KINESTHETIC SPATIOGRAPHY. INTERPRETING HUMAN MOVEMENT IN URBAN ENVIRONMENTS AND THE CONTRIBUTION OF DANCE.

DOI: 10.26341/issn.2241-4002-2024-3b-1-T02065

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Abstract
It is needless to say, the urban environment is considered the dynamic stage set, where every person's activities, affairs, and all other relevant facets of daily life take place. Each person enters this environment, and in their ways, they roam and interact trying to understand it through movement. This action demonstrates that human movement is a fundamental aspect of urban life, creating a bidirectional relationship between humans and their surroundings. As a result, the very structure of a city can be remodeled. Thus, it is an exceedingly important criterion to consider in urban design; examining the dynamic of movement can lead to more flexible and anthropocentric spaces. Due to the rapid development of technology and technological advancements, the complexity of human movement through urban environments has been neglected. As a result, it isn't its value that is recognized, but rather, the reformations it can induce to the existing structure of a city.

The purpose of this present research is the interpretation and comprehension of human movement, emphasizing the contribution of dance as an interpretive instrument. A choreographic approach on a large city scale can reveal the complexity of human interactions in an urban environment, as it focuses on the human senses, experiences, and bodily capabilities of each individual. The correlation between space and dance is a strategic approach that recognizes the transformative power of dance, as a tool to comprehend human movement; movement can appear as choreographed, improvised, or completely spontaneous, as it is affected by the layout of the space, individual life experience and the medium through which it is created.

Henceforth, there was a full recording of movements which is based on two primary theories: On The Image of the City, by architect and urban planner, Kevin Lynch, and on Labanotation, by choreographer and dance theorist, Rudolf Von Laban. These tools aspire to the notation of both space (Lynch) and movement (Laban), which introduce a new perspective relating spatial movement with spatial morphology. They both have a standard subject of analysis which is being reinterpreted and compared, thus enabling complete comprehension of how human movement intertwines with the urban web. In conclusion, the overview of this study contributes to a deeper understanding of urban morphology, and recognition of the amplitude of human movement, which can potentiate public spaces, promote social cohesion, and create a structured environment that is aligned with human kinesiology.

Keywords*: Urban environment, physical environment, kinesthesia, pedestrian movement, dance, kinesiology, morphology, notation, human scale.*

Introduction

How an organized whole and the elements that make it up, such as squares, streets, pavements, and the placement of buildings, or the process of development of a city, is a natural interpretation of movement? How is the morphology of a city influenced by human movement? How does a built whole form within the natural environment? through movement? Can the choice of different human movements be related to the morphology of the city? Space, as a multi-productive dimension, begins to be understood and interpreted as man interacts with it, coming to experience it in his way. As man traverses an area, he often feels open distances within it. For example, there is a big difference in the walkability of a distance of 10, 50, 100 meters, or a kilometer.

During movement, man perceives and interacts differently with the space he is in, and experiences it differently. He tries to interpret the space in which he walks, from the moment he comes into contact with it through his feet and his whole body. He plays, moves, and walks freely, organized, consciously, and improvisational, leaving his imprint of movement in space. Himself, as an entity, with his measure, his proportions, the way he moves, how does he influence the organization of the city? Can there be a synthetic process that forms a "golden mean" between human movement and the urban environment, since the urban environment itself body - which moves - contains a geometric-harmonic system, as does any organic whole? Furthermore, could a movement medium, such as dance, be a key design tool, which would cover the variety of human movements in the already existing organized space, in its geometry, its morphology?

The purpose of this research is to interpret human movement within urban environments, based on the given that human movement is quite complex, with several aspects - such as dance movements - but also redefining the concept of choreography within the urban fabric. The paper seeks to explore methods, tools, and systems that have human movement as a primary design criterion and to compare them with the spatial morphology of an organized whole. As in a theatre stage, in which the dancer produces specific or even improvisational movements, leaving new formations and flows on it, so in the urban fabric - which is shaped by certain flows and forms - how it is affected when the 'dancer'/man produces again a variety of movements, creating a new condition within the urban morphology?

Methodology

The present research had as a primary element how humans recognize and create new spatial arrangements in the physical environment, transforming it into structured space through its movement, which is constituted between anthropogenic and spatial elements. More specifically, the anthropogenic elements are divided into subjective and objective elements, which interact differently with the spatial elements, with human movement the link between these elements; however, the executive means of movement can be an object, a machine, consciously or unconsciously influencing both the human being and the space in which it takes place. movement. This condition brought as a reflection on how the spatial experience experienced in any way movement, can create a new image and perception of the image of a city, therefore having explained the dynamics of readability of an urban environment through a specific methodology (Image of the City) and having analyzing the importance of the human body and the multiple aspects of movements it can perform, similarly through methodology (Labanotation), I conclude that the best way to understand the complexity of the of human movement is a systematic recording of it in an existing - familiar - urban environment. The complexity of human movement is remarkably multidimensional, as is dance, which, despite the requirement of following a specific rhythm and time required for its

performance, involves all modes of movement of the body and its relation to the surrounding space.

1. Kinesiological reading of space

The man is confronted by several natural factors on how they interact in a plain, a mountain settlement, or a forest. Nature and the obstacles it poses, the sizes, natural formations, the textures of the terrain, the various materialities we observe, as well as the presence of other beings, are determining factors in 'how' and 'where' man can operate, and as a consequence explore how he can confront the environment. In the course of his pedestrian movement, he forms new boundaries in space, records and captures the landscape and the movements that form a series of physical improvisations that come into direct interaction with the physical environment; it starts from a point and from there begins to carve a path, a flow in the physical space, to fulfill its needs.The image of man is impossible to disconnect from his environment because he is in constant interaction with it. That is why the physical environment is recognized, takes shape, and begins to become active through movement.

The footprint that man leaves during the process of movement acts as a signal in space, which guides him, enables him to pass through the obstacles of nature, and finally creates a kind of labyrinth in the environment. This is why new paths and flows are opened up in the natural environment and anyone until they remain discrete, can read them again, step on them repeatedly, and have the opportunity to wander through the numerous geometries of space that he has created. The natural environment, then, is always alive, with moving non-human forms. In all of this, the step becomes a distinct movement in space, as it is what creates the imprint on the natural environment, suggesting the appropriation of the human being within it. each pattern created by the imprint takes the form of a road so that the very organization of space is born directly from the form of the place.

In the process of walking, he is first of all confronted with the characteristics of the place; secondly, he integrates the possibilities that his body allows him to move around the corresponding characteristics of that place; thirdly, he creates a mode of movement that can manage the conditions of the environment; and finally, he forms paths and engravings. From the moment a person steps on the ground until he completes his step it is observed that there is a continuous bodily improvisation in interaction with the complexity of the natural environment. This whole process is highly dependent on the materialities, textures, and morphology of the soil.*By walking, I learn new vocabulary for my body, where to step and how to step, adjust my pace to the demands of the place instead of following my natural rhythms, avoid leaning on thorns, and fall lightly.* It is the complexity of nature that regulates the movement of the body, as it is what prevents people from stooping, slipping, or climbing. The body is subjected to the challenges that the natural environment presents and is physically involved with it, which has its corresponding effects on the environment.

All that said, from the moment a human walks on the ground, he reshapes it at the same time. He uses his body as a system of proportions and dimensions for the construction, where in this case the construction is the road. Juhani Pallasmaa points out that as man moves and disperses through the natural environment, he creates patterns of circulation to exercise activity on them. The territory is bisected, and partitioned, as this is the context in which man moves. The axis of movement becomes a road axis, carving through the landscape, and can be straight, curved, undulating, broken, and all of these together. The new form of shape/flow produced by human movements in space creates a new organization and structure of space.

These movements can be categorized as follows: the somatic movements and the experiential movements. In the first category, the structure of space is directly influenced by the steps and maneuvers of the body as these are the elements that create the flow within the

physical environment. In the second category, experiential movement is related to direction, and interaction in space.

2. Relationship between anthropogenic-ergonomic elements and spatial elements

As long as a man needs two legs and two arms, the scale of his body must be the measure of size for all constructions. This applies not only to staircases and ceiling height but also to the design of public space in an urban context. This condition refers to the fact that the human scale must always be present in the compositional process of organizing a space, both small and large scale. A relationship is created between dimensions and the human being which helps to better understand and perceive space. Such examples have been seen in Jean Tricart's theory, Principes et méthodes de la géomorphologie 1965 in which 3 kinds of scales are identified:
- the street scale, to which the buildings belong
- the scale of the neighborhood, to which all the blocks belong
- the scale of the whole city, which contains all the districts.

But also in Edward Hall's theory, Proxemics Theory. Body proportions refer to the dimensions of the human body, which play an important role in understanding and interpreting the environment. Man faces the city with his body. His feet measure the length of the arcade, and the width of the square.

When moving on foot, the person constantly changes position and posture, and as a result the given perception of the space in which he or she is present changes. The visual information he receives when moving in an environment must be proportional to the positions/points in the space so that the appropriate transmission of the image can take place; he must adjust his movements as he sees constant changes in space, thus enabling his gaze to move from one point to another. In short, the visual stimulus received by the human eye must be able to be isomorphic to the view of the visual field it creates in space.

3. Relationship of anthropogenic - subjective elements with spatial elements

All movements are controlled by the motor system of every human being, creating a range of interactions both from the body and from the individual's temperament. The body is activated, and mobilized to touch, to feel the space, and along with it, all the senses work in parallel. All this contributes decisively to a better sensory experience in space which can work in the better interpretation of space, which requires good control of the body, as it is the body that connects the person with the external and internal world. For example, if the person moves on the axis upwards, it is implied that he is above the center of his body, which creates a sense of freedom, comfort, and relaxation. On the other hand, if he moves downwards, a sense of fear is implied, that he needs to protect himself from somewhere. Such cases are observed in African dancers, who come into direct contact with the ground, due to the vertical posture of their bodies and the gestures they perform. On the other hand, however, European dancers try to escape from the earth, jumping off the ground, creating a sense of perpetual movement on the stage.

The way a space is experienced is influenced by several factors, such as recognition of elements, aesthetics, the possibility of action, and the use of space, resulting in a spatial experience. For these to be realized, people must move through the space, judging which way to go. Therefore, the experiential experience of a space is directly interwoven with the person's kinesiological state. Such a case can be found in the Parc de la Distance, a project by the Studio Precht group in 2020, which applied the rules of physical distance to its design. The human being moves within this circular spiral, discovering space, charting his course and

therefore his own experience. It is observed that space is experienced as a labyrinth of continuous movement. The body and movements enter into a continuous dialogue with both the organization of the city and the buildings that surround it.

Subsequently, the image of the body in space becomes a unified and continuous experience; through it, man manages his dwelling, the spaces in which he will be active. In a way, he shapes space based on his movements, which change as the body grows and develops.

4. Will of Human Movement

People form walking paths that pass between buildings, cross sections of roads, and cross paths with other people so that their wanderings create a new field in space; ultimately human movement and subjective wandering subvert the data of public space. In this particular case, therefore, the "Flâneur"/"Flâneuse who wandered through the city to appropriate it, playing with random incidents during his walk, cannot be omitted. It is thus observed that in the process of movement, there is a two-way relationship between the observer and the observed. The observer selects, organizes, and also attributes what he sees as he moves. In the case of the dance drama, the dancers are the main component of the performance of the event, they enter into a public space in which they are given the facility to move more, but also for other visitors to watch them if they walk into that space. They appropriate the public space without pre-planning or defining the performance they will give and aim more at mobilizing and activating the spectators.

In many cases, however, the subject (man) needs the help of an object to move, and this is no other than the integration of the machine which has largely changed the spatial configuration of the city. Both the personal car and public transport have created great changes in the organization of cities. The integration of the machine produces new patterns of movement as it is necessary to first take into account how people move and interact within the city and then integrate the public transport network. it has reduced the travel time from one place to another, resulting in people moving at a much higher speed than when moving autonomously.

There is also the case, however, in which another body performs the movement but the body itself can control it. Is it possible that there is a category in which the human observer does not perform any movement but only moves an object that he has designed himself? Movable objects and kinetic art have made it possible through technology for human beings to intervene in the process of movement. Firstly, virtual kinetic art explores the possibilities of movement through technological elements, creating a hybrid space in which the human being is a mere observer and not an agent of movement. Ultimately, kinetic art contributed decisively to the creation of mobile objects, creating an inverse condition for movement from the one we know. Nonetheless, the rapid evolution of technology has reached the everyday means that people use to move, and as a result, they can move without being guided by anyone; I am referring to autonomous cars and their complex capabilities. They are capable of sensing the environment and operating without human involvement.

However, it is a human being who determines which way to move, dispersed within the mobility systems of each city, within which he or she performs different movements, creating his or her route. It defines the beginning and end of this, which may begin - or end respectively - in a square or generally in an open space within the urban fabric. The way people move around a city has a direct impact on the overall layout and design of a city. If a city experiences congestion due to people moving around, this can lead to the creation of new road layouts or changes to the road network to improve traffic flow. For example, in Piazza Del Campo in Siena, Italy, pedestrians have to walk three meters down the sloping pavement and then three meters up to complete the crossing of the square. The process of movement is

set in a context consisting of intermediate spaces, and events, which are necessary for the composition of the city's structure and as a result, the movement becomes more perceptible. The city directs people from one place to another and they choose whether to follow it or not.

5. Enhancing spatial experience and movement through poetics and kinesiology

The poetics of space refers to the emotional and sensory qualities that a space evokes, emphasizing elements such as intimacy, and connection with human experience. For example, the paths carved by the architect Dimitris Pikionis on the rock of the Acropolis and on Philopappou Hill were aimed at enhancing the element of surprise, i.e. the visitor turning around, the Parthenon appears above the ancient wall. Even Aeolou Street, which is parallel to Athena Street, (which according to the Cleanthi-Saubert plan envisaged a central axis directly to the rock of the Acropolis) is aimed at the Parthenon. This creates a different experience of urban space, which also contributes to the way people move, resulting in a sensory experience. (Following on from this) Both the poetics of movement and space contribute to the kinesthetic experience of space which is suggested through the way humans move through an environment. The term kinesthetic refers to the perception and understanding of space through bodily movement and sensory experience. That is, it emphasizes the idea that bodily interactions, such as walking, touching, and experiencing spatial relationships, shape our understanding of space. In the field of physiology, kinesthetics analyzes how muscles, balance, and motor sensors are involved in the perception and control of movement.

The kinesthetic experience creates a new reading and representation of the city, which also forms a 'different' mapping of the city. This new mapping focuses on how humans perceive and navigate urban environments. Once they have created new images of the city - through kinesthetics - a new perception of space has been created, which in the end also forms a different mapping.

6. Re-interpretation of the design process based on the motion/choreography method

The layout of space is directly affected by how the space is organized, and how the objects are presented in it, with the consequence that the overall spatial form is directly modified. Consequently, there is an interplay between the organization of space and spatial morphology as both of these elements refer - in our case, in which the human being moves - to the arrangement of the body parts in space and their relationship to each other. It is the man who will assimilate the organization of space as he is presented in it, according to his size, spatial orientation, and the capacities of his bodily movement, thus morphing it, consciously or not, based on his posture and movements. The body is constructed to allow a man to participate in six movements beyond the circular motion to himself. The movements are: forward, backward, up, down, right, left. These movements define the body's image in space, which forms a foundation in the formation of spatial form. He is in an aware relationship with space, as a dancer does as he performs a dance movement, which translates as a living changing architecture because he creates forms in space. The dancing body produces movements that continuously produce spatial formations, which create an organized field of possible movements.

Therefore, the morphology of space is directly determined by the position the body occupies and the way it will move. When the human body is in a space, it is somehow trapped and regains its freedom to the extent that it perceptually settles into the sensible geometry of the space and coordinates its bodily shape with it.

Results; Recording movement: notation of movement and space - Assimilation of human movement urban environment

Space is transformed through the body's action, as human movement introduces a dynamic into geometric space, giving it a new aspect. All body parts begin to meander in various ways, giving multiple kinesiology effects in space. Is it possible to record, by some method, all this multiplicity of human movements in space? And if so in what way, so that it can be brought into relation with the morphology of space?

This method is called semiotography (or kinesiography) of space, which visualizes human movement with the help of certain symbols within an urban environment. The first tool I used to record movement is the Labanotation notational system of dance movement, by choreographer, and dance theorist Rudolf von Laban. This system records the structural aspect of movement or otherwise, "the mechanics of movement - what part of the body is moving in space. It is based on the use of abstract symbols that represent body parts and movements they can perform. This visualization covers any form of movement that a person performs, as well as any kind of movement in space. According to Laban, the most direct and clear difference that is perceived by someone observing a kinetic process is that between the flow of motion and the shape of the motion. It is worth pointing out that Labanotation has movement, not dance, as its point of reference, so it can be applied to any form of movement.

The second part of the methodology I used was based on Kevin Lynch's mental maps, refining the image of the urban environment based on the five key elements that make it up, which he also used for the cities of Boston, New Jersey, and Los Angeles. "The Image of the City" explores how humans perceive and navigate urban environments. His work was based on the key elements of urban Imagibility and Legibility, providing information on perception and navigation in the city, highlighting the value of the kinetic aspects in the urban fabric. He, himself, focuses on people and their kinesthetic experience of space, emphasizing how they perceive and represent a city and how they might record it. There are two similarities between the two theories: Lynch's theory notates space, while Laban's theory notates movement. Therefore, based on this condition, I considered these two tools to be the most appropriate to capture human movement in an urban - but also familiar - environment with complete clarity.

1st Step; Recording is carried out within a radius of 350 meters which marks the boundaries of my neighborhood, including the places I walk around the most. around my home. (Appendix 1)

2nd Step; The diagram illustrates the key services that services that exist around the house, some of which are landmarks. (Appendix 2)

3rd and 4th Step; Mapping the neighborhood based on Lynch's mental map methodology (Appendix 3)

5th Step; I count the distance and the duration it takes to complete my walk. (Appendix 4)

6th Step; Mapping of possible moves that can be that can be carried out during the movement using the Labanotation. 4 possible movements have been recorded. (Appendix 5)

7th Step; Create possible motograms which are Possible motifs that symbolize the movements performed by the human being during the time of walking. (Appendix 6)

8th Step; Positioning of the markers and nodes that pass through the routes. (Appendix 7)

9th Step; Placement of the kinetograms within the Paths. Note the relationship that can exist at the beginning of the corridor (house), in the 'middle' (nodes), and at the end (landmark). In between these, there may be a repetition of symbols, until the time required for each path is completed. (Appendix 8)

10th Step; Final visualization of assimilation of human movements performed in the aforementioned elements of the urban environment, observing the multiple aspects of movement around the specific forms of these elements. (Appendix 9)

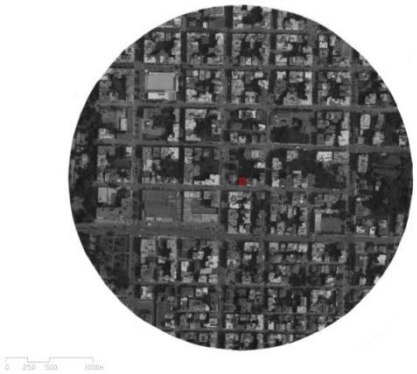
Conclusion

It is a fact, after all, that every living being treats space as a structure of motion, and is concerned with the distances between two points, the directions, the flows, and the boundaries that intervene to move from one space to another. Can we finally assume that the organization of a structured set is the element that establishes an infinity of possible movements? Is it possible that the dynamics of the human body - which produces the infinity of movements, is the link between the spatial elements, the rhythm of movement, and the morphology of an environment?Through movement, the natural environment is recognized and inhabited, transforming it into material, and creating an interplay between man and space.

Bernard Tschumi said that in "*aninhabited world, boundaries can be rendered through a syntax of place, path, pattern, and edge. Within each of these four, architectural arrangements can be considered that respond to the natural landscape as well as to human bodies. Humans form a multitude of flows, forming a set of spatial relationships that are considered pathways of the human body's existence and movement in space".* Similarly, choreographer David Rockwell said that: "*the built environment urges us to move around it and to give it movement. The paths are long enough for pedestrians to move along the square in two directions simultaneously, offering proximity without any visual barrier. The curved movement paths create the promenade, while the platforms are likened to urban scenes. Human movement, as a function of both kinesthetic and bodily perception, is the essential medium that documents the spatial morphology of a city, highlighting the numerous schematic representations it creates".*

By interpreting the complexity of human movement with that of dance, a holistic approach and understanding of how dance, as an art form deeply rooted in human expression and physicality, offers a unique way of observing, recording, and documenting a space. Just as in a choreography it brings to the fore elements associated with the manipulation of geometric engravings, visual flights, marks, and boundaries in a scene so too a simple, everyday pathway requires a documented process that recognizes the characteristics of an urban space. We could ultimately say that the city is everyone's everyday setting, with constant interactions, events, and experiences, where, through the complexity of movement, a spatial approach is created between the morphology of the city and man. (Appendix 10)

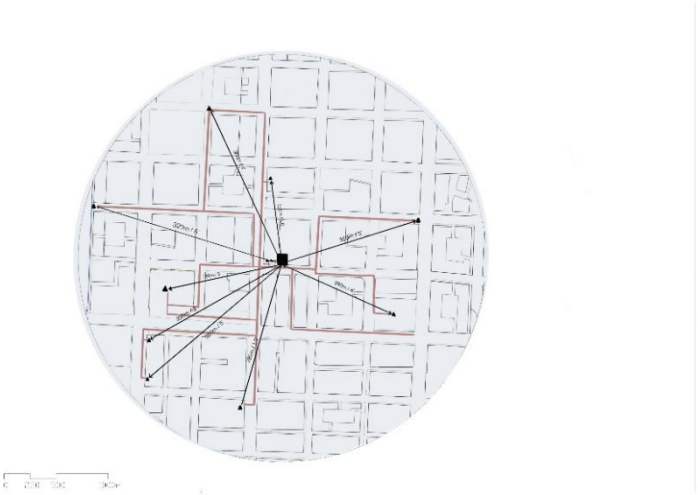
Appendices



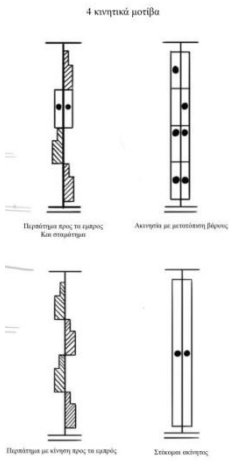
Appendix 1

Appendix 2

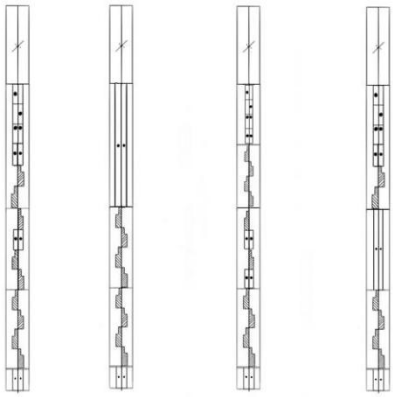
Appendix 3



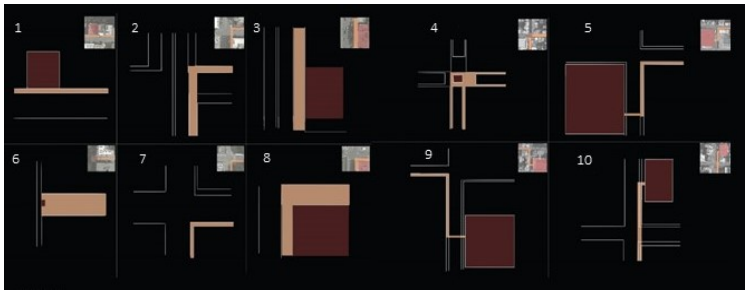
Appendix 4



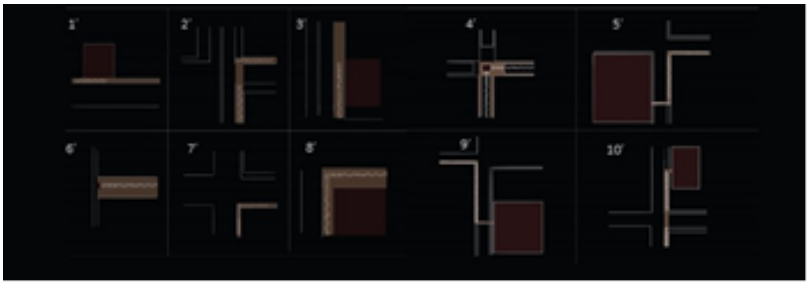
Appendix 5



Appendix 6

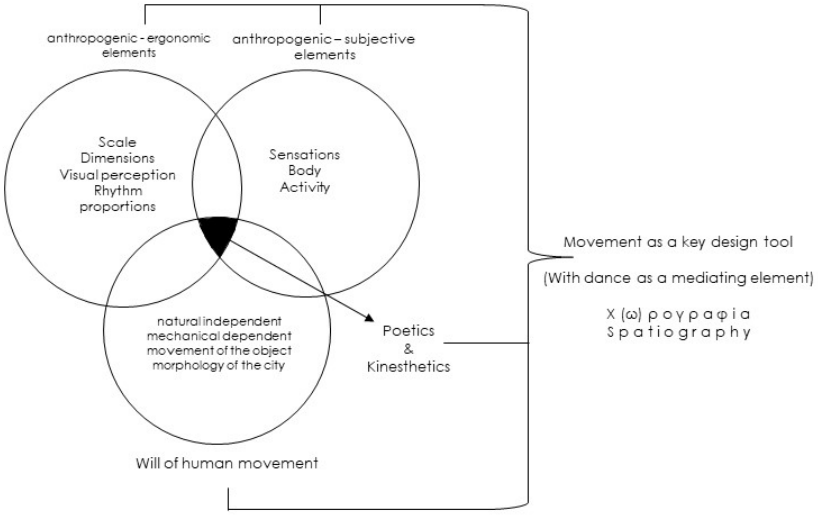


Appendix 7



Appendix 8

Appendix 9



Appendix 10

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