway that is meant to be taken through space, typically indicated by a solid or dashed line and often including arrowheads to indicate the direction of movement.[10] Sometimes these diagrams are drawn in an axonometric view, especially if the design includes multiple levels in order to show the circulation between levels as well as within each one. The example of the Mercedes-Benz Museum designed by UN Studio demonstrates a circulation diagram that encapsulates the central concept of the design (Figure 3.17 - 3.18). Built in 2006 in Stuttgart, Germany, the structure is based on a trefoil of three overlapping circles, consisting of twists and spirals arranged around a central atrium. The curves and slopes of the building's form are reminiscent of the looping roads of the Mercedes-Benz test course nearby, and are meant to evoke the smooth feeling of driving down a highway.[11]

The museum has two main trajectories of movement for visitors to take as they explore the exhibits, one showcasing the brand's cars and trucks while the other takes visitors through the history of the company. These pathways intersect at various points along the way, allowing for opportunities to switch between trajectories during the descent through the museum's exhibits. The diagrams in Figure 3.18 demonstrate this spiraling form, using color-coding to differentiate between the two pathways of movement through the museum. The exploded axonometric diagram (A) demonstrates the overlapping layers of the intertwined exhibits, with dashed lines serving to thread the layers together while also indicating the direction and path that the circulation takes from one level to the next. Diagram (C) of Figure 3.18 zooms in on one layer of this ramp system, indicating the movement between levels and their relationship to the central atrium.

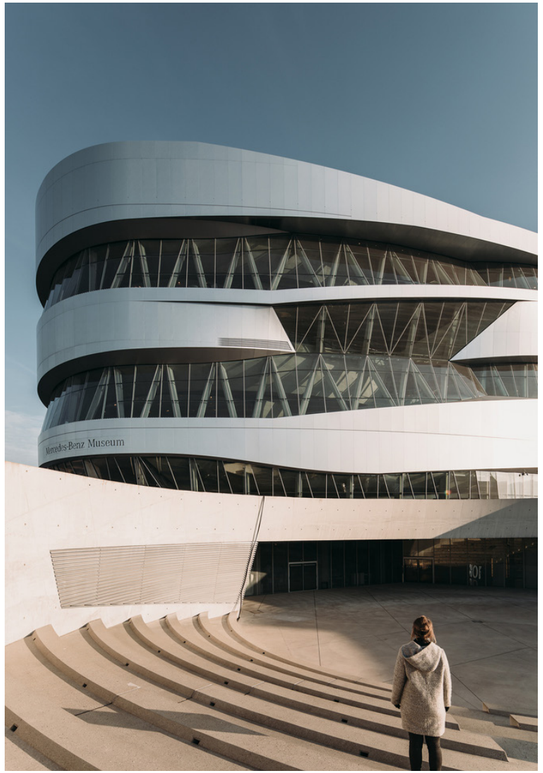


Figure 3.17 - Mercedes-Benz Museum, UN Studio

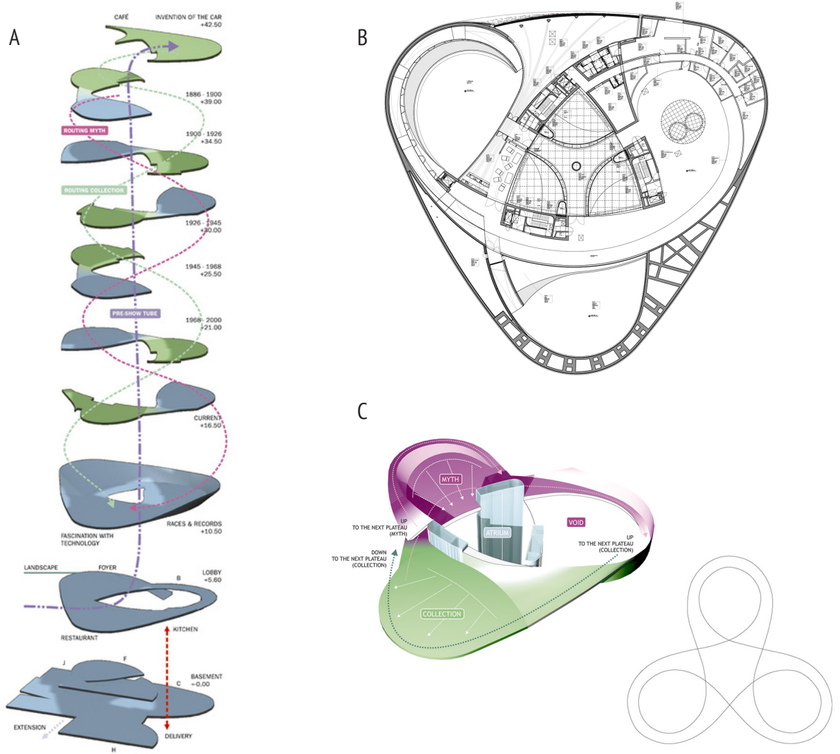


Figure 3.18 - Mercedes-Benz Museum, UN Studio

The circulation diagram serves to indicate the intended movement pathway through a space and its relationship to the built structure, communicating the logic of the building's layout and form by visualizing a sense of flow and cohesion. However, the circulation diagram is often an idealized version of the movement pathway through a space rather than what the pathway would be in actuality, leaving out the intricacies of the variation of movement within a space.

Another way that movement can be represented in architecture is through the use of program diagrams. The program diagram is a method of representing the division of spaces within a project according to function. How these functions relate to each other spatially can indicate movement based on the relationships and interactions between functional spaces. For example, OMA's Seattle Central Library (Figures 3.19 - 3.20) is designed around its program organization, and the movement through these spaces. The form of the building is based on the systematic stacking of the programmatic elements as five platforms and four interstitial spaces that create a flow between them. Each of the five platforms hosts a programmatic element that is relatively stable — parking, staff areas, assembly/meeting space, books, and headquarters — while the four connecting spaces host programmatic elements that are more unstable or fluid — the kids area/public assembly, living room, mixing chamber, and reading room. Here, the programmatic elements are organized such that the areas with more movement are situated between the more stable areas, serving to connect each level through this systematic layering.[12]

The program diagrams shown in Figure 3.20 demonstrate these programmatic relationships and how they influence the movement through the spaces in the library. The stacking of blocks indicates the division of activity between levels, and the staggering of their alignment creates a natural invisible line that can be traced through the layers of the building. In addition to this overall circulation that is implied through the programmatic assembly of the space, the division and labeling of the different parts of the program between levels also implies particular bodily movements that are associated with each of these programmatic elements. For example, the reading room implies the actions of sitting and reading, while the Books platform implies a meandering through the shelves and the action of pulling books off of the shelves and flipping through the

Figure 3.19 - Seattle Central Library, OMA

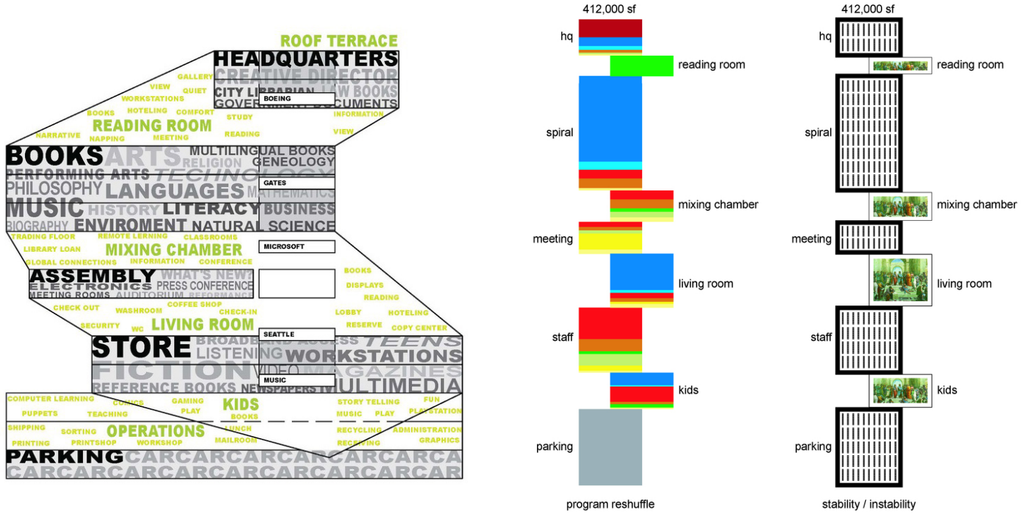


Figure 3.20 - Seattle Central Library, OMA

pages. Here, the associated experiences that the viewers or interpreters of the drawing have with each of the designated spaces helps to give a picture of the movement that occurs within the different areas of the library.

While less explicit in its representation of movement than the circulation diagram, the program diagram similarly communicates the logic of a building's layout and form, which implies a movement through and between the spaces indicated in the diagram. Through indicating the functions of the programmatic elements of the space, it gives a sense of the actions that may occur — however, this requires certain assumptions and associations to be made about the actions that typically take place in those spaces.

Similar to the program diagram, movement can also be represented through a symbolic or image-based representation of the actions that occur in a space. In 1962, Cedric Price and Joan Littlewood collaborated on a design proposal for a Fun Palace to be located in London as an interactive cultural and educational leisure complex. Based on the idea of spontaneous, unstructured play, the desire was to create an environment for a variety of activities to take place, in a flexible manner and as an impermanent structure within existing sites in the city. This included theater space, workshops, a "science playground," galleries, film screening spaces, and more — the goal was to create a place for a variety of activities to occur with ease of exploration, promoting active and passive leisure.[13] Figure 3.21 shows a diagram of the Fun Palace which represents the different activities that occur within the structure and their arrangement relative to one another. The activities and their associated actions are indicated by symbols and icons, while arrows connect these activities to each other and weave them into the structure of the space. The use of symbols and miniature sketches of actions and activities indicate the bodily movements of the users of the space, either through the drawing of a figure executing the motion or through the association of an image with a particular action — for example, the image of a wrench implies the action of tightening or loosening a bolt, or more generally using hand tools to assemble or disassemble something. In this case, the diagram indicates the bodily movements that occur within the space as well as their relationships to each other spatially, giving a sense of program and circulation within the open, exploratory environment of the Fun Palace.

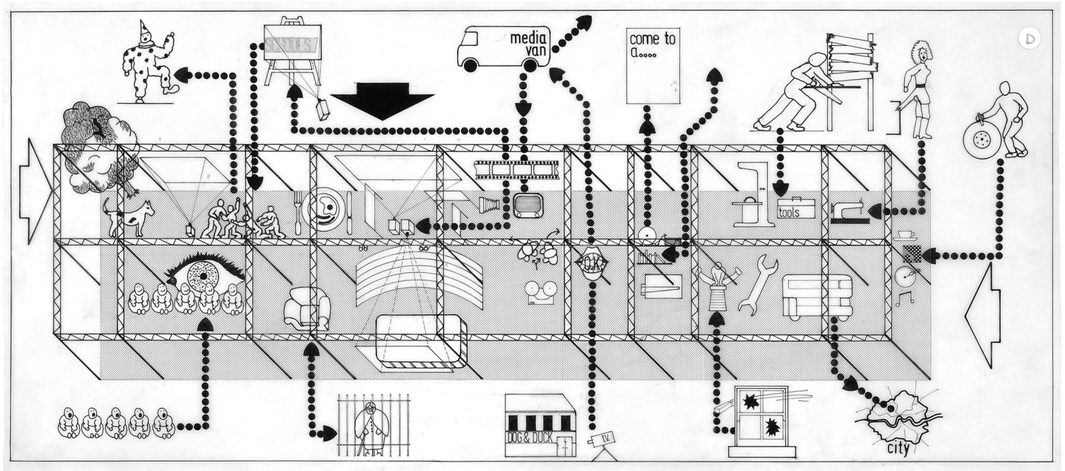


Figure 3.21 - Fun Palace, Cedric Price

Movement can also be represented visually in architectural drawings through the use of scale figures. Incorporating representations of people into drawings helps give a sense of scale to the viewer, but these figures can also be used to indicate the bodily movements that may occur in a space based on how they are positioned. Figure 3.22 shows a series of scale figures performing a variety of actions, taken from Bert Bielefeld's *Spaces in Architecture: Areas, Distances, Dimensions*. The human figure serves as a measure of dimension and space based on the ways that people are expected to interact with the built environment, therefore the bodily movements of the intended users are considered when designing spaces that will be inhabited by particular actions.[14] In a diagrammatic sense, the scale figure can act as a tool to visually represent movements and spatial relationships by drawing the figures mid-action, indicating how they will interact with the designed space. The layout of multiple scale figures within one drawing can also be used to indicate the larger scale pathways of movement through the space based on their relative placement.

An example of this can be seen in Figures 3.23 - 3.24, which show drawings of the Beijing Guanganmennei Community Center, designed by MAT Office. Designed as a leisure and cultural space for the community, the center includes spaces for a variety of activities including a theater, library, community service station, rehearsal rooms, and workshop spaces.[15] Each of these spaces invites a particular type of movement based on its function, which are represented in the architectural drawings of the space. In the axonometric drawings of the overall building and of individual rooms (Figure 3.23), human figures are drawn within each of these spaces to indicate both their scale and the movements that are meant to occur within each part of the program. The perspective section drawings (Figure 3.24) give a closer look into a few of these spaces, also using figures to indicate the types of movements that may occur within each space.

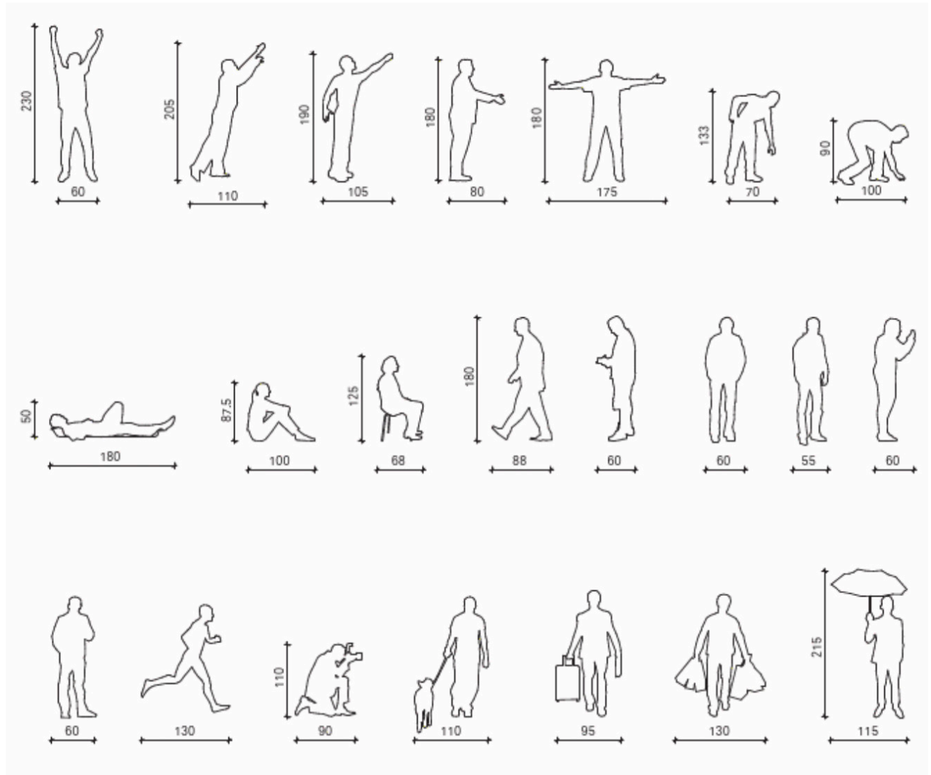
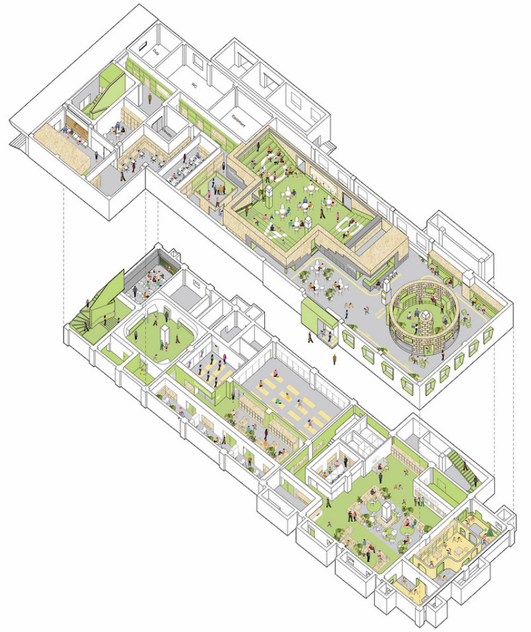


Figure 3.22 - scale figures depicting various activities, Bert Bielefeld



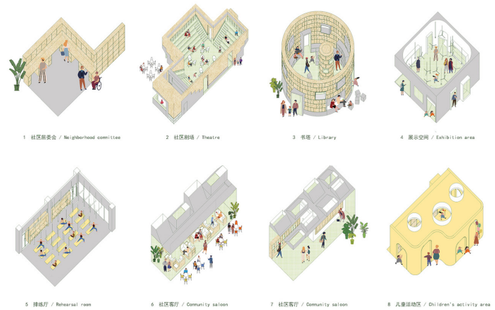


Figure 3.23 - Beijing Guanganmennei Community Center, MAT Office

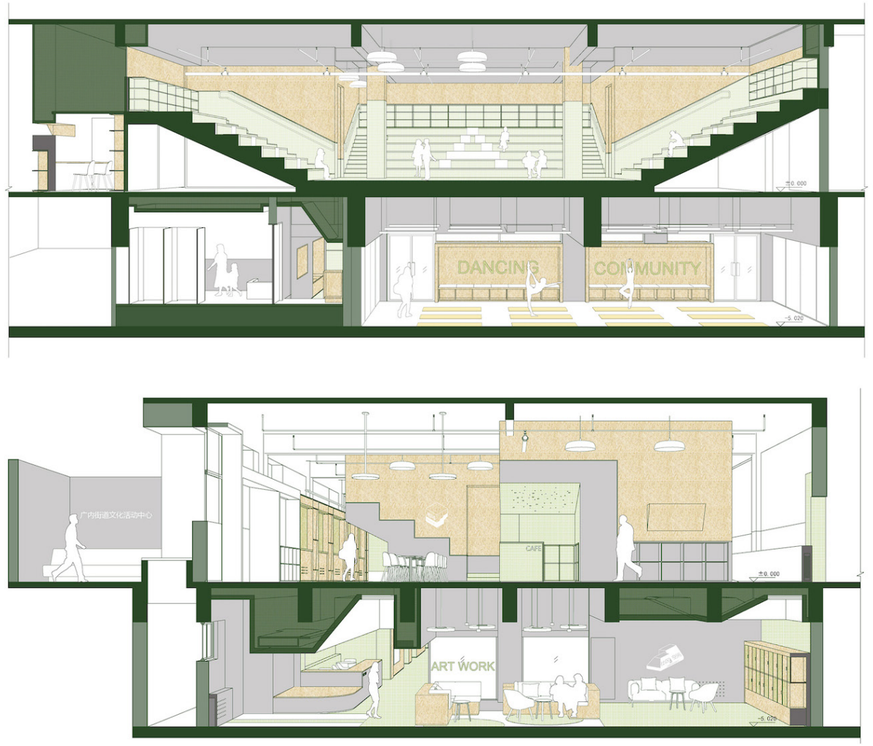


Figure 3.24 - Beijing Guanganmennei Community Center, MAT Office

COMPARISON OF REPRESENTATIONS OF MOVEMENT

When comparing these diagrammatic methods used by architects and by postmodern dance choreographers, there is some overlap and also some notable differences in strategy and priority. On the one hand, the intended audience of the drawing is often different in each case: typically diagrammatic representations of movement drawn by architects, as described above, are created for presentation purposes, such as for a client or to communicate the concept in a portfolio of work; meanwhile, the choreographer often uses these drawings for themselves, and potentially the dancers, during the choreographic process, or perhaps for archival purposes.

The element of time is essential to an understanding of movement, and yet is often absent from architectural depictions of movement, meaning there is no indication of the time necessary to travel the distances that are indicated or any representation of changes in pace that may occur within an environment. The design of spaces does not orchestrate the timing of movement in a specific time frame, but rather creates the potential for movements to occur at any time within the space. However, architecture can dictate the sequence of movements within a space, and can also determine the relative speed of movement based on the types of actions that occur within that sequence. For example, a person will often slow down when approaching and opening a door, and speed up again once through. There are also certain settings that often contain more varied pace in patterns of movement, such as a museum where the users meander through the space, slowing or stopping at points to view the works on display.

This concept of time and pace is addressed in various ways in the choreographic methods described above; for example, Lucinda Childs' movement scores divide pathways into distinct movement phrases separated at regular intervals, while Labanotation uses the structure of a staff with divisions, much like musical bars, to

indicate the passage of time. On the other hand, the choreographic diagrams described above noticeably lack indication of the movement pathway's relationship to the physical space in which it is situated — this is likely due to the fact that many of these works can be performed in a variety of locations, as long as there is a sufficient area of open space for the movement to occur.

It can be seen that the focus of choreographic diagrams and of architectural drawings differs, as each discipline does not prioritize communicating the same elements of movement. However, even the elements that are less prioritized are still factors in the experience of movement in both cases. Therefore, each discipline can learn from one another's methods in order to enhance their own approach to visually representing the kinesthetic experience in each context more comprehensively.

03 ENDNOTES

1. Susan Laikin Funkenstein, "Engendering Abstraction: Wassily Kandinsky, Gret Palucca, and 'Dance Curves.' *Modernism/modernity* vol. 14, no. 3 (September 2007): 389-406.

2. Wassily Kandinsky, *Point and Line to Plane*, New York: Solomon R. Guggenheim Foundation, 1947.

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4. Dr. J. Marey, *History of Chronophotography*. Washington: Government Printing Office, 1902.

5. Vera Maletic, *Body - Space - Expression: The Development of Rudolf Laban's Movement and Dance Concepts,* Berlin: Mouton de Gruyter, 1987.

6. Vera Maletic, *Body - Space - Expression: The Development of Rudolf Laban's Movement and Dance Concepts,* 114.

7. Lauren DiGiulio, "Disrupting the Grid: Lucinda Childs's Scores for Silent Dances," *A Journal of Performance and Art* 42, no. 2 (May 2020): 21-33.

8. Deedee Min and Ji-Hyun Lee, "A Graphical Representation of Choreography by Adapting Shape Grammar," *IASDR2015 Interplay,* 2-5 November 2015: 1486-1499.

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10. Francis Ching, *Architecture: form, space, & order,* New Jersey: John Wiley & Sons, 2007.

11. "Mercedes Benz Museum," *UNStudio*, 2006, https://www.unstudio.com/projects/mercedes-benz-museum/

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Figure 3.1: Wassily Kandinsky, *Dance Curves*, drawings, reference photographs by Charlotte Rudolph, in "Engendering Abstraction: Wassily Kandinsky, Gret Palucca, and 'Dance Curves'" by Susan Laikin Funkenstein, *Modernism/modernity* vol. 14, no. 3 (September 2007): 389-406.

Figure 3.2: top: Étienne-Jules Marey, *A man pole vaulting*, chronophotography, *Research Gate*, 1884 (uploaded December 2020), https://www.researchgate.net/figure/A-man-pole-vaulting-Chronophotography-by-Etienne-Jules-Marey-1884_fig4_347826635; bottom: Étienne-Jules Marey, *Man walking*, chronophotography, *Research Gate*, 1914 (uploaded January 2019), https://www.researchgate.net/figure/Mareys-Chronophotography-Scientific-American-1914_fig1_330247666

Figure 3.3: Vera Maletic, adapted from Rudolf Laban's Choreographie, *The Octahedron* and *The Cube*, drawings, in *Body - Space - Expression: The Development of Rudolf Laban's Movement and Dance Concepts* by Vera Maletic, Berlin: Mouton de Gruyter, 1987: 61.

Figure 3.4: *Labanotation*, diagrams, *dCode*, https://www.dcode.fr/labanotation.

Figure 3.5: Sandra Aberkalns, *Labanotation for Septet (1953), choreographed by Merce Cunningham*, notation diagram, *n+1 magazine*, 2011, https://www.nplusonemag.com/issue-16/essays/the-merce-cunningham-archives/

Figure 3.6: Lucinda Childs, *[work-in-progress score for Melody Excerpt]*, drawing, restored by the Northeast Document Conservation Center, *danceworkbook*, https://danceworkbook.pcah.us/asteadypulse/dances/melody_excerpt.html.

Figure 3.7: Lucinda Childs, *[pathway sketches for Melody Excerpt]*, drawings, *danceworkbook*, https://danceworkbook.pcah.us/asteadypulse/dances/melody_excerpt.html.

Figure 3.8: Trisha Brown, *Untitled*, drawings, in "A Graphical Representation of Choreography by Adapting Shape Grammar" by Deedee Min and Ji-Hyun Lee, *IASDR2015 Interplay*, 2-5 November 2015: 1488.

Figure 3.9: Trisha Brown, *[notebook sketch for "Locus"]*, drawing, *ArtEZ*, https://www.artez.nl/en/creating-beyond-finding-freedom-in-a-covid-style-framework-of-trisha-brown-s-locus

Figure 3.10: Trisha Brown, *Untitled*, drawing, 1975, *Trisha Brown Dance Company*, https://trishabrowncompany.org/trisha-brown/visual-art/

Figure 3.11: pathway drawings from rehearsal for *Between Thresholds* (left: Lucy Richards; right: Abby Chan)

Figure 3.12: overlaid pathway drawing from rehearsal for *Between Thresholds*; Abby Chan, Helena McGowan, Wilsie Ferris, and Lucy Richards

Figures 3.13 - 3.16: drawings by author

Figure 3.17: Eva Bloem, *[Mercedes Benz Museum]*, photographs, *ArchDaily*, 2017, https://www.archdaily.com/805982/mercedes-benz-museum-unstudio

Figure 3.18: UN Studio, *Plan* and *Diagram*, drawings, *ArchDaily*, 2017, https://www.archdaily.com/805982/mercedes-benz-museum-unstudio

Figure 3.19: Philippe Ruault, *[Seattle Central Library]*, photographs, *ArchDaily*, 2009, https://www.archdaily.com/11651/seattle-central-library-oma-lmn

Figure 3.20: OMA, *Legibility Section (left)* and Seattle *(in)Stability Diagram*, diagrams, *ArchDaily*, 2009, https://www.archdaily.com/11651/seattle-central-library-oma-lmn

Figure 3.21: Cedric Price, *[Diagram of activities for Fun Palace]*, drawing, *Dearq*, 2024, https://revistas.uniandes.edu.co/index.php/dearq/article/download/8549/9448/51008?inline=1

Figure 3.22: Bert Bielefeld, *Dimensions (in cm) of people performing various activities*, drawing, in *Spaces in Architecture: Areas, Distances, Dimensions* by Bert Bielefeld, Basel/Berlin/Boston: Walter de Gruyter GmbH, 2018: 10.

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Figure 3.24: MAT Office, *Perspective Sections*, drawings, *ArchDaily*, 2021, https://www.archdaily.com/956676/cultural-activity-center-of-beijing-guanganmennei-community-mat-office?ad_medium=gallery

04

IMPLEMENTING CHOREOGRAPHIC METHODS IN THE DESIGN OF PLAY STRUCTURES

IMPLEMENTING CHOREOGRAPHIC METHODS IN THE DESIGN OF PLAY STRUCTURES

These choreographic methods of directing movement — positive and negative space, lighting, imposed geometry, and the movement of other people — can be implemented in the design of architectural spaces to create kinesthetically stimulating environments that invite movement at multiple scales. This can take the form of crafting specific movement patterns to be followed or creating more open-ended opportunities for movement to occur.

As a case study of the implementation of these methods and as a further opportunity to explore what a movement-centered design approach can look like, I have focused on the design of playground structures and developed a design proposal that utilizes these choreographic and diagrammatic methods. The typology of the playground is helpful for further understanding of postmodern dance choreography in an architectural context, as it is an environment that is designed for movement as its primary purpose and to encourage full-bodied movement for the sake of movement in an exploratory, play-based environment. In this context, the built structure acts similarly to an improvisational score in postmodern dance: providing a framework that gives some level of direction to the movement, while still leaving room for variation and experimentation of movement within the framework that is provided.

SYNTHESIZING DIAGRAMMATIC METHODS

To begin this movement-centered design process, I experimented with the types of diagrammatic representations of movement through space described previously, synthesizing strategies used in both architecture and dance choreography to create different methods that can be used to visualize movement pathways and actions. As a part of this experimentation, I began with observation of movement pathways inside the dining hall in Blanchard Hall at Mount Holyoke College, where I observed the movement of students around the central area of the space, mapping their pathways and notating their bodily movements (Figure 4.1). As I recorded this information, I attempted to represent time duration and bodily movements in my drawings, pulling ideas from the postmodern choreographic diagram precedents previously described. Using symbols from Labanotation for body parts and spatial orientation along with geometries pulled from some of Trisha Brown's sketches, I indicated moments of bodily movement outside of walking such as picking up dishes, serving food onto a plate, or turning one's head to look at what was on the counter.

From here I continued to develop a diagramming system based on Labanotation as a second iteration of this work, incorporating some of the hatches and symbols into a plan drawing of movement pathways. In this system (see key in Figure 4.2), the pathway itself is drawn at varying thicknesses to indicate relative pace of movement along the pathway, with a wider line indicating slower movement and a thinner line indicating quicker movement. Within this line are three possible hatches, indicating low, mid-level, or high movement, referring to the body's proximity to the ground. When a bodily movement other than walking occurs somewhere along this pathway, it is represented with a set of symbols, which indicate the body part or parts primarily performing or instigating the movement, whether the action involves flexion or extension, and the orientation of the movement relative to the body of the user. As I developed this system, I used the example of Sycamore Creek Park, an adult fitness playground in Pickerton, Ohio (Figures 4.3 - 4.4). The

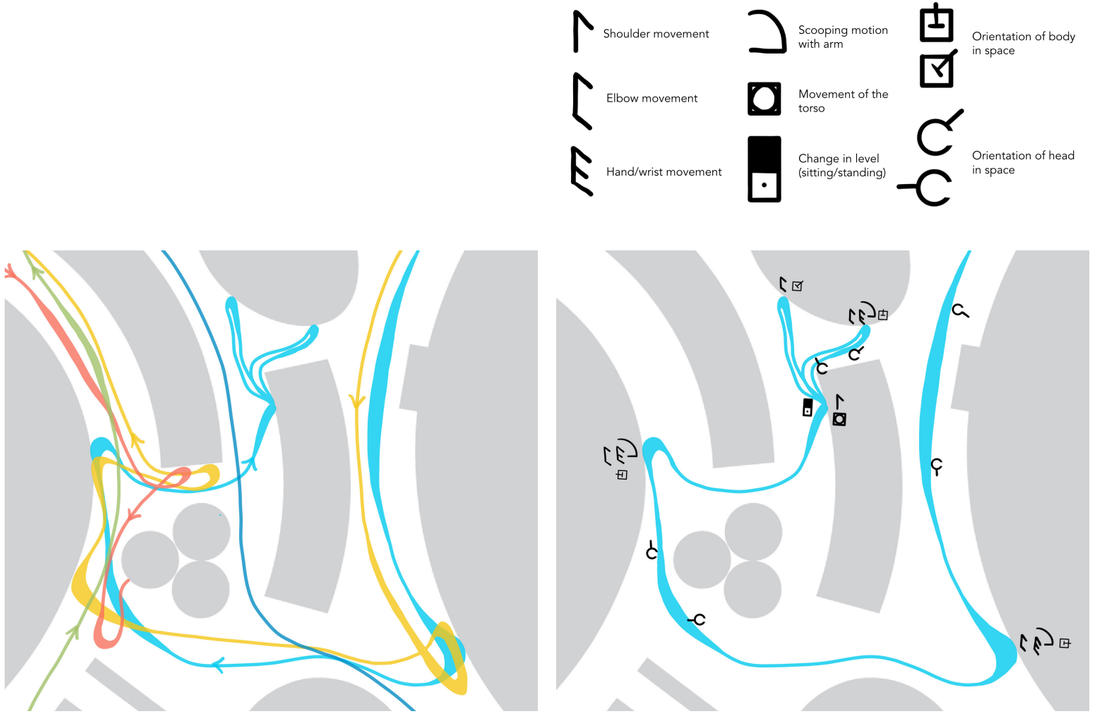


Figure 4.1 - diagrams of movement pathways in Blanchard Hall Dining Commons, Mount Holyoke College

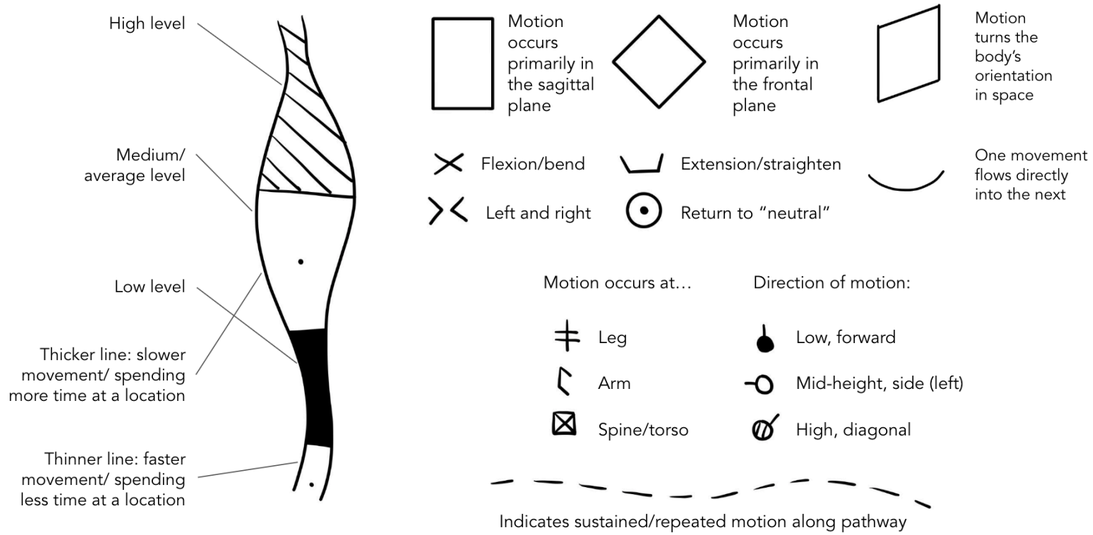


Figure 4.2 - key to Labanotation-based diagramming system

Figure 4.3 - Sycamore Creek Park Fitness Playground, Landscape Structures

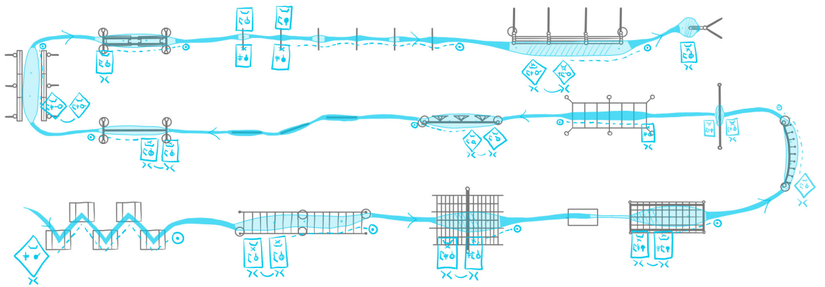


Figure 4.4 - movement diagram for Sycamore Creek Park

park has a variety of structures that encourage different types of bodily movements, which made it helpful for me to develop this method of diagramming movement. The park is laid out as an obstacle course with a designated start and end point, meaning that while variation of movement pathways is possible, there is a specific intended pathway for the movement to take through the structure.

In addition to this system based on Labanotation, I also combined some of the drawing strategies of Lucinda Childs and Trisha Brown to create a diagram that includes both the plan and elevation of movement pathways. Figure 4.5 shows a diagram of this style, also analyzing the movement within Sycamore Creek Park. This method utilizes a series of disjointed pieces of the overall movement pathway, divided in this case not by the exact amount of time taken for each segment but by breaks between major actions at the playground's various structures. Overlaid behind this is a simple sketch of the rise and fall of the body's elevation relative to the ground, taken from Trisha Brown's sketches for her work *Pyramid*. This diagram shows the relationship between plan and elevation in terms of the body's relative position, and gives a rough sense of time based on the intervals into which the pathway is divided. Rather than following the pathway like a map, the intervals represented in each line read from left to right regardless of the pathway's trajectory.

Additionally, I experimented with methods of representing smaller scale bodily movements using a small piece of a phrase from my choreography *Between Thresholds* to experiment with diagramming methods. First I combined the abstract representations of the body's shape and movements from Kandinsky's "Dance Curves" with the concept of overlapping successive stills that is found in chronophotography (Figure 4.6). Here, while the diagram does not depict a literal representation of the human body and its actions, it does give a sense of the movement and its general progression through time and space. I also created a method of diagramming bodily movements that is still abstract but also a more clear representation of the human body, focusing on the joints and their relative positions as they move through space (Figure 4.7). The overlay of multiple snapshots within the movement, as well as arrows indicating the direction of movement of different parts of the body, help give a sense of the movement's trajectory.

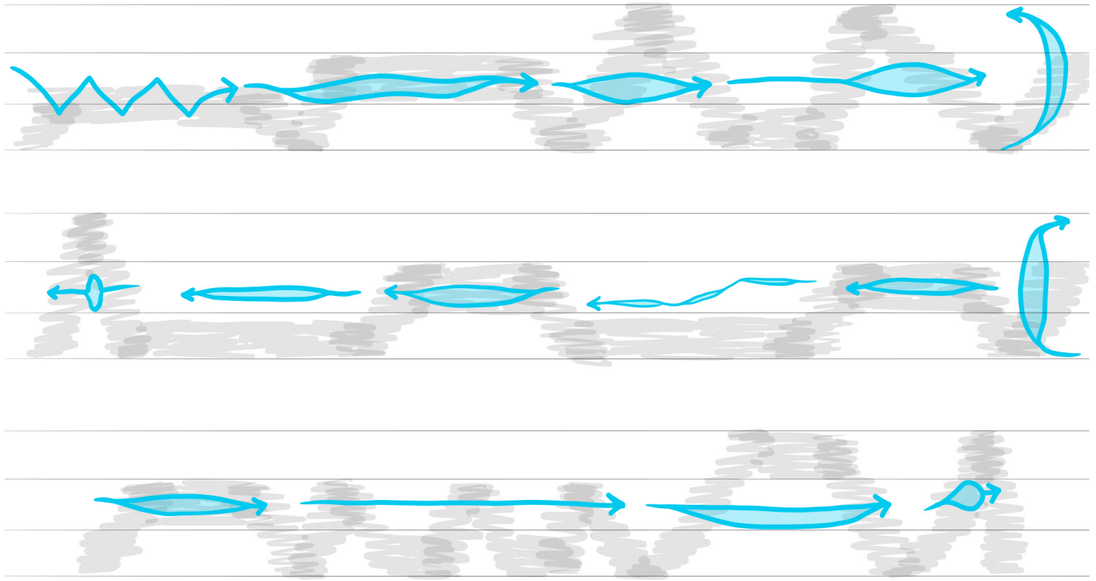


Figure 4.5 - movement diagram for Sycamore Creek Park

Figure 4.6 - bodily movement diagram of movement from "Between Thresholds"

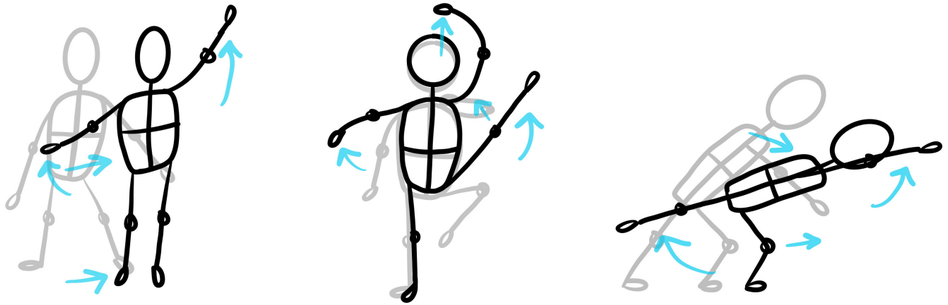


Figure 4.7 - bodily movement diagrams of movement from "Between Thresholds"

While each of these methods of diagrammatic representation has its benefits and provides helpful information about the movements of a design, they each also have certain limitations. The Labanotation-based system, though incorporating both scales of the kinesthetic experience into one method, requires knowledge of the symbols used to indicate bodily movements, or the interpretation of a key, in order to be read and understood. The method inspired by Lucinda Childs and Trisha Brown combines plan and elevation, but in order to address the element of time it removes the movement from its physical context. The combination of Kandinsky's "Dance Curves" and chronophotography also includes an indication of the passage of time, but the representation of the human body is unspecific, and it faces the limitation of being confined to a single plane of movement. The diagrammatic representation of bodily movement focused on the major joints of the body provides more of this detail, but is still abstract and does not show certain nuances in movement such as the rotation of body parts or their orientation in space relative to the rest of the body.

Ultimately, where some drawing methods lack, others satisfy; therefore a combination of drawing methods can be used to comprehensively represent movement and the full kinesthetic experience, at different scales and in relation to the surrounding environment. Just as a plan drawing or a section alone does not individually tell the whole story of a piece of architecture, it should not be expected that the kinesthetic experience of a space can be fully represented in a single diagram — a combination of methods can be used to express the movement within an architectural space. In addition, in almost every case there is not one single way to move and relate to a space, but an infinite number of possibilities even within a controlled environment. When visually representing movement and its relationship to space and surroundings, it should be understood that this variation can and will occur.

PRECEDENT ANALYSIS: FIVE FIELDS PLAY STRUCTURE

Located in Lexington, Massachusetts, the Five Fields Play Structure by Matter Design (Figure 4.8) creates opportunities for movement exploration with a variety of movement pathways and patterns, and a balance of directed and unrestricted movement opportunities. The desire of the architects was to create a play structure for the Five Fields Neighborhood common land that encourages risky and challenging play for children while maintaining safety and "without any singularly functional elements." The design features multiple points of entry and modes of access to the different elements of the structure, so that a variety of circulation pathways are possible. Painted geometric shapes throughout the structure provide visual cues for entrance and direction, but are left abstract to allow freedom of choice.[1]

An analysis of the Five Fields Play Structure movement pathways using the diagrammatic methods described previously confirms this to be true. As illustrated in Figure 4.9, the structure has five main entry and exit points, creating many possibilities for movement pathways through and around the structure: (A) the rope ladder, (B) the zip line (the only element that is unidirectional), (C) the open ledge, (D) the climbing rope with stairs, and (E) the side climbing rope. These five access points are located at different heights relative to the sloping ground plane, resulting in a variety of levels in the overall structure, as represented in Figure 4.10. This arrangement results in frequent movement between levels and relative proximity to the ground, which also varies due to the incline of the ground plane. These different access points provide a variety of options for movement pathways through the structure, and a range of bodily movements at the different types of access points and interactive elements within the structure.

While some elements of the structure allow freedom for movement exploration, there are also elements that encourage particular bodily movements (Figure 4.11). Ladders and climbing ropes facilitate the motion of

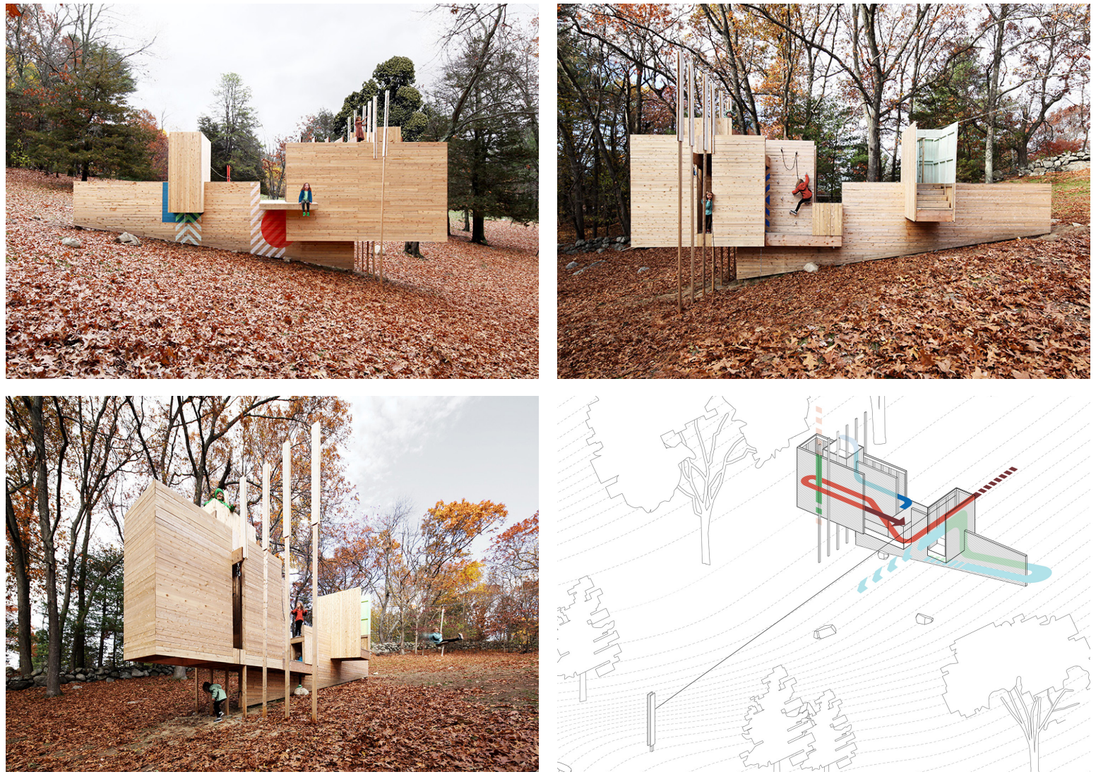


Figure 4.8 - Five Fields Play Structure, Matter Design

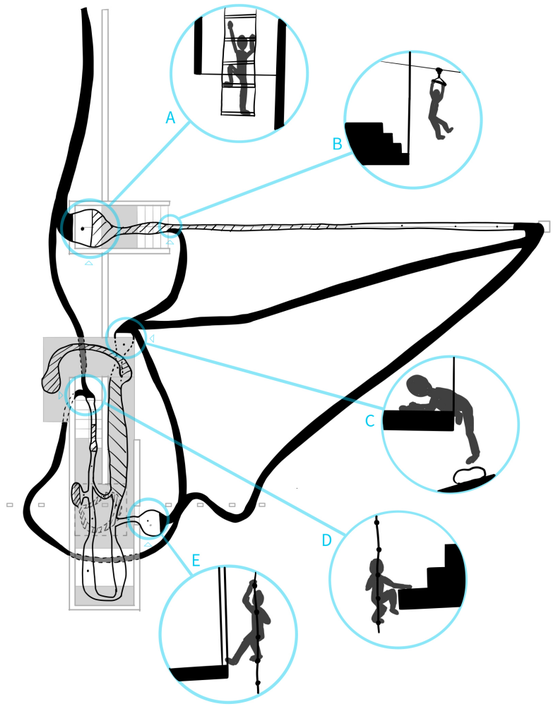


Figure 4.9 - movement analysis diagram of Five Fields Play Structure

vertical climbing, focusing on the flexion and extension of the arms and legs and a combination of pushing and pulling (A). The climbing wall encourages lateral movement, also focusing on flexion and extension of the arms and legs but this time in the frontal plane (B). Various points throughout the structure, such as the platform ledges and stair entry point, encourage more full-bodied climbing motions that include the torso, as well as the action of jumping off of the structure onto the ground below (C). The zip line also encourages this action of jumping, but with the added element of gripping the handles of the zip line and letting the weight of the body propel through space. The cords stretching across the gap in the floor facilitate careful stepping and balancing, encouraging a slowing of pace to traverse the gap.

The Five Fields Play Structure is an example of a playground that encourages movement exploration, providing a framework for movement to occur while allowing many possibilities for how the users can interact with the various elements. With familiar playground elements combined with a non-traditional playground structure and form, the design prompts certain bodily movements while also incorporating elements that are less specific and can be interacted with in multiple ways.

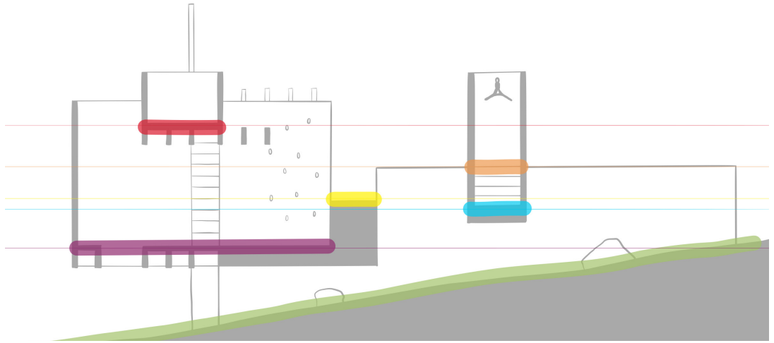


Figure 4.10 - analysis diagram of levels within Five Fields Play Structure

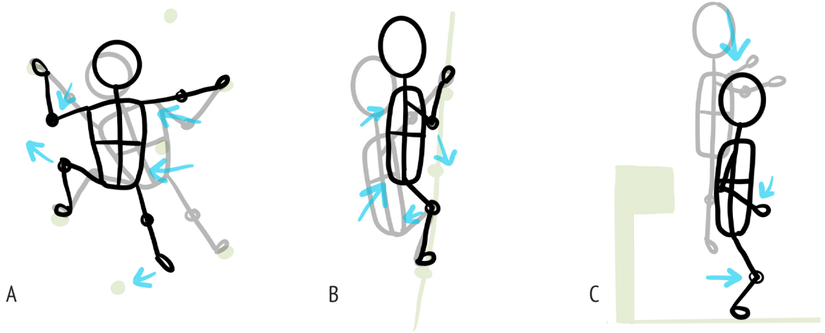


Figure 4.11 - bodily movement diagrams for movements within Five Fields Play Structure

PRECEDENT ANALYSIS: WELLES PARK NATURE PLAY

Designed by the landscape architecture firm Site Design Group, the Welles Park Nature Play Garden in Chicago, Illinois is a nature-based playground with a variety of activities meant to encourage connection with nature through exploratory play. Designed in the footprint of a playground that previously existed on part of the site, the park includes a series of walking paths with various seating areas and play elements scattered throughout. Included in the design is a log balancing course, log steppers, climbing stones, a tree climber, a build wall, a series of small hills, a tree circle council ring, and sensory garden beds. The play space is made entirely of natural materials, such as logs and stones, and includes planting areas with native trees and shrubs throughout the park (Figure 4.12).[2]

Rather than one centralized area, the activities and interactive elements of the play space are located at different areas of the overall park. Spread around this space are a variety of seating options, climbing and/or balancing elements, and areas for open exploratory play (Figure 4.13). The various movements that are encouraged by the different elements of the play garden include full-bodied climbing, jumping, crawling, sagittal and lateral stepping, balance, and fine motor sensory interactions. There are also various tree stumps, logs, and stones scattered throughout the walking paths between the larger areas of concentrated activity, such that the walking paths are not simply connections between the areas of activity but can also provide opportunities for different modes of movement exploration.

The Welles Park Nature Play Garden creates an exploratory environment for its users to interact with elements of nature through an embodied experience of the natural elements that are used to encourage movement. The placement of the interactive elements spread out around the park encourages larger scale movement throughout the space as well as the bodily movements that are facilitated by its various structures.

Figure 4.12 - Welles Park Nature Play, Site Design Group

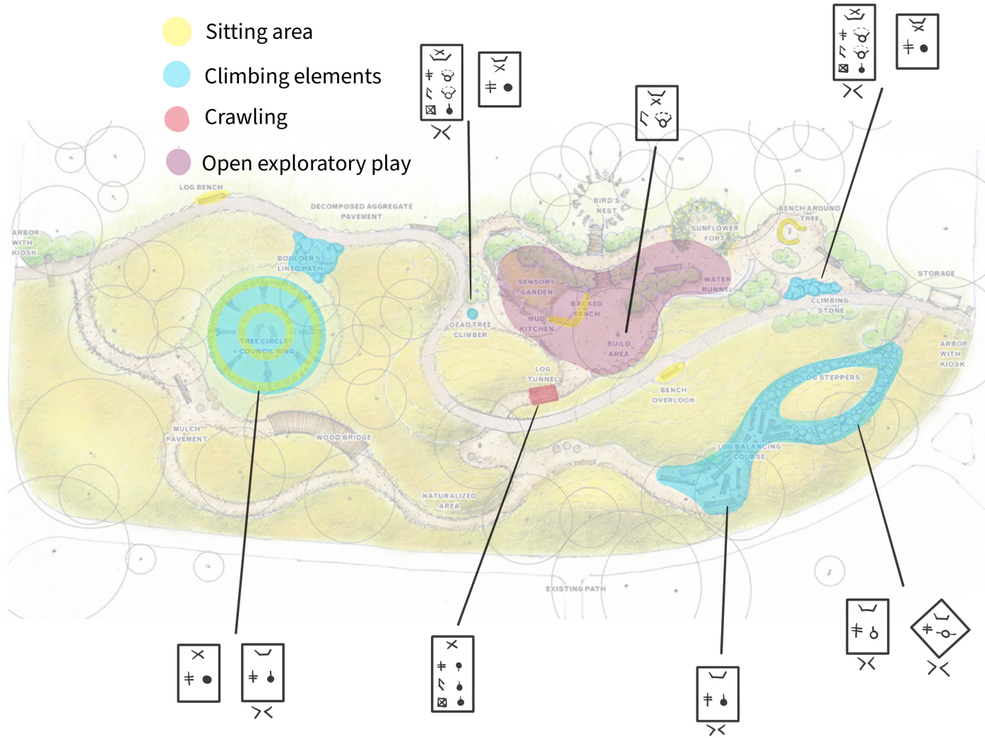


Figure 4.13 - Welles Park Nature Play movement diagram

PRECEDENT ANALYSIS: CHOREOGRAPHIC OBJECTS

Postmodern choreographer William Forsythe, in addition to his performance works for the stage, also curated a series of interactive installations which he referred to as "Choreographic Objects." These installations are based around the idea of "physical thinking" — or, that the movement of our bodies is not just a physical phenomenon but also part of an intellectual experience.[3] Each installation is meant to facilitate movement through interaction with the curated environment, while also stimulating the mind to discover and experiment with the body's capabilities.

One of the earliest of these Choreographic Objects is *White Bouncy Castle* (1997). The large, stark white inflatable structure allows the users to playfully explore the way that their bodies react to an unfamiliar material and the effect that this environment has on their mobility (Figure 4.14). The open space inside the structure allows for freedom of movement within its boundaries, while the bouncy quality of the floor and wall surfaces encourage jumping, bouncing, and a sense of disequilibrium.[4] As they are immersed in an environment that is unusual in its texture and plasticity, the everyday movements of the participants are affected by the structure's quality, and they are faced with the task of navigating how their body responds to this altered environment as well as the freedom to explore different ways of interacting with the installation.

Another of Forsythe's Choreographic Objects known as *Scattered Crowd* (2002) consists of thousands of balloons, connected in pairs by long strings with one balloon filled with helium and the other filled with air, such that the balloons hang weightlessly in the midst of the open space (Figure 4.16). Participants are invited to move in and around the forest of balloons, manipulating them by the strings if desired but asked to avoid entanglement and collision.[5] The bodily movements encouraged by this installation are primarily focused on the arms and hands, accompanied by a simple act of walking throughout the space; however, the focus of

Figure 4.14 - Choreographic Objects: "White Bouncy Castle"

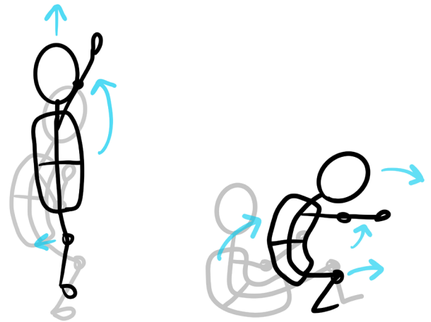


Figure 4.15 - bodily movement diagrams for "White Bouncy Castle"

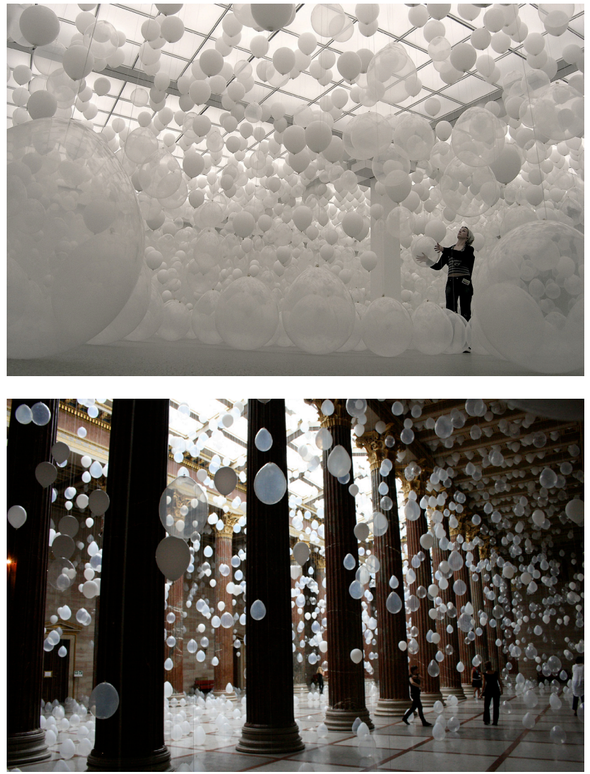


Figure 4.16 - Choreographic Objects: "Scattered Crowd"

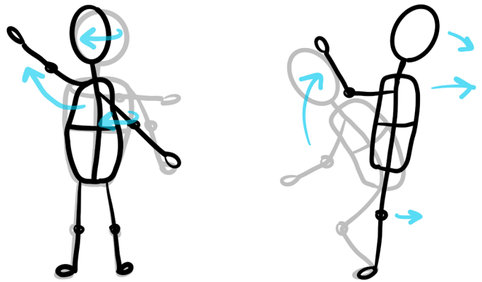


Figure 4.17 - bodily movement diagrams for "Scattered Crowd"

this environment is less on the movements themselves and more on their quality. Through engagement with the objects, participants learn that softer and slower movements are most effective in the manipulation of the delicate balloon apparatuses. Through this interaction, they explore ideas of resistance, responsive motion, and control of velocity and momentum.

The Fact of Matter (2009) curates a more physically demanding and challenging experience. The installation consists of dozens of polycarbonate gymnastics rings suspended from the ceiling in a seemingly random configuration and at varying heights (Figure 4.18). The participants are invited to traverse the space using only the rings, without touching the ground below. This task is meant to encourage users to "confront the limits of their physical capacities."[6] Here, the installation encourages bodily movements such as the flexion and extension of the arms and legs, as well as both abduction and adduction, with an array of directional and orientational possibilities. Though this may seem to allow a certain amount of freedom of movement, the task also requires a significant amount of muscular effort, and requires participants to keep their bodies and their movements connected to their center of gravity in order to navigate the unstable environment.

These Choreographic Objects, along with many other installations in the series, provide opportunities for movement exploration outside of the average person's typical movement repertoire. They each encourage the participants to make discoveries about the relationship of the body to space and to the built environment, both how their own body shapes the space around them, and how the space in turn influences their body and its movement. This type of embodied learning, while familiar to the dancer, is not common in many other contexts; Forsythe's installations provide a space for this kinesthetic experimentation to occur.

Figure 4.18 - Choreographic Objects: "The Fact of Matter"

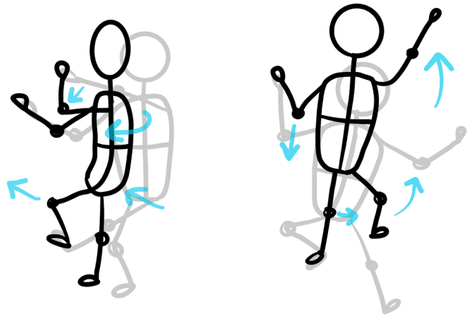


Figure 4.19 - bodily movement diagrams for "The Fact of Matter"

04 ENDNOTES

1. "Five Fields Play Structure," *Matter Design*, 2016, https://www.matterdesignstudio.com/five-fields-play-structure

2. "Welles Park Nature Play," *Site Design*, https://www.site-design.com/projects/welles-park-nature-play/

3. Louise Neri and Eva Respini, *William Forsythe: Choreographic Objects*, The Institute of Contemporary Art/Boston, Munich/London/New York: DelMonico Books, 2018.

4. Louise Neri and Eva Respini, *William Forsythe: Choreographic Objects.*

5. Louise Neri and Eva Respini, *William Forsythe: Choreographic Objects.*

6. Louise Neri and Eva Respini, *William Forsythe: Choreographic Objects.*

04 FIGURE SOURCES

Figures 4.1 - 4.2: drawings by author

Figure 4.3: *[Sycamore Creek Park]*, photograph, *Landscape Structures*, https://www.playlsi.com/en/commercial-playground-equipment/playgrounds/sycamore-creek-park---fitcore-extreme/.

Figure 4.4 - 4.7: drawings by author

Figure 4.8: Matter Design Studio, *Five Fields Play Structure*, photographs and drawing, *Matter Design*, 2016, https://www.matterdesignstudio.com/five-fields-play-structure

Figures 4.9 - 4.11: drawings by author

Figure 4.12: Site Design Group, *Welles Park Nature Play,* photographs, *Site Design,* https://www.site-design.com/projects/welles-park-nature-play/.

Figure 4.13: Site Design Group, *Welles Park Nature Play Plan*, drawing, *Site Design*, https://www.site-design.com/projects/welles-park-nature-play/; annotated by author

Figure 4.14, 4.16, 4.18: The Forsythe Company, *Choreographic Objects*, photographs, William Forsythe Choreographic Objects, https://www.williamforsythe.com/installations.html

Figure 4.15, 4.17, 4.19: drawings by author

05
PROJECT PROPOSAL

PROJECT PROPOSAL

My design proposal further explores the implementation of the choreographic methods described previously through the design of a series of interactive play structures, following a design process that is centered around crafting movement pathways. Situated on the Mount Holyoke College campus, my proposal consists of four interactive play structures placed at intervals along the Upper Lake Loop Trail walking path (Figure 5.2). Each structure is designed to facilitate specific movements, encouraging modes of moving that are often encountered in a dance setting in a recreational, play-based environment. The structures themselves are also dynamic, able to be moved and reconfigured either as a part of or in addition to the primary movement goal of each structure. The goal of this project is to create spaces for students and community members to engage in full-bodied movements that are not often encountered in everyday life, and to encourage movement exploration that stimulates the kinesthetic sense.

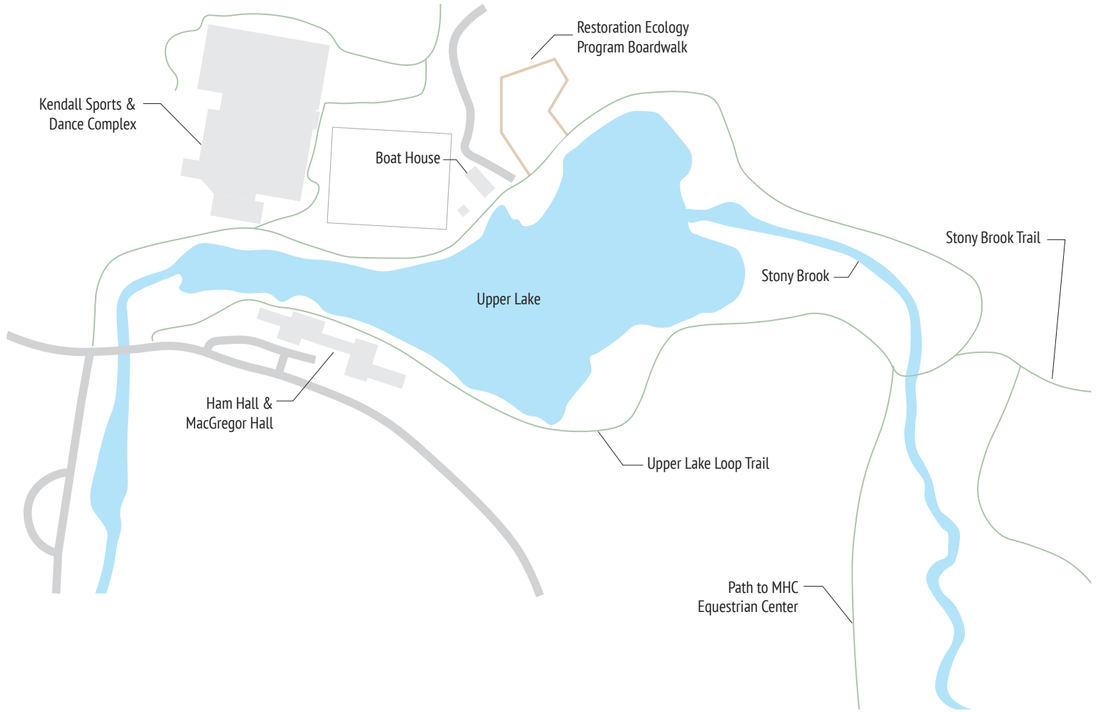


Figure 5.1 - site plan of Upper Lake Loop Trail

SITE: UPPER LAKE LOOP TRAIL

The site for this project is the Upper Lake Loop Trail, a walking path that encircles Upper Lake on the Mount Holyoke College campus and is approximately one mile in length. The trail can be accessed from the campus near the Kendall Sports & Dance Complex and the residential buildings MacGregor Hall and Ham Hall. Most of the loop is wooded, with a relatively flat gravel path along the water's edge which crosses Stony Brook near the access to the Mount Holyoke College Equestrian Center. Near this bridge is also a trailhead for the Stony Brook Trail, which branches off from the Upper Lake Loop to join the Long Farm Trail. The section of the trail which passes the outdoor athletic facilities of the Kendall Sports & Dance Complex passes the boat house, with two boat launch docks on the water nearby. Close to this point is the Restoration Ecology Program's wetland restoration project, a wooden boardwalk that guides people through the wetland area by the lake while providing information about the area's ecology.[1] There are several benches located at intervals around the trail, situated near the water's edge to provide views of the lake. The Upper Lake Loop is a popular walking spot for students and community members in the town of South Hadley, providing a recreational space for people to walk, relax, and enjoy the nature of campus.

I selected this site on campus because it is a setting where people frequently go to engage in recreational movement in the form of walking. Placing these play structures along the trail provides people the opportunity to expand their range of movement while engaging in this recreational activity. Along the trail, I identified four sites to place each one of the interactive play structures. These sites were chosen due to the available open space that could accommodate movement and built structures, their ease of access from the trail without interrupting the existing path, and their relative placement to each other at intervals around the overall site. Two of the sites are situated between the trail and the water's edge, while the other two are situated further into the wooded area on the opposite side of the trail from the lake.

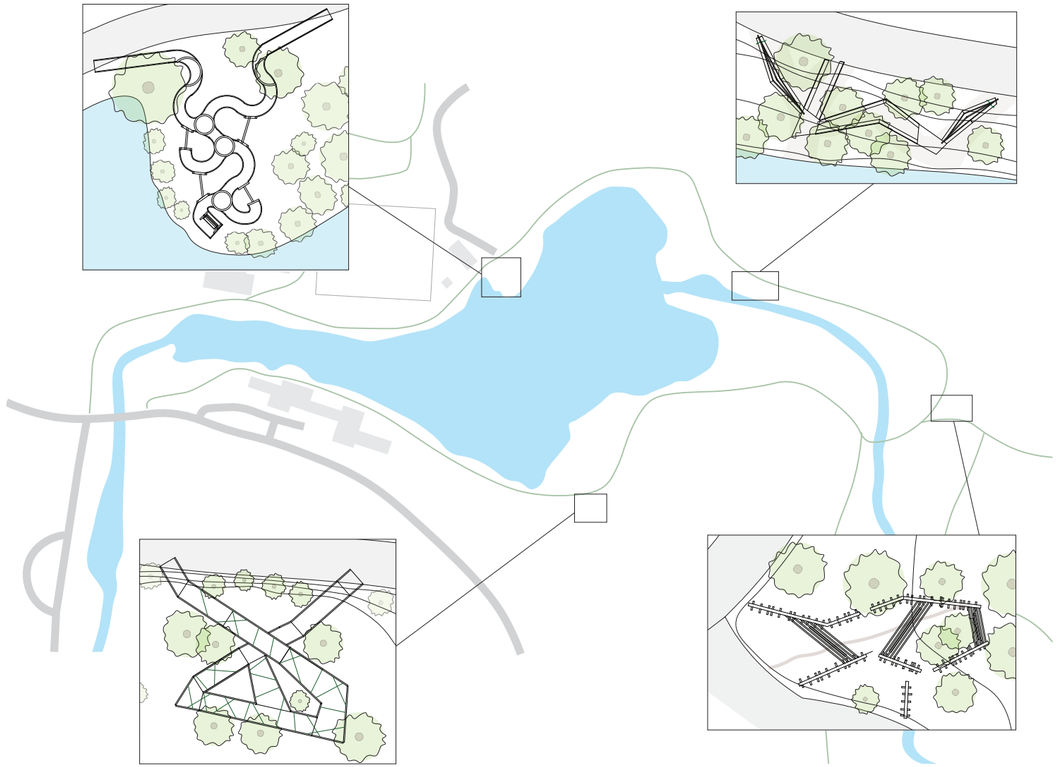


Figure 5.2 - Upper Lake Loop Trail with identified sites & structure plans

SELECTED MOVEMENTS

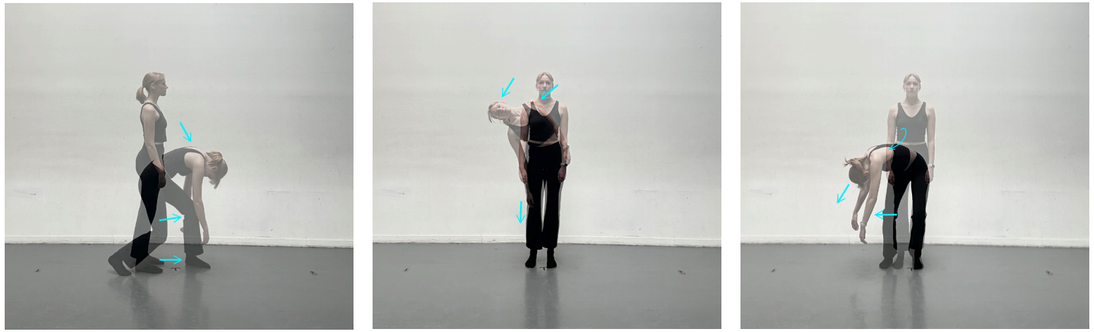
I began the design of each structure first by identifying what types of bodily movements each one would be used to encourage. These movements and movement concepts were taken from my experience in modern and postmodern dance contexts, selected based on ideas that tend to arise often and also are less common in the average person's daily activities. The first structure facilitates flexion of the spine and the concept of floorwork, in this context applied to refer to any movements in which more parts of the body than just the feet are touching the ground (Figure 5.3). The second structure encourages movement in the lateral direction, as opposed to the typical forward-facing movements most often encountered in daily life, as well as the concept of balance (Figure 5.4). The third structure facilitates the action of tilting one's central axis off of the vertical orientation that we spend much of our time existing in, as well as the concept of partnering, specifically counterbalance (Figure 5.5). A counterbalanced relationship between two people exists when two people support one another's weight in an equal exchange of tension or pressure, such that neither could perform the action without the other. The fourth structure encourages rotation, primarily with the goal of spinal rotation or a twist within the body but which also could result in rotation of the body as a whole in its spatial orientation, as well as the action of jumping (Figure 5.6). Each of these movements has been selected to encourage a type of movement that is outside of our more common ways of moving our bodies through space, in order to facilitate exploration of the movement possibilities of one's own body.

Each of these movement types also exists within my choreography for *Between Thresholds*. Figure 5.7 depicts examples of moments in the piece when each of these movements occur:

- Figure 5.7a: The dancer moves through a flexed spine as she drops her head and arm down to her left and back up to her right.

STRUCTURE 1

Flexion of the spine



Floorwork

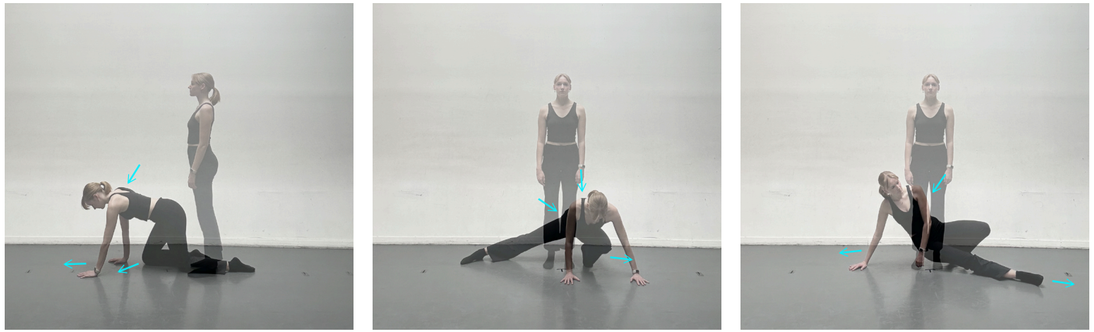
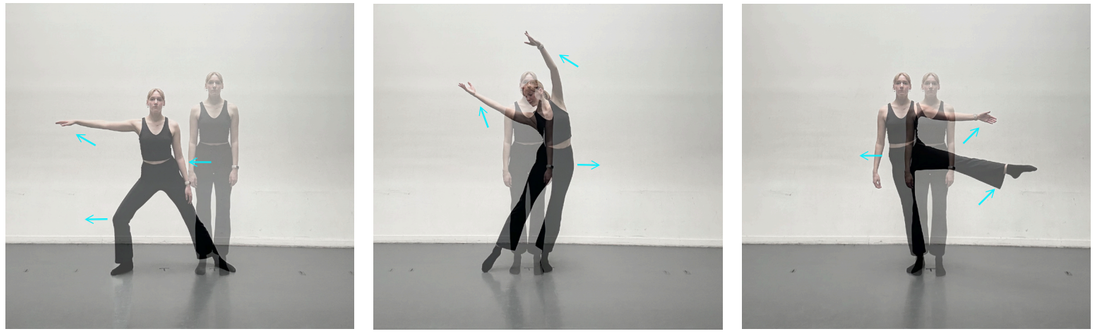


Figure 5.3 - selected movements for structure 1

STRUCTURE 2

Lateral movement



Balance

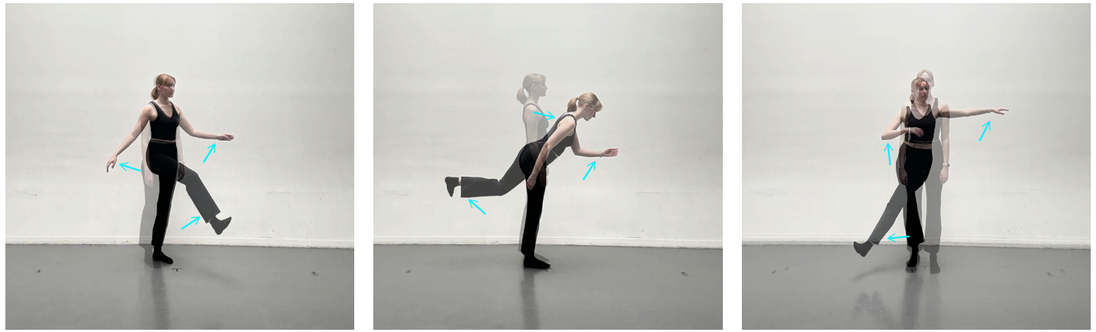
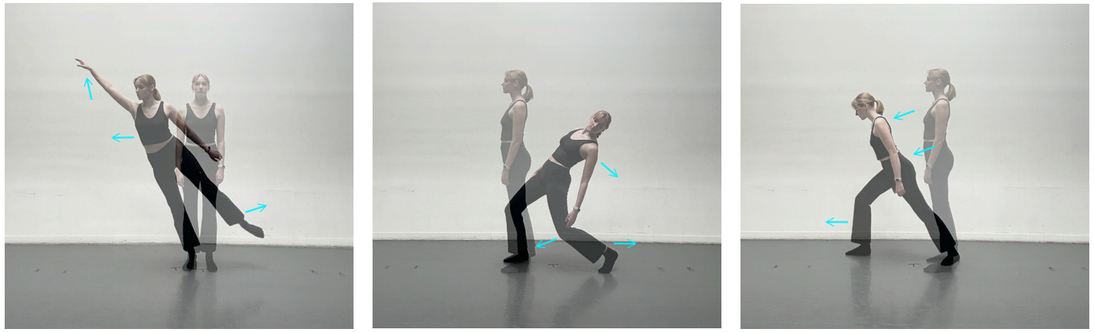


Figure 5.4 - selected movements for structure 2

STRUCTURE 3

Central axis off of vertical



Counterbalance

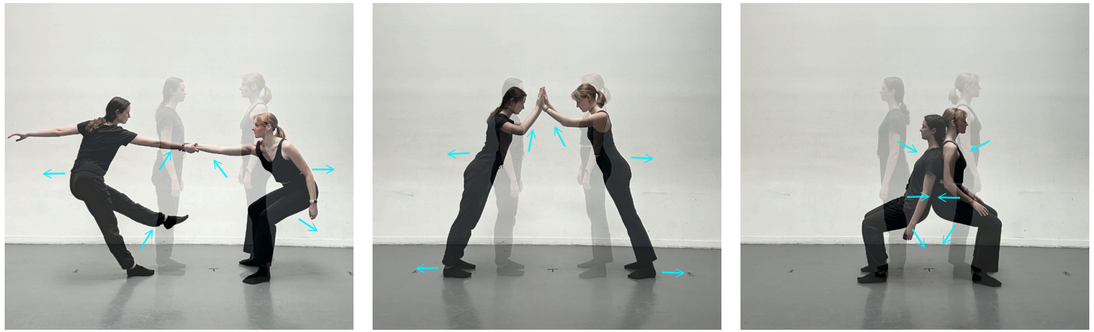
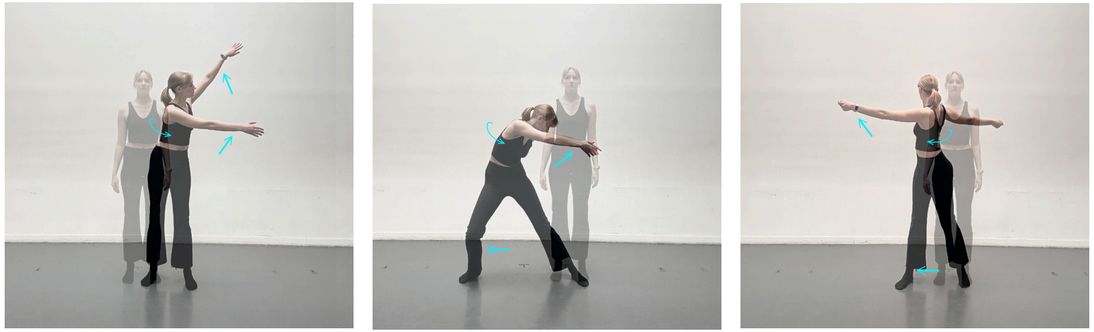


Figure 5.5 - selected movements for structure 3

STRUCTURE 4

Rotation



Jumping

Figure 5.6 - selected movements for structure 4

Figure 5.7 - examples of selected movements as seen in “Between Thresholds”

Figure 5.7a - flexion of the spine

Figure 5.7b - floorwork

Figure 5.7c - lateral movement

Figure 5.7d - balance

Figure 5.7e - central axis off of vertical

Figure 5.7f - counterbalance

Figure 5.7g - rotation

Figure 5.7h - jumping

- Figure 5.7b: This moment is from a movement phrase that is entirely floorwork, in which the dancers' movements are close to the ground and they support themselves with different parts of their body other than their feet, in this case the hands and lower leg.

- Figure 5.7c: The dancer is moving in the lateral plane, reaching her arm and leg in opposite lateral directions before bending both in towards her center.

- Figure 5.7d: The dancers are balanced on one leg as they suspend a slow motion of the leg.

- Figure 5.7e: The dancer is reaching forward far enough to tilt her central axis off of vertical, before catching herself by stepping backward before she has the chance to fall forward.

- Figure 5.7f: The dancers are in a counterbalanced relationship in which each dancer is pulling away from each other, with tension between their arms.

- Figure 5.7g: The dancer rotates her spine as she reaches her arms back towards her leg while maintaining a stable orientation with her legs and pelvis.

- Figure 5.7h: This moment is from a sequence of jumps, in which the dancers shift their weight and orientation while in the air.

These examples demonstrate how each of these movements and movement concepts can appear in a dance context, as a reference point for how these movements are then translated into the design of each of the four interactive structures.

In applying these selected movements to the identified sites along the trail, I began by identifying the current movement pathways within each site through my own experience walking around the area, considering

approaches from both directions around the loop and movement opportunities related to the existing conditions of the site. From here, I crafted a movement pathway through each site considering changes in elevation, available space, views, and approach. Within these larger scale pathways, I then identified where along these pathways the intended body movements could occur, either as points or intervals of sustained movement. With this movement sequence as a base, I then worked to create a built structure that could facilitate those movements, using the choreographic methods described previously to direct movement through each site.

Figure 5.8 - photos of site 1

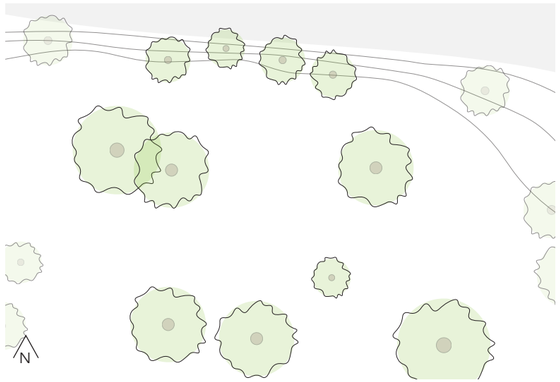


Figure 5.9 - site 1 site plan

STRUCTURE 1

Site 1 is located approximately halfway between the two bridges along the Upper Lake Loop, on the side of the trail opposite from the water's edge. The site is close to a bend in the trail when approached from either direction, and is at a point along the path that is further removed from the edge of the water than other areas of the loop. The level of the site is below the level of the trail, and the transitional incline from the path down to the site is quite steep. The area is adjacent to a wet marshy area of land.

Figures 5.11 - 5.12 use the hatched circulation pathways from my Labanotation-inspired movement diagramming system to indicate the existing network of pathways through the site based on my own experience, as well as the desired movement pathways for the site and the resulting structure. The design of this structure uses the drop in elevation from the path to accommodate the crossing of pathways by dipping one path below the level of the trail while lifting the other above, so that one crosses over the other. The space between these two paths is kept small to encourage the action of bringing the body low and close to the floor surface in order to pass under the platform above. The sloped ramp surfaces throughout the structure introduce variation in the elevation of the user relative to the ground plane, while also giving the users the opportunity to navigate how their movement responds to an uneven floor surface as they traverse the structure.

Along this pathway created by the system of ramped platforms, the structure uses the method of positive and negative space to encourage flexion of the spine and to facilitate floorwork. Cords of rope stretch between the walls on either side of the platforms, creating negative spaces to move through, over, and under as one travels through the structure. The end of each cord is attached to the wall inside a slit in the wall such that either end of the cord can be moved into multiple different positions, creating possibility for a variety of configurations

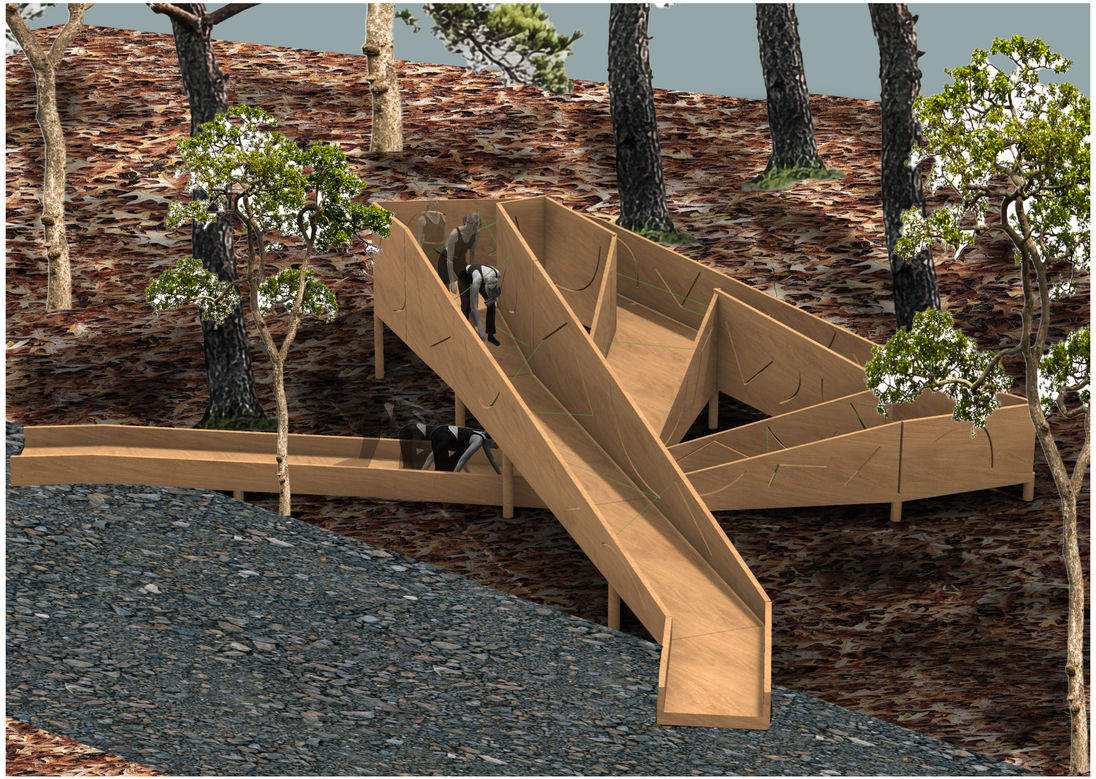


Figure 5.10 - structure 1 rendering collage

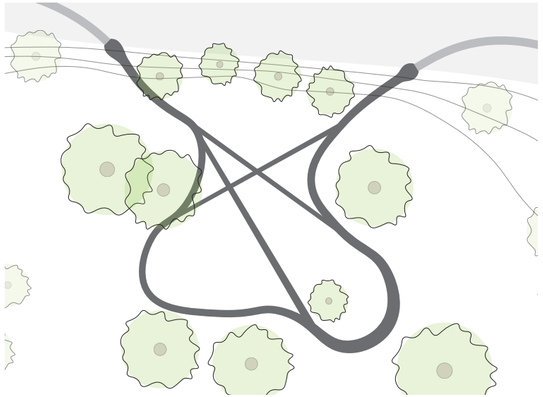


Figure 5.11 - site 1 existing movement pathways

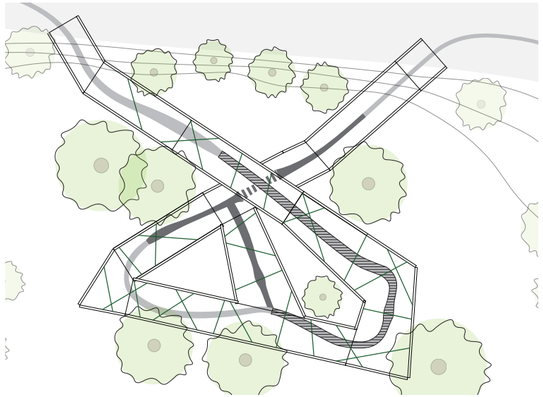


Figure 5.12 - site 1 proposed movement pathways with structure

of the cords. This interactive aspect of the structure encourages additional movement and exploration within the framework of the provided elements, encouraging movement through the act of moving the cords as well as moving through them. The variation in the height of the walls creates variation in the height and angle of the cords that are stretched across, so that the movements within the space also become varied throughout. The negative space between the cords directs the pathway taken through the structure, as well as the bodily movements of the users as they navigate their way through the available spaces.

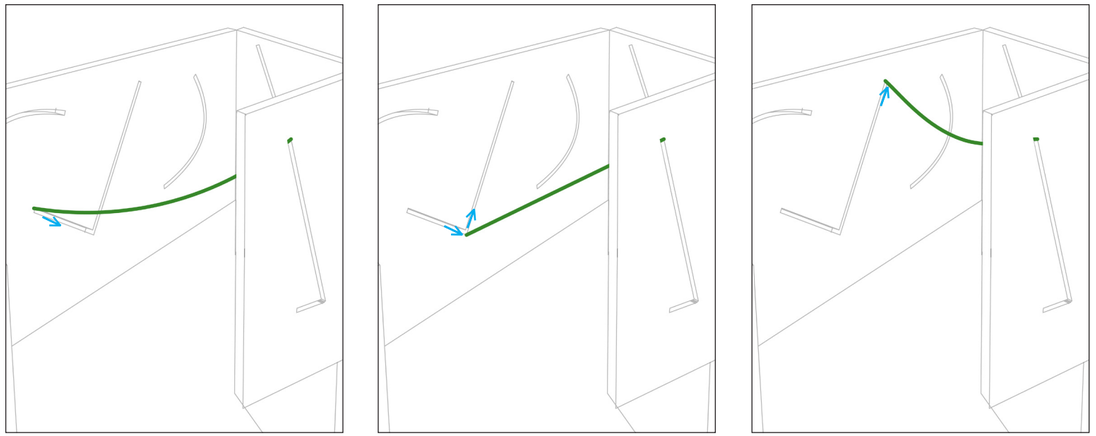


Figure 5.13 - detail of moveable elements in structure 1

Figure 5.14 - structure 1 rendering

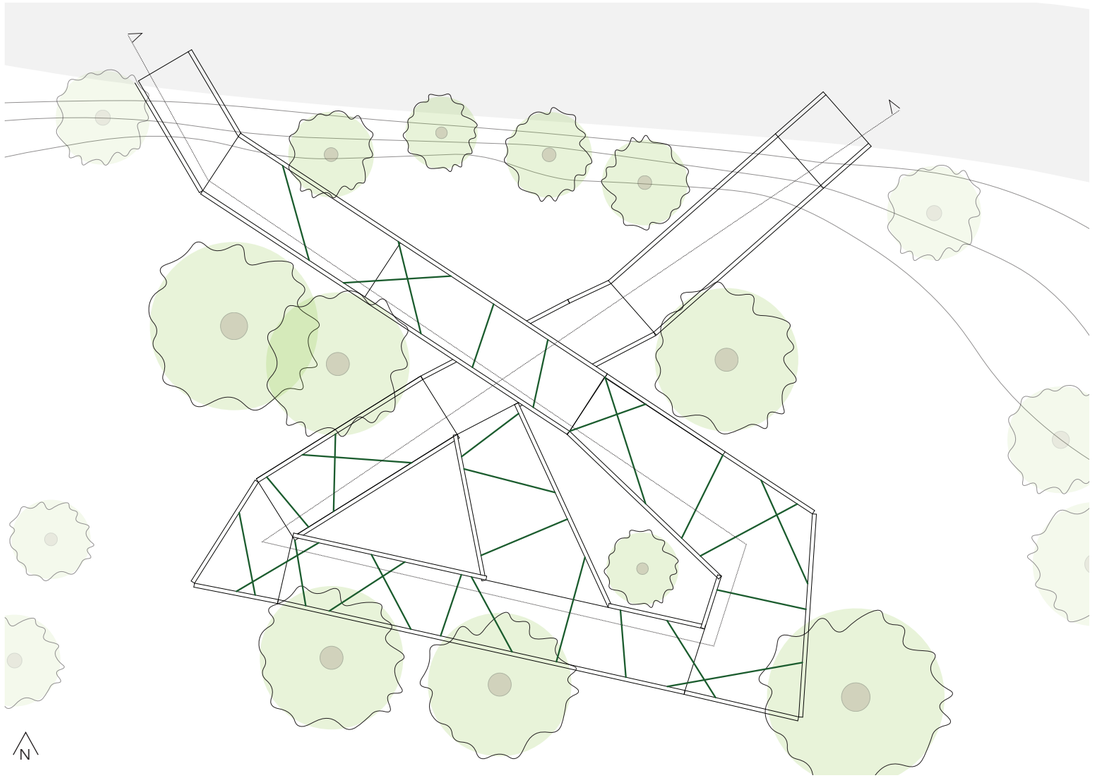


Figure 5.15 - structure 1 plan

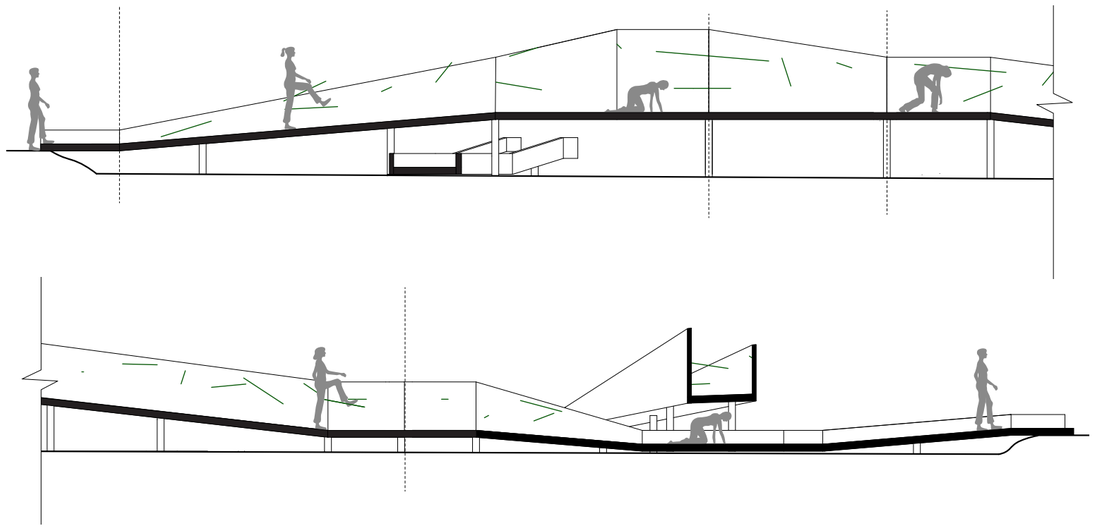


Figure 5.16 - structure 1 section

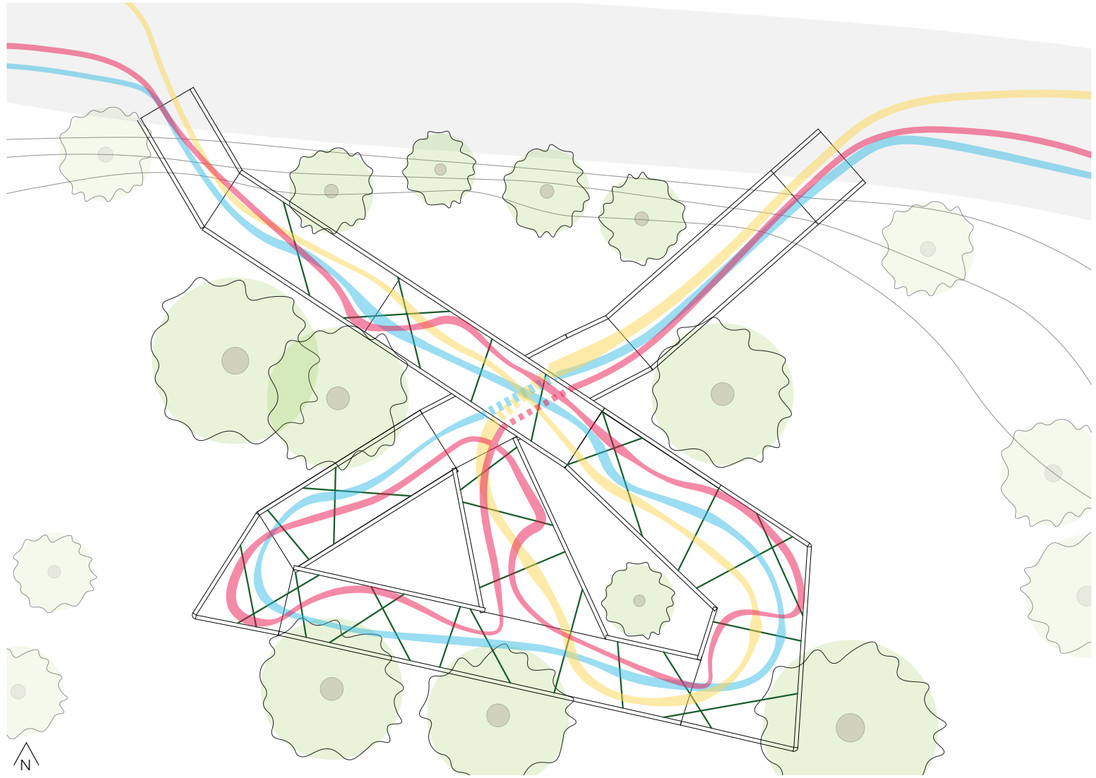
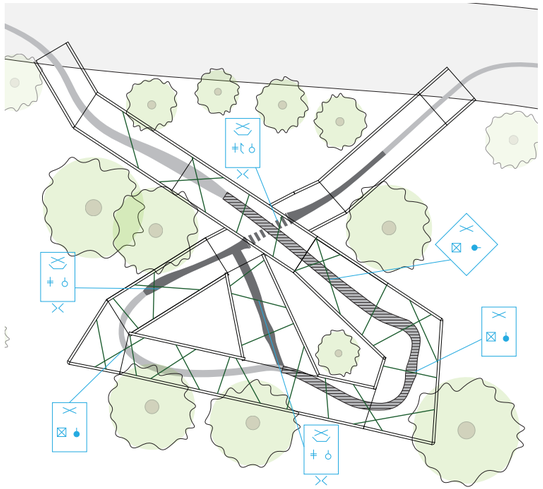


Figure 5.17 - movement pathway possibilities through structure 1



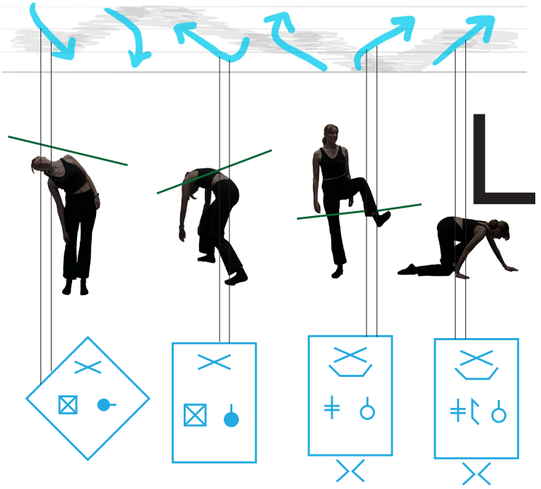
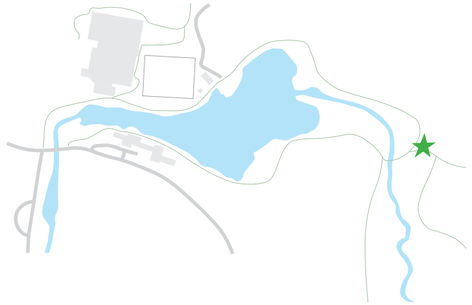


Figure 5.18 - structure 1 movement analysis diagrams

Figure 5.19 - photos of site 2



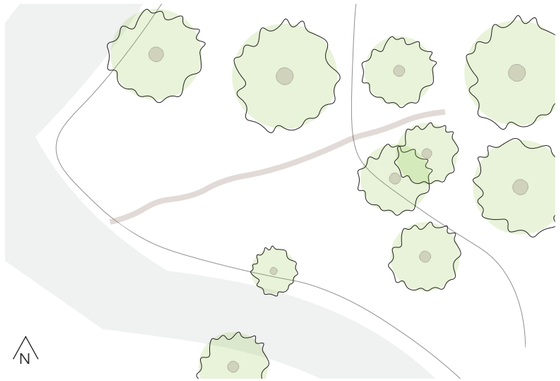


Figure 5.20 - site 2 site plan

STRUCTURE 2

Site 2 is located at the point along the Upper Lake Loop Trail where the Stony Brook Trail branches off. Because of this, the site has more possible directions of approach than the other selected sites. The area of the site is defined by the position of the trees in the area and the open space within their boundaries. The ground in this area is a step down from the gravel path, and gently slopes up away from the intersection of the paths. Existing on the site is a long fallen log which cuts diagonally across the site, stretching from the edge of the walking path across to the opposite end of the area, creating a physical and visual division between the two sides. This log has become partially embedded into the ground, showing signs of existing in this location for a long period of time.

Figure 5.23 depicts the movement pathways within the structure, based on the natural movement within the site as indicated in Figure 5.22 but adjusted to create more variation in elevation relative to the path. The movement loops around the fallen log that cuts across the site, with diagonals crossing from one side to the other over the log at select points. Three different entrance points onto the structure correspond to the three different directions one could approach the site from along the walking trails.

In this structure, lighting is used to direct movement, and the actions that are encouraged by the structure are lateral movement and balance. The structure consists of a series of vertical walls dotted with holes that penetrate through both sides. Towards the bottom of each wall are protruding pegs that act as footholds. To traverse the structure, users hold one loose peg in each hand and insert them each into the holes in the wall, moving the pegs with them as they move laterally along the walls. This mechanism encourages the users to flex and extend their arms and legs in the frontal plane, or lateral direction. At three points throughout the structure, balance beams stretch between two opposite walls, providing the opportunity to cross over from

Figure 5.21 - structure 2 rendering

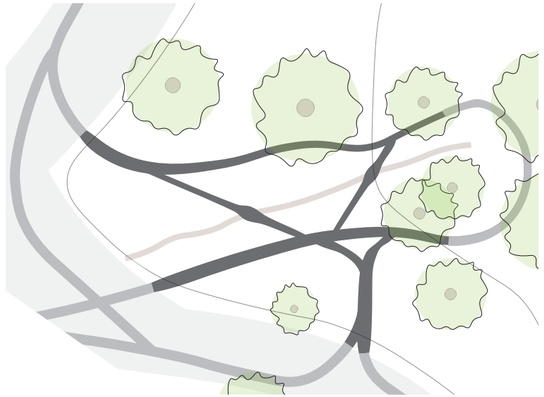


Figure 5.22 - site 2 existing movement pathways

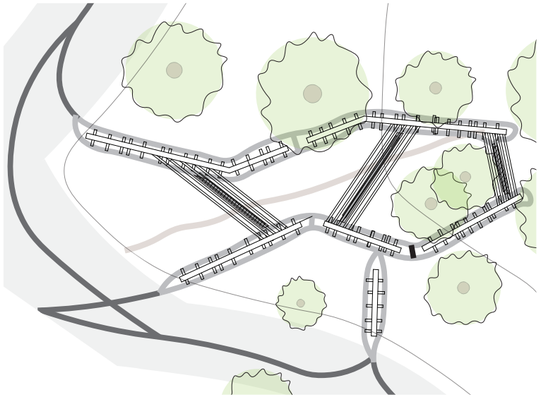


Figure 5.23 - site 2 proposed movement pathways with structure

one side of the site to the other over the fallen log. Overhead, a series of thin parallel beams stretch across between the walls above the balance beams which project patterns of light and shadow below, giving a sense of direction to these crossing points between sides. The beams can also act as additional support when traversing the balance beams if desired.

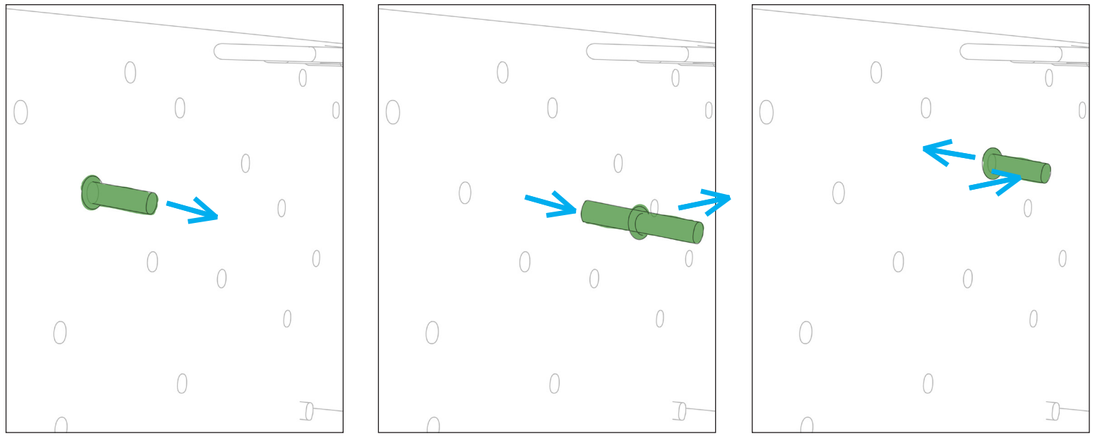


Figure 5.24 - detail of moveable elements in structure 2

Figure 5.25 - structure 2 rendering collage

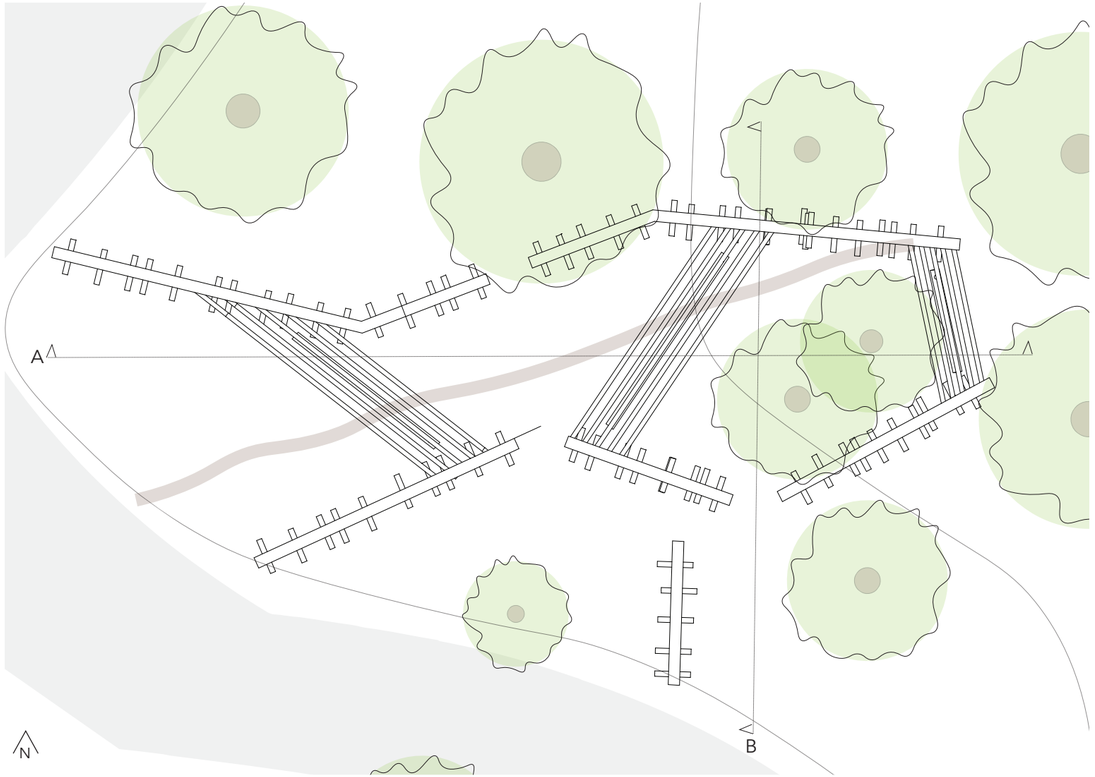
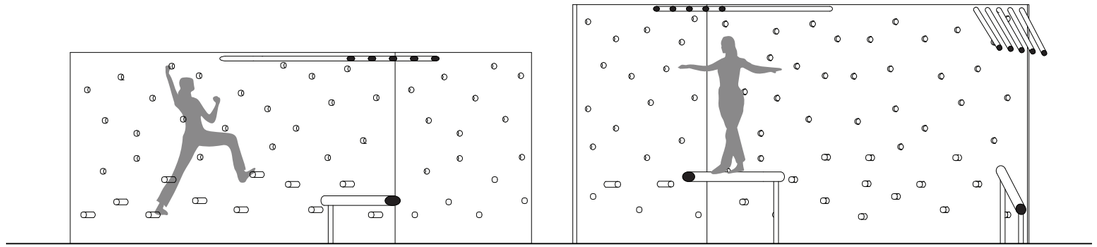
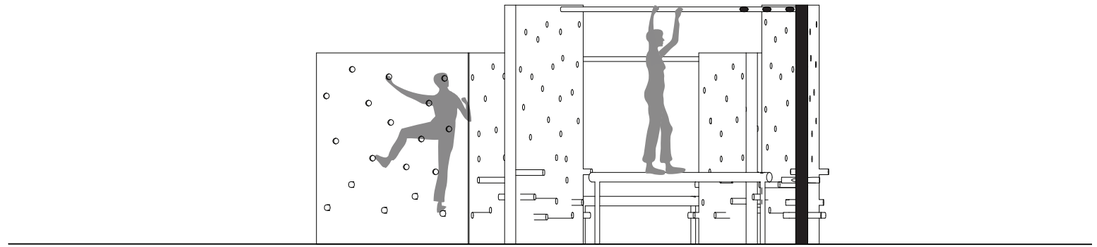


Figure 5.26 - structure 2 plan



Section A



Section B

Figure 5.27 - structure 2 sections

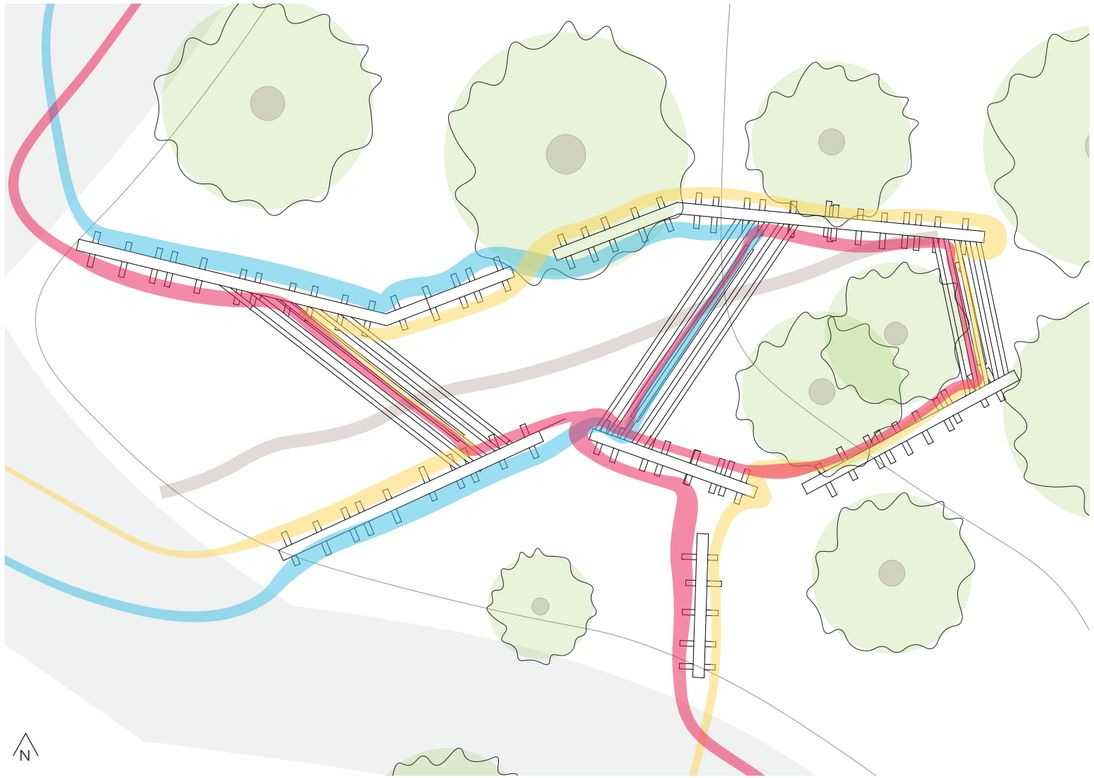


Figure 5.28 - movement pathway possibilities through structure 2

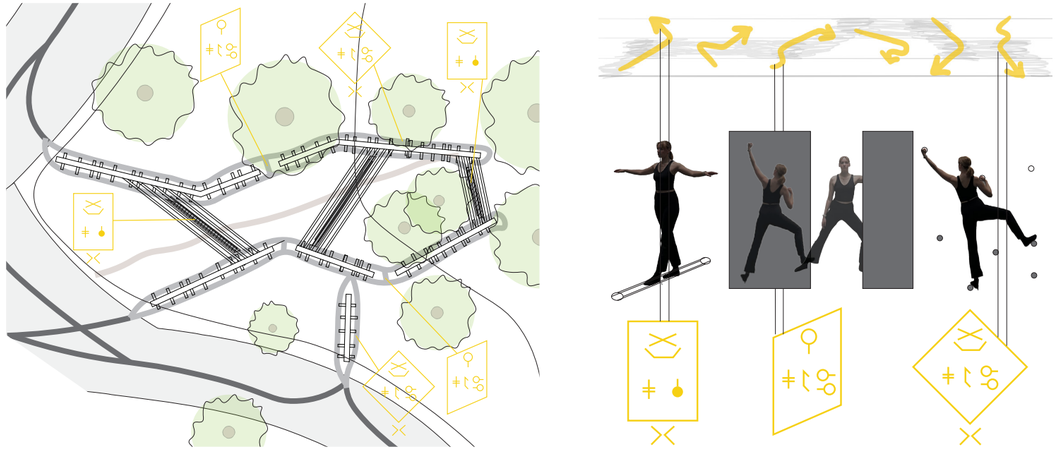


Figure 5.29 - structure 2 movement analysis diagrams

Figure 5.30 - photos of site 3

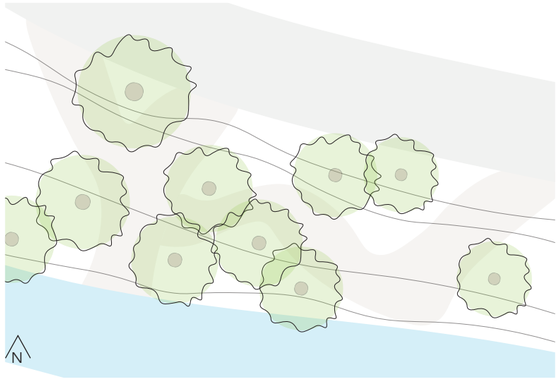


Figure 5.31 - site 3 site plan

STRUCTURE 3

Site 3 is located near where Stony Brook branches off from Upper Lake, and is in between the walking path and the water's edge. The ground slopes towards the water before dropping off along the shoreline. The trees within the site create a weaving pathway, with two open lookout points near the water. The ground has a beaten path leading down from the trail to the water, indicating frequent use of the spot to view the lake and its wildlife.

Figure 5.33 depicts the circulation of the site, following the beaten paths curving around and between the trees. There are three main entrance points from the gravel pathway into the site and down to the water's edge. Here, the topography of the site itself offers variation in elevation, as well as orientation in space while traveling within the site. The structure follows these existing pathways.

This structure uses the movement of other people as the primary method of directing movement, and takes the form of a partner activity. The structure facilitates the action of tilting the central axis of the body off of its usual vertical orientation, as well as the concept of counterbalanced partnering relationships. The layout of the structure connects the two lookout spots to one another and to the walking trail. Two adjacent wooden platforms follow the path between the trees, at times tilted away from each other and at times towards each other. When these two platforms are angled away from one another, there is a rope positioned in between which slides along a bar that divides the space between the two platforms. With one person on each side, the users grip the rope and lean away from each other in a counterbalanced relationship, and must maintain this sharing of weight as they travel along the platforms, which vary in their distance between one another. At the intervals where the two platforms are angled towards one another, the central bar ends and the rope is left behind; the users now press into one another in order to continue traveling along the structure. There can be

Figure 5.32 - structure 3 rendering collage

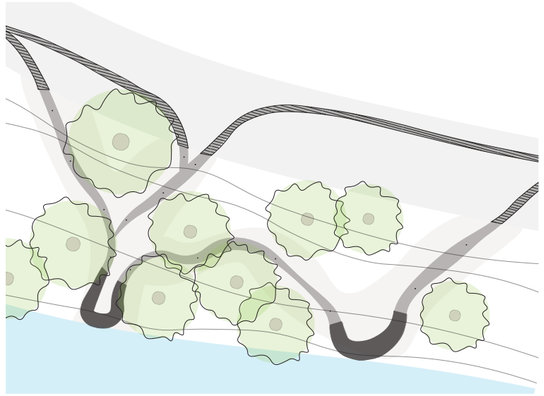


Figure 5.33 - site 3 existing movement pathways

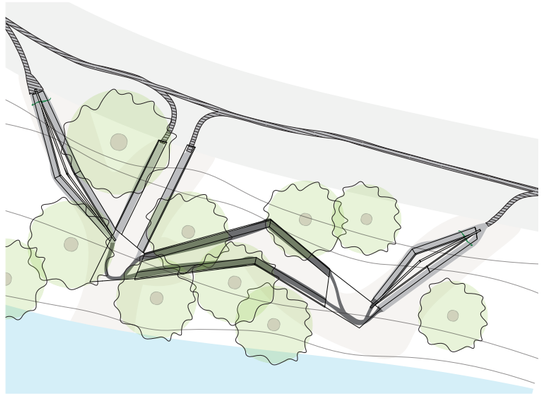


Figure 5.34 - site 3 proposed movement pathways with structure

variation in how this counterbalance is maintained between the two partners, but the users are either pulling away from or pushing in towards one another as dictated by the orientation of the platforms. Near the two lookout points within the site, there are horizontally level platforms that act as a spot for the users to reorient themselves and their relationship to gravity as they switch between the actions of pulling and pushing. These points also act as stopping points for viewing the lake, providing a ledge to sit on if desired at the two natural lookout points within the site.

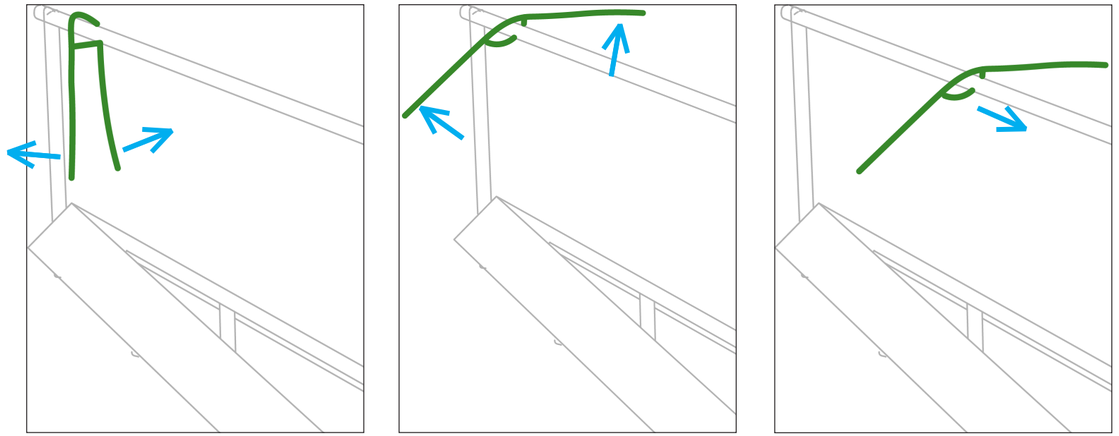


Figure 5.35 - detail of moveable elements in structure 3

Figure 5.36 - structure 3 rendering

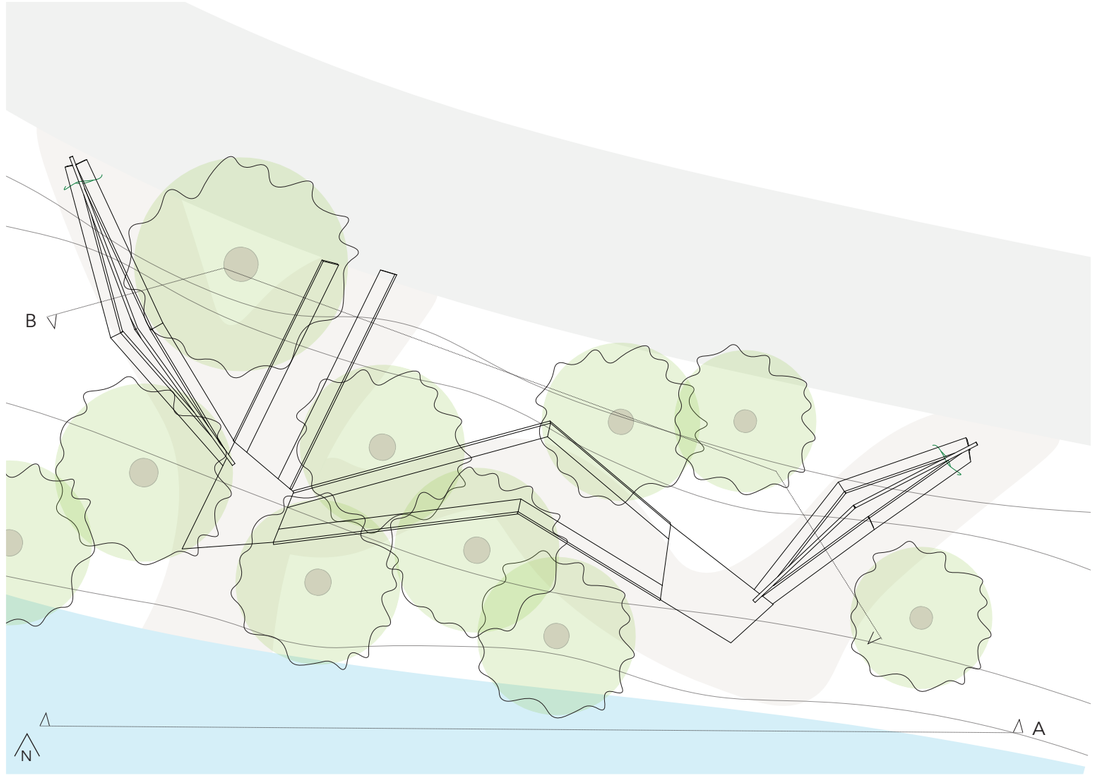
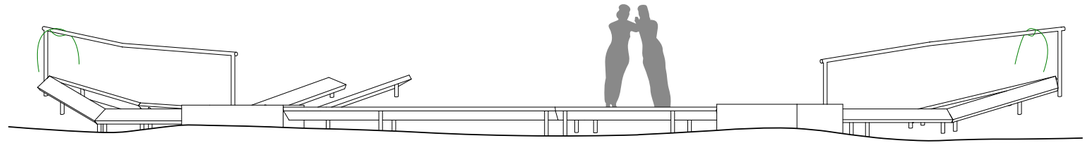
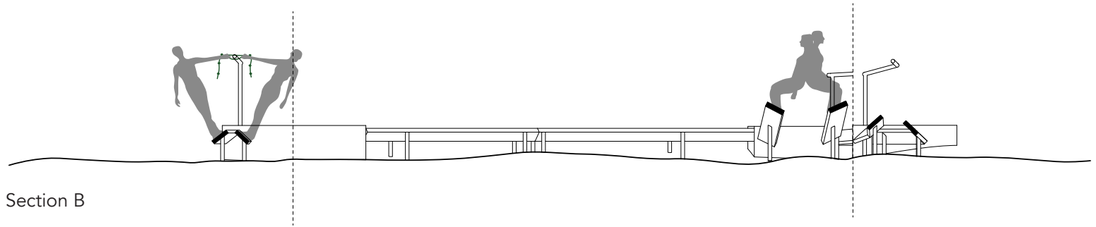


Figure 5.37 - structure 3 plan



Elevation A



Section B

Figure 5.38 - structure 3 elevation & section

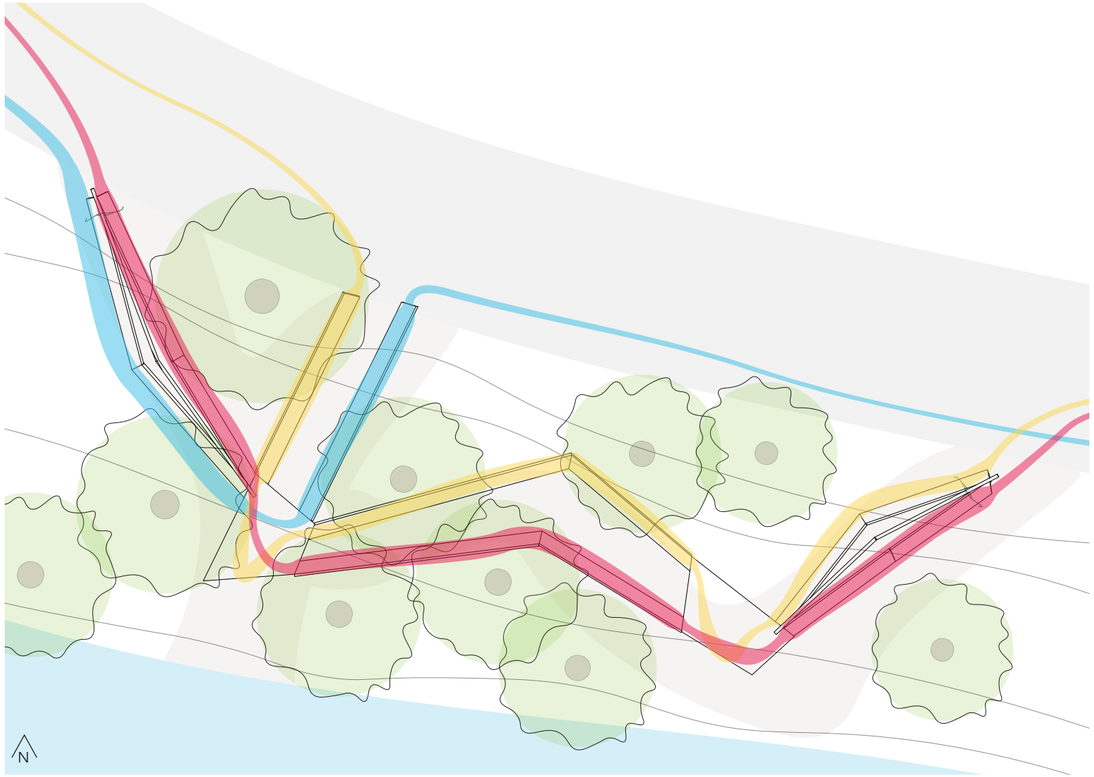
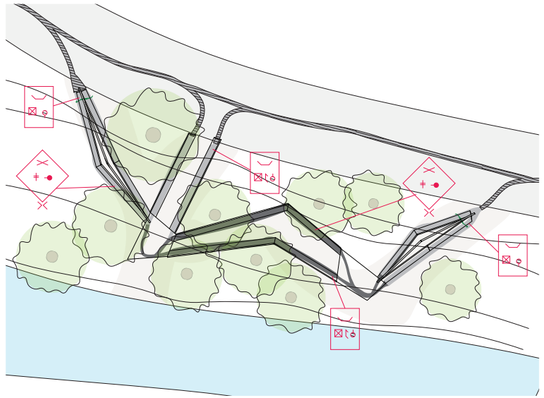


Figure 5.39 - movement pathway possibilities through structure 3



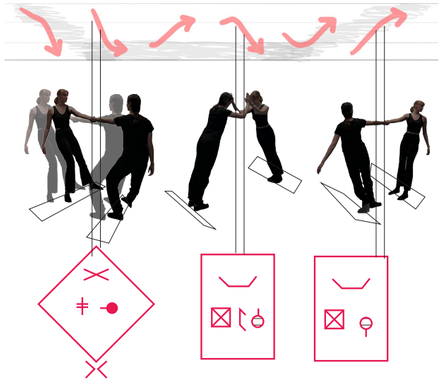


Figure 5.40 - structure 3 movement analysis diagrams

Figure 5.41 - photos of site 4

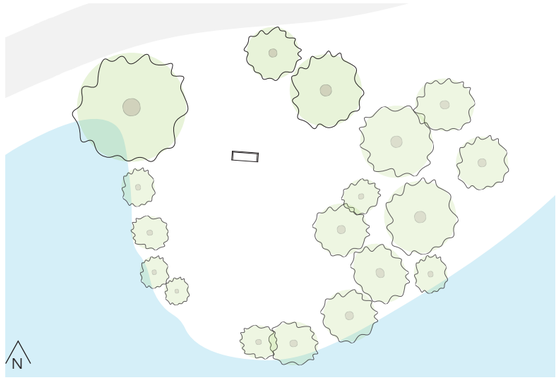


Figure 5.42 - site 4 site plan

STRUCTURE 4

Site 4 is the largest and most open area out of the four selected sites, located across the path from the boat house and the entrance to the Restoration Ecology Program boardwalk. The site is an open, relatively flat grassy area that extends out into the lake from the side of the gravel path. Trees and shrubbery surround the perimeter of the site's area along the edges of the water, becoming dense towards the southeast side of the site and thinning out towards the southwest side to provide a view out onto the water. Currently a wooden bench is situated on the site, close to the gravel path and further removed from the water's edge.

Approaching the open space of the site with the method of imposed geometry, the designed pathway is imposed onto the empty space to create pathways that would otherwise not have existed within the site. This network of pathways takes into consideration elements of the site — such as the location of the trees near the gravel path and the view out towards the southwest of the site onto the lake — but creates new movement patterns within the open area. These pathways were created by overlapping and intersecting a series of arcs, and creating opportunities to cross between these arcs to increase potential circulation options and changes in direction.

The bodily actions that are facilitated by this structure are rotation — which primarily refers to rotation of the spine while the feet remain stationary, but can also result in rotation of the whole body as a unit — and jumping. The structure consists of a raised wooden platform that takes the shape of a series of arcs which connect and intersect through the open space of the site. Along the way, vertical screens positioned on arced or circular tracks block the pathway, such that one must slide the screen out of the way in order to continue traveling along the platform. Some of the screens are at a height tall enough to walk through, while others require bending or crawling under to get to the other side. These different heights also mean that at different

Figure 5.43 - structure 4 rendering

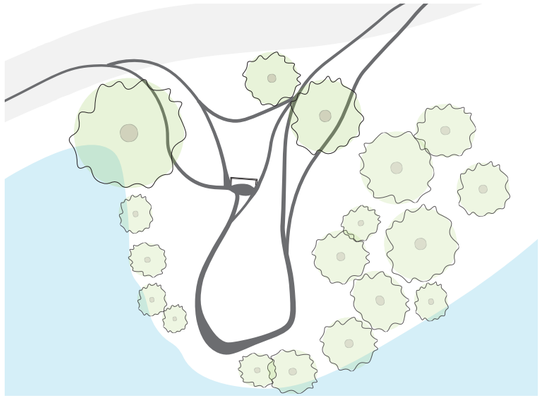


Figure 5.44 - site 4 existing movement pathways

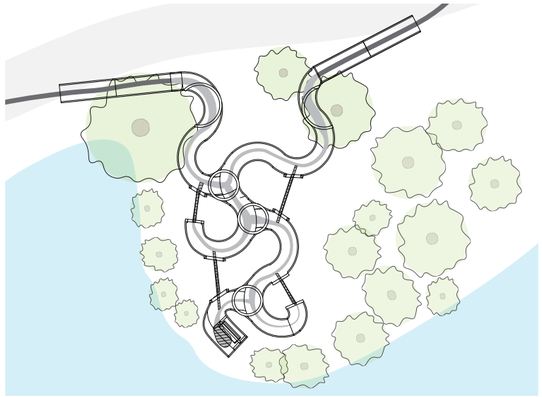


Figure 5.45 - site 4 proposed movement pathways with structure

moments the user reaches up or down to move the screen, varying the mode of rotation within the body. At various points throughout the structure, there comes an opportunity to jump between pathways with the help of a swinging rope which slides along a horizontal track, facilitating the movement of jumping over the gap between platforms. At the southwest end of the site, there is a stopping point that overlooks the lake with a swinging bench. This serves to maintain the existing seating element on the site while repositioning it to be better optimized for the view. This setup also maintains similar actions to other points of the structure — namely, swinging with the weight of the body and facilitating the separation of the body from the floor surface below — but in a stationary spatial position.

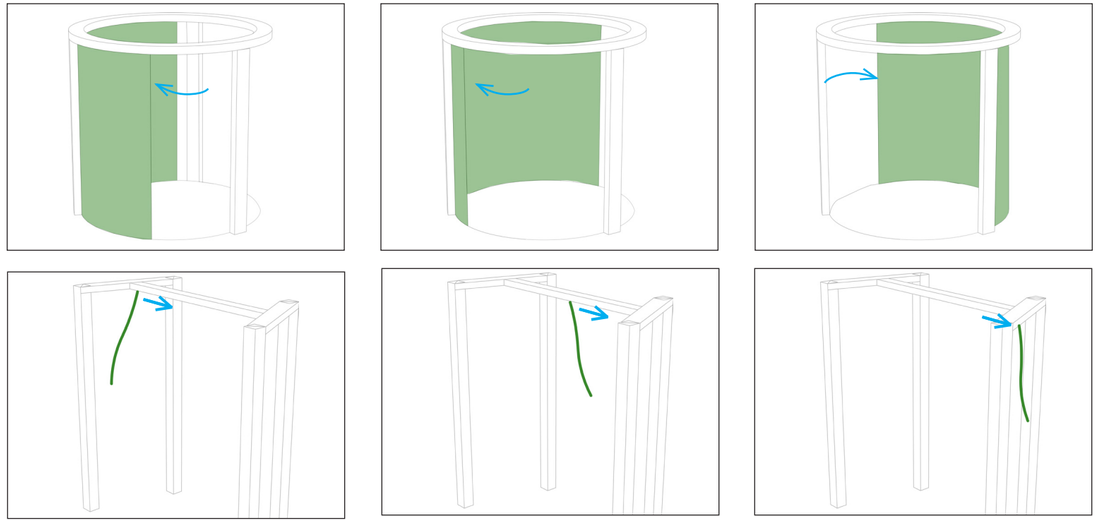


Figure 5.46 - detail of moveable elements in structure 4

Figure 5.47 - structure 4 rendering collage

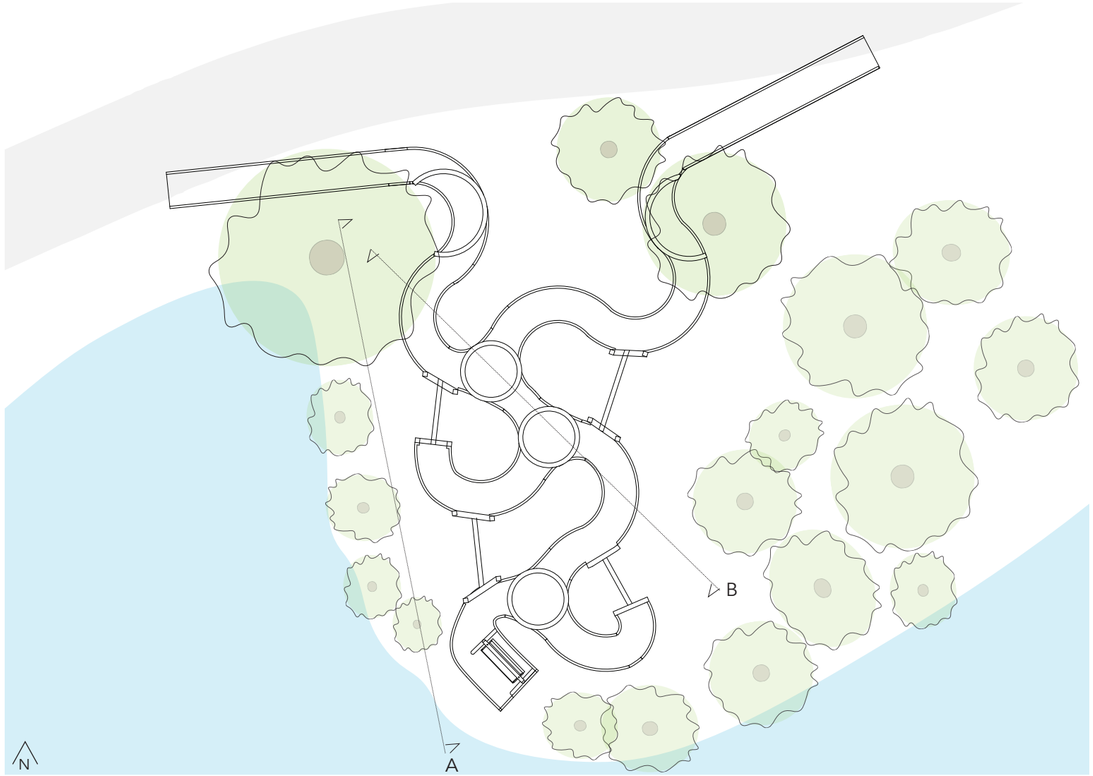


Figure 5.48 - structure 4 plan

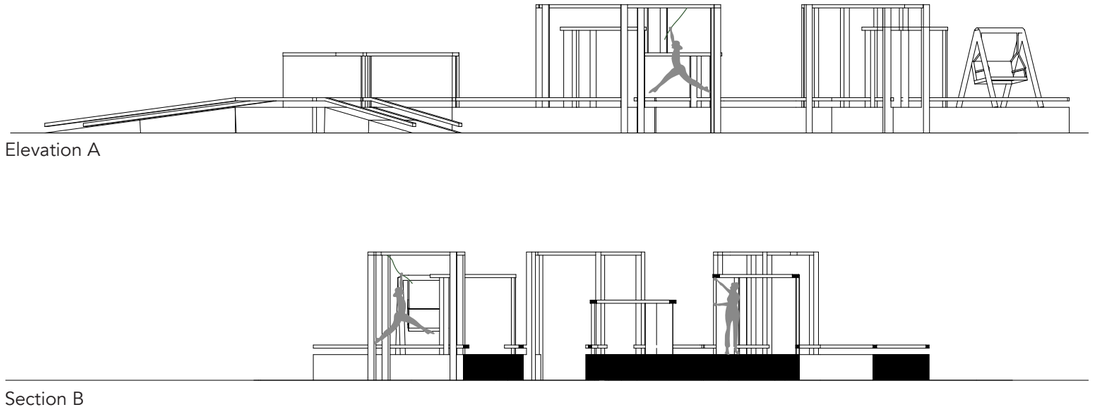


Figure 5.49 - structure 4 elevation & section

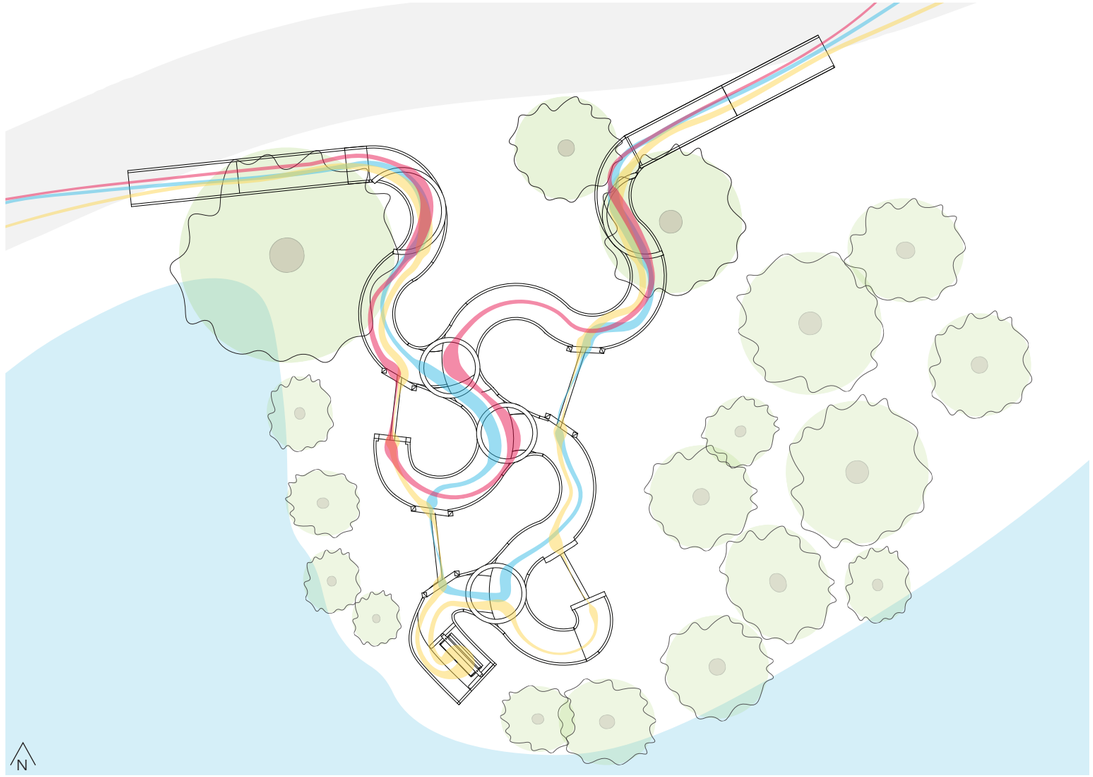
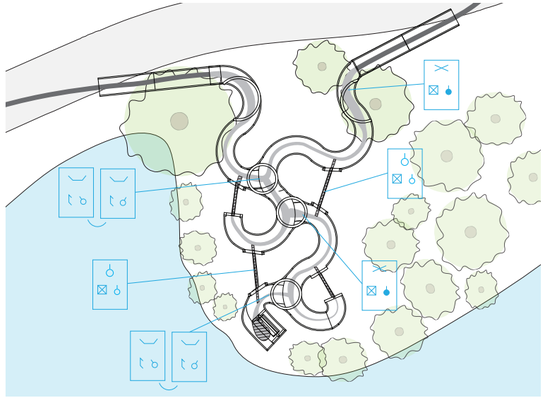


Figure 5.50 - movement pathway possibilities through structure 4



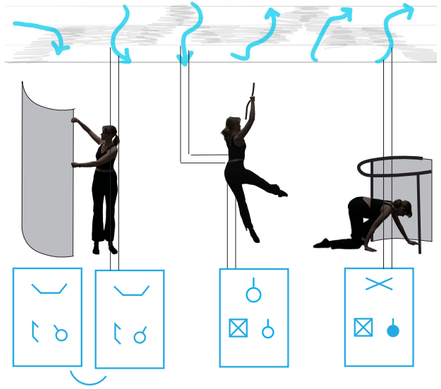


Figure 5.51 - structure 4 movement analysis diagrams

VARIATION IN MOVEMENT

The goal of this project is to create a recreational play space on the Mount Holyoke College campus that allows students and community members to engage in full-bodied movements beyond average daily actions, bringing movements from a dance context into an environment that is approachable to those who do not regularly engage with these types of motions. The structures act as an improvisational movement score by providing a guide for movement exploration while allowing freedom to play within the framework provided. By largely staying away from traditional playground equipment, the design avoids preconceived associations of the movements that standard and familiar equipment is typically meant for, leaving space for exploration of the movement possibilities within each structure. While each one is based around specific movement ideas, these ideas are purposefully kept as broad categories so that movements are not restricted, and any movement outside of those specifically selected is welcome. This sense of play and discovery in a movement-centered environment brings the users into the world of dance improvisation, cultivating an experience focused on the movement possibilities of the body and the kinesthetic experience of movement itself.

05 ENDNOTES

1. "Campus Trails." *Mount Holyoke College*. https://www.mtholyoke.edu/academics/centers-and-facilities/campus-trails

05 FIGURE SOURCES

Figures 5.1 - 5.6: drawings and photographs by author

Figure 5.7: Peter Raper, *[MHC Senior Capstone Concert "Between Thresholds"]*, photograph, *Flickr*, 2025, https://www.flickr.com/photos/111040228@N03/albums/72177720324734391/.

Figure 5.8 - 5.51: drawings and photographs by author

CONCLUSION

CONCLUSION

In order to design spaces that center the human experience, architects must consider the experiential aspect of movement and the kinesthetic sense. We are constantly moving as we experience architectural spaces, whether by changing our relative position in space or the orientation and position of our body in the space immediately surrounding us. To consider these concepts, designers can reference the work of postmodern choreographers and their orchestration of movement pathways through space. Incorporating these methods into the architectural design process supports an approach to design that prioritizes the kinesthetic experience.

In this project proposal, I model an example of what a movement-centered design approach can look like. The human body has countless movement possibilities, and yet so many of these go unused and unexplored by most. This project aims to expand the movement repertoire of the users and to encourage curiosity and discovery about how the body can move and respond to the built environment. The focus of this project is on movement as the primary function of the interactive play structures, in order to more clearly demonstrate how movement considerations can be addressed in the design process. These strategies, diagrammatic methods, and approaches to stimulating the kinesthetic sense are not exclusive to the design of playground structures, however — a movement-centered design approach can and should be applied to a variety of design contexts and typologies.

If, as Bloomer and Moore suggest, a building is an incitement to action and a stage for movement, there is so much more that could be done on the stages of our built environment, and so much potential for how our movement repertoire could be expanded by incorporating possibilities for alternative modes of moving into architectural spaces. What if libraries were designed to encourage variation in movement pathways and bodily actions, turning the process of searching for books into an exploration of both knowledge and

movement possibilities? What if schools were designed such that the transitional space of the hallways between classrooms became not merely functional but a kinesthetic learning environment? What if a residential home were designed to include features which encourage different modes of moving, creating possibilities and invitations for stimulating the kinesthetic sense in one's own home, every day?

Movement exists in every corner and level of the built environment, and is the thread which binds together every space that we inhabit. It is not just a means of transportation from one place to another, but an experience in and of itself that should not be overlooked. By taking on the role of the choreographer, architects can create designs that center the experiential aspect of movement and how it relates to the built environment.

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White Bouncy Castle (1997)

Scattered Crowd (2002)

The Fact of Matter (2009)

APPENDIX

Between Thresholds

Choreographer Meghan MacBeath

Dancers Abby Chan
Wilsie Ferris
Helena McGowan
Lucy Richards

Curtains Molly Armbrust
Ryanne McCann
Molly Thomas

Costume Design Meghan MacBeath

Music Credits "Travelling Istma" by Geoff Bennett
"Salt" by Poppy Ackroyd
"Fern" by Zöe Keating

Notes & Acknowledgments

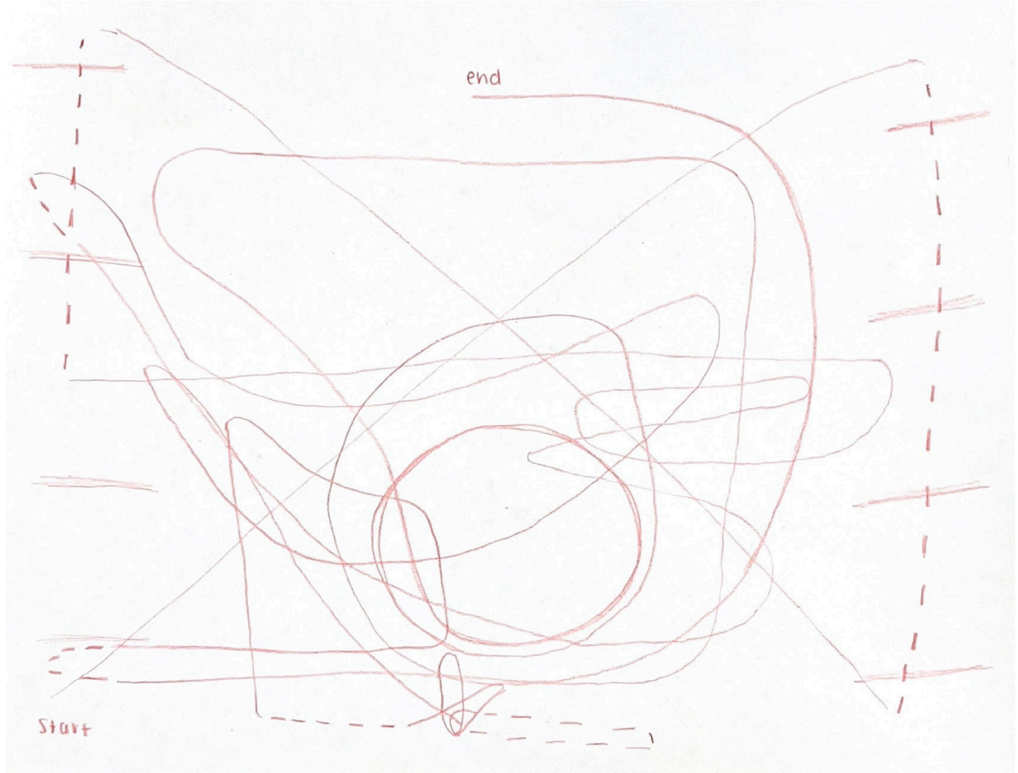
This process and work is part of an ongoing exploration of the overlapping roles of the choreographer and the architect, investigating shared methods of directing pathways of movement through space. It highlights the relationship between movement and its surroundings: how the space informs the movement, and how movement shapes the space itself and our perception of it. As we travel from here to there, what guides the in-between?

Thank you so much to my wonderful cast, Abby, Wilsie, Helena, and Lucy, for your consistent dedication to this process and work - I am so grateful for your hard work, investment, and willingness to try whatever I bring to rehearsal! Thank you also to my classmates for your endless support throughout this process and the last four years we have spent together, and to all of the dance faculty for inspiring me and pushing me to find my artistic voice. Thank you to Naomi Darling, Lisa Haber-Thomson, and Barbie Diewald for your support in the development of my thesis project, which has been deeply connected to this choreographic process. I would also like to give a special thank-you to Ezekiel Baskin and the production team for your dedication to realizing my artistic vision through the lighting of this work. Lastly, I would like to thank my family for your constant love and support, and for encouraging me to become the artist that I am today.

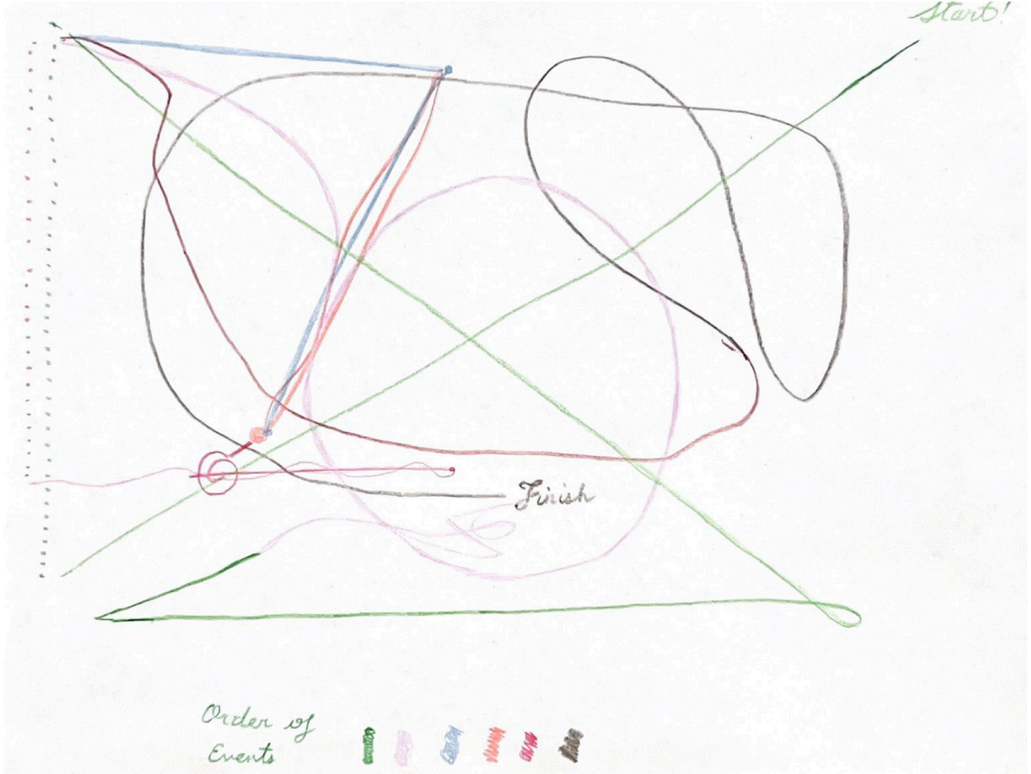
Program page for "Between Thresholds," MHC Dance Department 2025 Senior Capstone Concert "Soul Ties" (program design by Frankie Crosby)

Visit this link for a recording of *Between Thresholds* by Meghan MacBeath, performed in the Mount Holyoke College 2025 Senior Capstone Concert (video by Paul Fortier):

https://youtu.be/8xKFbNp6m8o



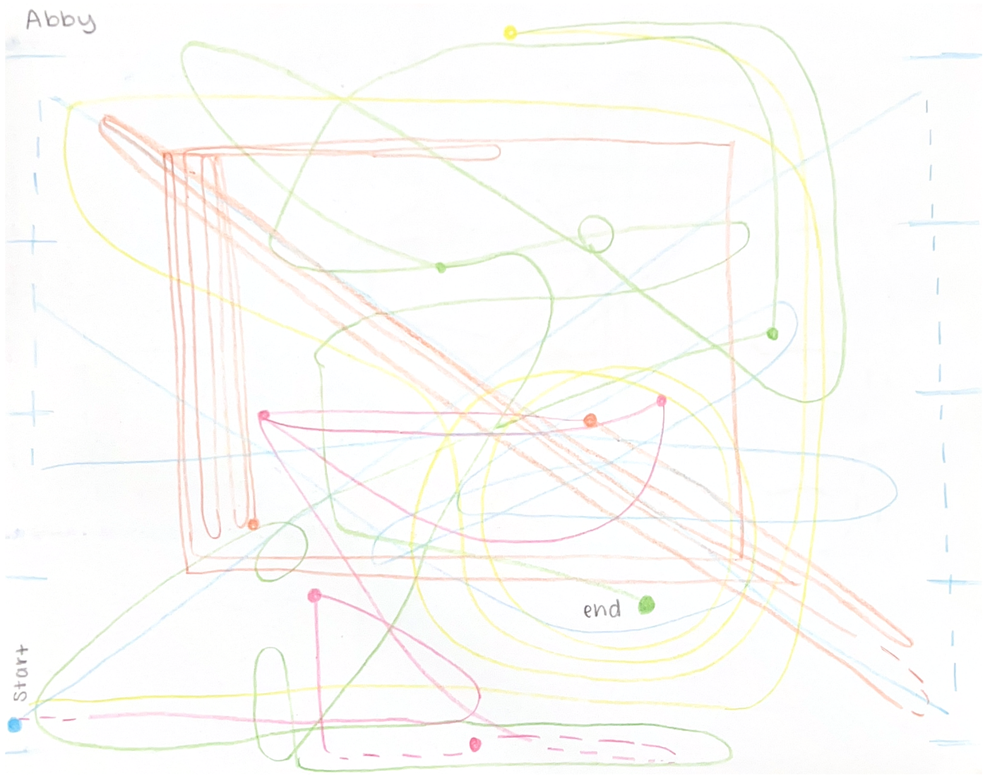
"Between Thresholds" movement pathway diagram, mid-process (Abby Chan)



"Between Thresholds" movement pathway diagram, mid-process (Wilsie Ferris)

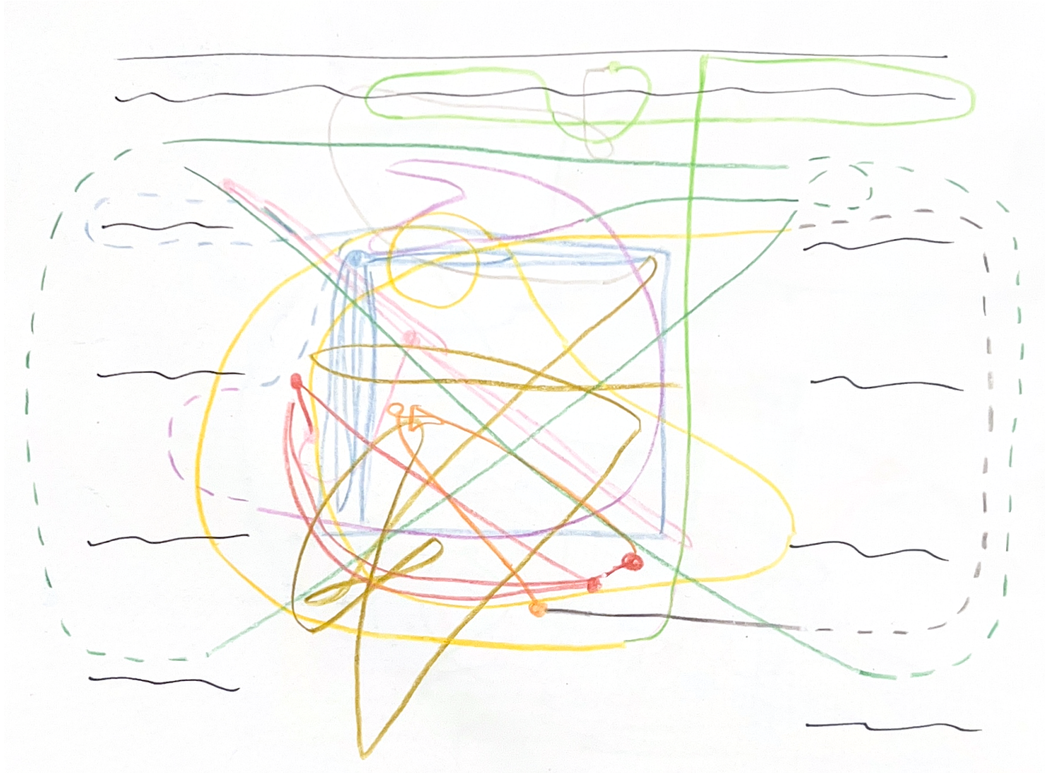
"Between Thresholds" movement pathway diagram, mid-process (Helena McGowan)

"Between Thresholds" movement pathway diagram, mid-process (Lucy Richards)



"Between Thresholds" movement pathway diagram, finished work (Abby Chan)

"Between Thresholds" movement pathway diagram, finished work (Wilsie Ferris)



"Between Thresholds" movement pathway diagram, finished work (Helena McGowan, drawn by Meghan MacBeath)

"Between Thresholds" movement pathway diagram, finished work (Lucy Richards)