Variable Space: A Conversation Between Architecture, Landscape and the Body

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Variable space is a type of environment that facilitates, invites and prompts the body to inhabit space in a variety of ways beyond those practiced in daily life. Such environments may offer a sense of relief within a society where design standards, social codes, safety regulations and liability concerns, have come to dictate how, where, when and why our bodies move. The lack of spatial variability in our urban environment not only limits the human range of movement but encodes spaces with invisible labels that reinforce social, physical and generational segregation.

MOVEMENT AND SPACE

Variable space unfolds through interactions between movement and space. As an example we might consider the body ascending and descending in space and how the ground plane might be shaped to facilitate this movement. The basic architectural element of stairs would typically be associated with such movement, which would be performed with a relatively even rhythm of weight shifts; a similar movement can be achieved through an undulating ground plane that becomes a mounded form. Unlike the stairs, the mound as a landform has the opportunity to vary topographically, perhaps ascending very gradually to the top and then dropping steeply on the other side. Depending on ability, skill level, desire for challenge etc. a person would have many options for traversing the slope. As such the constructed variable space of the mound invites a conversation between architecture, landscape and the body. Using bodily movement as a driver for generating space, a rich palette of variable spatial conditions can be generated and tested. In order to take this research to the next level, collaboration with movement experts in the fields of dance and occupational therapy, was both necessary and enlightening. From the dancer's perspective, movement is the primal mode of human expression and communication; therefore enhancing not only the quantity but also the quality of movement practiced in our daily lives must be taken seriously. From an occupational therapist's point of view, movement of the whole body along with the positioning of neighboring body parts is viewed from a sensory-motor perspective and balancing of four rhythms: rest, sleep, work and play.[1] Both dance and occupational therapy offer a multi-faceted understanding of body-space or person-environment[2] relationships that are particularly relevant to designers today as we seek new ways heighten bodily presence in an era of digital dominance and reduced spatial awareness, counteracting detrimental effects on human health and well-being. Through this research the distinctions between the proximate and grounded world of the human body and the more distant realms of architecture and landscape begin to dissolve and inform each other.

BODY AND ARCHITECTURE

The relationship between body and architecture is grounded in architectural history. Recalling the Modulor Man devised by Le Corbusier in 1947, the human body played an important role in architecture. As a universal system of proportions based on a six-foot tall man as the "module", his Modulor Man is segmented according the "golden section", a ratio of approximately 1.61. These proportions can be scaled up or down to infinity using a Fibonacci progression, allowing them to be applied to everything from furniture to buildings. The use of a male figure of perfect proportions has been subject to modernist critiques that call into question the notion of normality: "The embodiment of normality was expressed in a diagram conceived by Le Corbusier in 1925 called the Modulor, a device which utilized the proportions of the (able) body to enable the architect to create the built spaces…"[3] While disability, gender and ability are clearly problematic, the other issue is that the Modulor Man is viewed as a static being. Perhaps a useful way of updating Le Corbusier's Modulor Man would be to propose an alternative body that operates as a modulator of space to acknowledge the dynamics of movement, space and time as essential to architecture. Going back further, Leonardo da Vinci's Vitruvian Man also represented a set of ideal proportions, depicted as a static body inscribed in a circle and a square. As an architect, engineer and author of the treaty 'De Architectura'[4] which was the book on architecture during the Renaissance, Vitruvius placed the body at the forefront in a quest for humanist architecture and to define a universal formula for making beautiful buildings.

	CHOREOGRAPHIC ANALYSIS	SPATIAL ANALYSIS
Discipline	Dance/Choreography	Occupational Therapy
Method	Laban Movement Analysis (LMA) of Playful Actions: swinging / lying down / balancing	Plaster Casts and Choreographed Figures: Balancing of Four Rhythms (rest, sleep, work, play)
Framework	BODY, EFFORT, SHAPE, SPACE	FACILITATE, SUPPORT, CHALLENGE

Figure 1: Organizational structure for two research methodologies

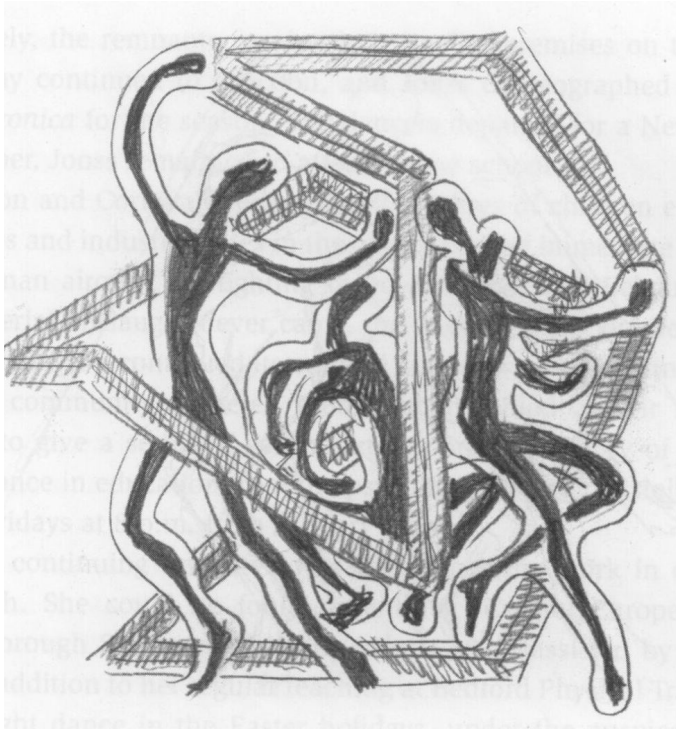
In contemporary architecture, the human body as a form-generating device and symbol of ideal proportions has been overtaken by numerous other design drivers relating to program, material, tectonics, structure, environmental concerns, cultural conditions, digital fabrication etc. More recently, dance and architecture joined forces through choreographer William Forsythe and Ohio State University's Advanced Computing Center for the Arts and Design (ACCAD) and the Department of Dance, in the creation of Synchronous Objects (2009) a system for understanding and analyzing the interlocking systems of organization in the choreography of William Forsythe's "One Flat Thing, reproduced"[5]. Using a gridded field of tables as a horizontal datum, the dance is viewed frontally (in elevation) and from the top (in plan) through video. The project also works with scores, translating movements over time to paper. A notation system was developed as a set of instructions that guided each dancer's movement. Like an orchestral piece with repeated themes and theme fragments, the multiple formats of the work, from a staged performance to scores and architectural diagrams, co-exist as interconnected elements held together like a set of architectural drawings.

BODY AND LANDSCAPE

Since the 1960's land art movement, when artists began to explore landscape as an alternative setting and medium for artistic exploration, the body's relationship with landscape took on new forms. Often falling under labels such as participatory practice, public art and performance art these practices have also found themselves intertwined within discourses of landscape architecture and urbanism.

In the 1970's Trisha Brown, one of the founders of the Judson Theater group, made us aware of the roof-scape of New York City through her bold movement explorations in urban settings. In Brown's seminal 1970's work 'Man Walking Down the Side of the Building'[6] she made us aware of the vertical landscape of walls in the city. Floor of the Forest[7] is another piece by Brown that consists of a sculptural steel frame holding up a web of ropes that have been threaded with colorful used clothing. Placed at eye-level, this horizontal plane becomes a soft platform for two dancers to negotiate. Climbing onto the apparatus, the dancers weave their way across the structure by putting on and then taking off the clothing, in essence creating a suspended landscape of bodies. Choreographer Simone Forti created a 'Dance Construction'[8] called the 'Huddle' consisting of a group of people who stand very close together in forming a solid little mound and take turns climbing over the top, coming down the other side, and then another one climbs over the top and down the other side. This piece calls attention to the structural attributes of human body operating collectively as living architecture. Austrian choreographer Willi Dorner studies the negative spaces of cities by having dancers occupy them in 'Bodies in Urban Spaces.'[9] Lita Albuquerque's 'Spine of the Earth'[10] was a striking large-scale performative sculpture that took place in 2012 tracing the topography of the Baldwin Hills Scenic Overlook in Culver City, California. More directly associated with landscape architecture and its legacy is the collaborative work of Lawrence and Anna Halprin, driven by a deep interest in community engagement and "unlocking the creative process."[11] These early 1960's experiments have evolved into many of the innovative

Figure 2: A Three-Ring Harmonic Form Danced By Three Figures Within An Icosahedral Framework.[Laban Archive, National Resource Centre Dance]



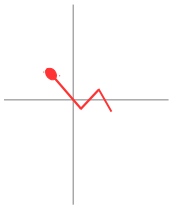
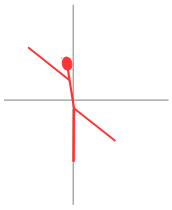
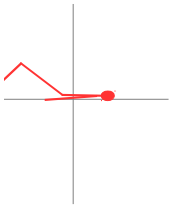
	BODY	EFFORT	SPACE	SHAPE
 SWINGING	Whole body activity Grasping rope thru arms Engage core muscles	Time/weight: rhythmic alterations of acceleration and deceleration; sensation of strength and lightness Space: mostly free flow so gives sensation of letting go; being carefree	Forward/backward, sideways could be more soothing	The body arcs through space two-dimensionally, connecting self (body/ core) to the environment (space) potentially creating an enhanced sense of **connectedness in the world**.
 BALANCE	**Core connectivity and core control;** Small modulations of core muscles help to rebalance the body when it begins to go off balance (balancing does not happen in complete stillness even it looks/feels relatively still).	D**irect space** combines with **modulations of bound flow** (control) **and free flow** (to regain balance); grounding (i.e. dropping one's weight into gravity through the body part on which one is balancing); counterbalance using opposition force	**Countertension** (a.k.a. active use of "spatial tension" or "oppositional reaching"); **risk, commitment, recovery, resilience**, and the relationship between **stability/mobility** (with potential applications to everyday living).	**Inner shaping of the core** and **outward shaping of the whole body; expressive and fully physical bodily shapes** (e.g. balancing on balls of feet with arms reaching straight up produces a "pin-like" 1-dimensional shape whereas reaching ones right hand to "side-right-high" and left foot to "side-left-low" produces a "wall-like" or flat 2-dimensional shape.
 LYING DOWN	Settling of bodily fluids (greater potential for healing to occur); increased possibilities for **sensing**. Softer visual focus allows other senses; **release** muscle tension around the joints; potential for whole body movement	Time: can encourage stillness and thus, **a break from the accelerated pace of contemporary living**; weight: allows one to experience passive weight (allowing, receiving, sensing, resting); flow: release tension (i.e. bound flow) for possibility of increased ease of mobility (i.e. free flow)	Space: Lying promotes a change from verticality and a **change of perspective** on the world/environment.	When groups of people lie down horizontally, it introduces new possibilities for **sharing, collaboration, listening, and group process**.

Figure 3: Laban Movement Analysis of Playful Actions [by Lisa Sandlos]

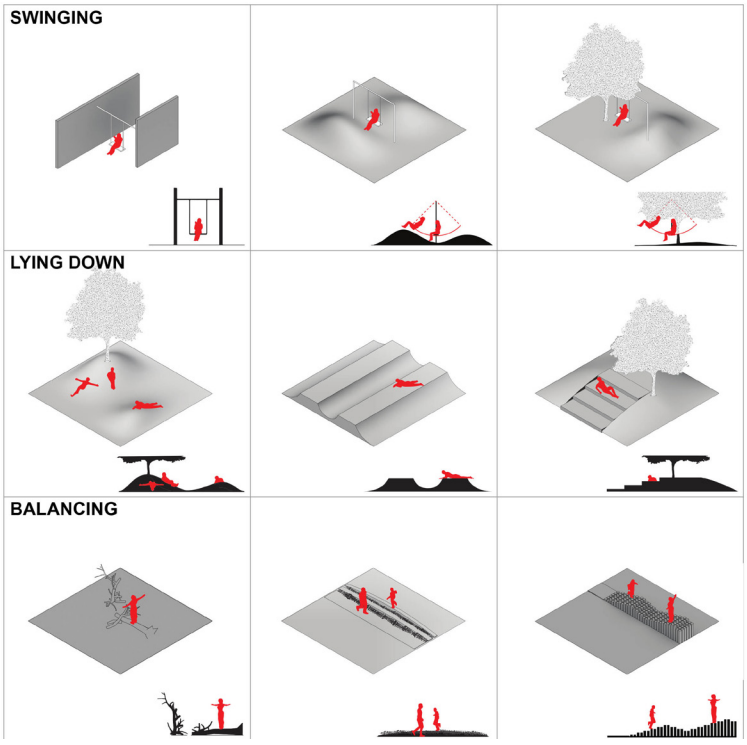


Figure 4: Landscape spatial typologies derived from playful actions

participatory practices that have come to be the expectation of citizens and clients today. Choreographer William Forsythe conceives of the body as a kind of landscape: "the body as a terrain acted upon by the work and an agent of inscribed and remembered forms that consciously monitors its own actualizations."[12]suggesting that body and landscape operate as a cohesive whole.

TRANSDISCIPLINARY EXCHANGE

As common thread across the disciplines of architecture, landscape architecture, dance and occupational therapy, movements performed in everyday life offer an excellent point of departure for collaborative exchange. Such movements include sitting, standing, leaning and lying down in combination with those that are more dynamic and playful such as balancing, swinging, hanging, jumping and climbing. Designers can play a key role in heightening the experience of movement by deploying a body-centered approach to designing the built environment. The goal of this research is to inform this body-centered approach by investigating new methodologies for analyzing movement-space relations through: 1) Choreographic Analysis [using Laban Movement Analysis of playful actions] and 2) Spatial Analysis [using plaster casts and choreographed figures]. See Figure 1.

CHOREOGRAPHIC ANALYSIS

Dance is an art form where the human body, as the primary medium of expression, is elevated from being a mere user or inhabitant of space to a generator and agent of space. Unlike most artistic disciplines that require bodily attachments (musical instruments) or materials (canvas and paint) as part of the creative process, dancers are liberated from the need for accoutrements. Dancers consider the body as an instrument that gives shape to space. Through movement space is a medium to be manipulated, pushed and pulled, expanded and contracted. However because movement is ephemeral, this can be a difficult concept to grasp. As described by dancer Yvonne Rainer, "Dance is hard to see."[13] Similarly, designers require a whole set of tools ranging from drawing instruments to computer software, in an effort to represent design propositions. Yet human bodies cannot be divorced from designed spaces in today's urban environment, playing a role that blurs the binary condition of space and user; humans play a dual role as both makers and users of space. Choreography as "the art of ordering bodies and their movements in time and space – making images, stories, and feelings concrete"[14] is a definition that could also be applied to landscape design. In landscape writing, 'choreography' is sometimes used as a verb in the context of designing a process and/or circulating people through a city, or as a noun describing movement patterns in the landscape.

In the 1920's and 30's, German movement theorist Rudolf Laban sought ways to make these concepts tangible through the notion of the 'Kinesphere' which refers to the three-dimensional physical space around the body, reachable upon extending oneself without the need to shift one's weight.[15] It may be envisioned as an elastic bubble around the body which may expand and contract. Laban developed a system for analyzing movement known as Laban Movement Analysis (LMA). Laban sees movement as "living architecture", the body as a three dimensional space having length, width, and depth, working with dimensional tensions as well as with diagonal tensions through the body. The structure behind LMA as it is practiced today encompasses four main categories: Body, Effort, Shape, and Space (B.E.S.S.), considering movement in a multi-dimensional way. Laban's work is valuable for designers because it helps them to see what they don't see, it heightens the presence of movement, as something so ubiquitous that it is easily disappears from our consciousness. Geometric figures were often used to heighten one's visual and sensorial awareness of movement as illustrated in Figure 2.[16] Laban Movement Analysis (LMA) has been used by a wide range of groups and individuals including dancers, athletes, actors, researchers, sociologists, psychologists, therapists, and educators. Laban also developed what is known as Laban notation, a coded language that was used to record and visualize movement. Movement

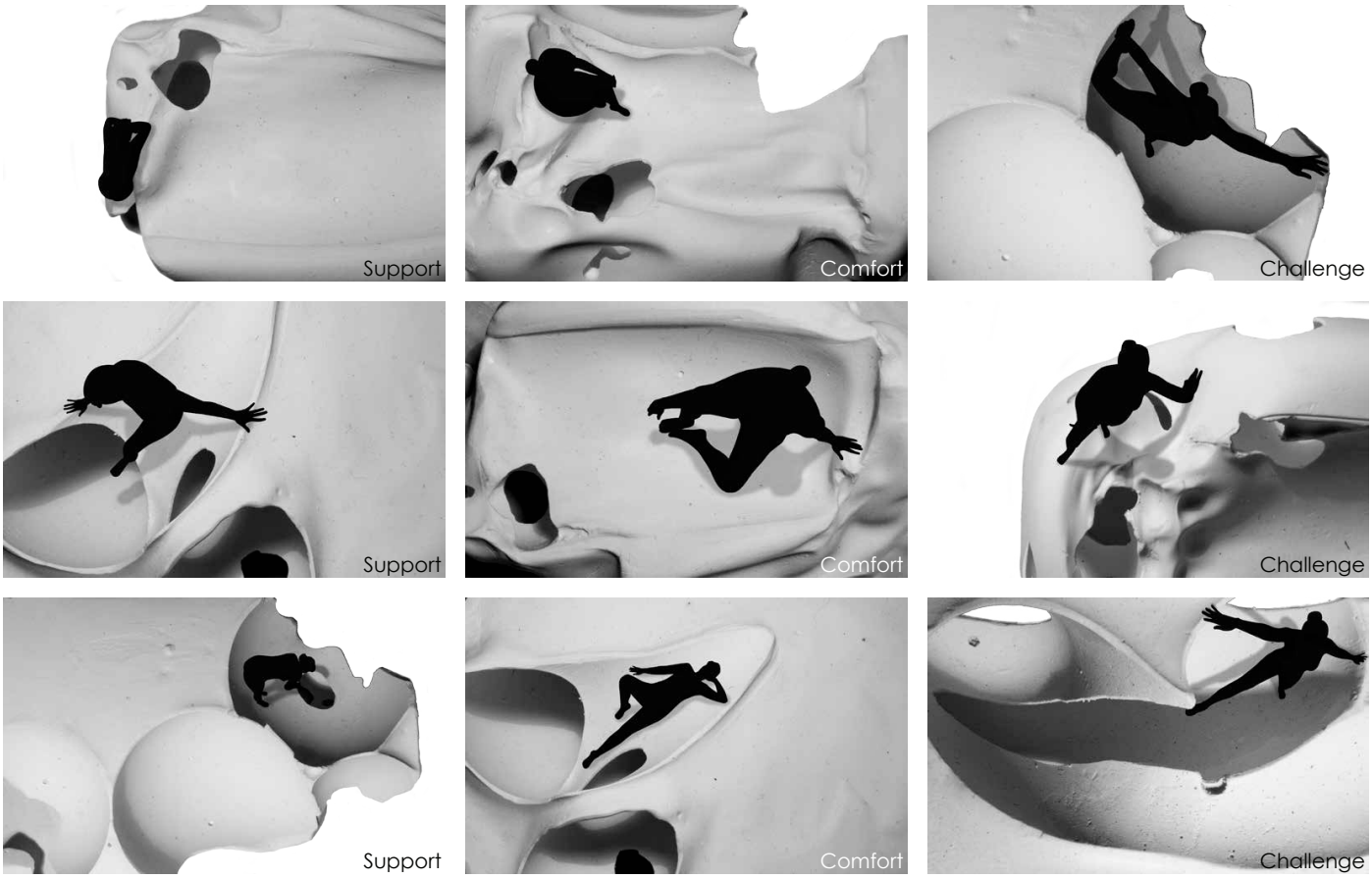


Figure 5: Plaster casts and choreographed figures [by student: Rachel Wells]

is spatialized on paper like a musical score, or architectural diagram that deconstructs a sequence of actions over time.

Choreographic analysis draws from existing theories that bring together the fields of architecture, landscape architecture and dance. Choreographer and collaborative researcher, Lisa Sandlos, analyzes these actions using Laban Movement Analysis (LMA), a choreographic method for interpreting human movement. Extracting from some of the basic movement typologies mentioned above, the following playful actions were selected for preliminary analysis: swinging, balancing and lying down. Through transdisciplinary exchange, both choreographer and designer are able to advance their understanding of how movement informs the design of variable space. See Figure 3. Based on this analysis, a set of landscape spatial typologies was developed. See Figure 4. These diagrams test the translation from action to form, suggesting potential applications in urban space.

SPATIAL ANALYSIS

As a healthcare profession that views the human body through a sensory-motor lens during its occupations or daily-life actions, occupational therapy can serve to bridge the links between body, space, health and well-being, that are often overlooked by designers. Since daily-life action takes place both within and around buildings and outdoor spaces, a more appropriate view of space is one where architecture, landscape and the body are interwoven, as if in conversation with each other.

The profession of occupational therapy originated in mental institutions in the United States during the 1920's. The traditional treatment for the mentally ill had been one of restraint and basic management of behaviors. A psychiatrist by the name of Adolf Meyer became aware of that active participation in meaningful activities or occupations gave rise to an increase in health and function of patients.[17] From its very inception, occupational therapy's governing philosophy included the promotion of health and wellness in human beings through a balanced attention to four main "rhythms": rest, sleep, work, and play. Through transdisciplinary exchange these elements were translated into three spatial operations: support, facilitate and challenge, that offer varying possibilities for engagement with space depending on a host of factors including a person's age, ability, body type, cultural background, physical health, emotional well-being etc. In other words, the operations acknowledge a diversity of movement types.

In 2016 I developed a landscape architecture design studio at California Polytechnic University, Pomona. Students were asked to explore variable space using casted plaster forms as well as their own bodies as choreographed figures. As a pedagogical method, this analysis gives agency to the human body as a driver rather than a passive user of urban space. Through the act of casting plaster students learned to think in reverse as a means of shifting perspective and understanding spatial occupation at one-to-one scale. They began the project by generating sequence of plaster castings where the formwork could be varied with each iteration; in effect a parametric process was emulated through a set of analog steps. The overall goal was to investigate variable space through an architectural construction process (plaster representing a material such as concrete), that exhibits the variable qualities of landform. Analyzing the results, we observed many experiments that began only as surface textures but through iteration became a composition of positive and negative volumes, where negative space may have penetrated through them. Upon completion of the plaster forms, the three spatial operations above- support, facilitate and challenge- were explored by asking students to position their own bodies to imagine occupation of their casting, testing how the constructed plaster space might support, facilitate and challenge the body. They took photos of themselves in various positions in order to study the geometric/spatial potential of the casting. Photos turned into silhouettes and were photoshopped into a photographs of castings which could be scaled up or down and cropped as needed to study relationship between body and spatial volumes. Figure 5 illustrates one student's investigation.

This studio serves as a point of departure for a forthcoming design-build studio. Plaster experiments will be further developed and scaled up to one-to-one scale to become concrete site insertions for a schoolyard in Los Angeles. The goal would be to generate new relationships between architecture, landscape and the body by treating each of these three as equal participants in a dynamic process that acknowledges the spatial potential of architectural and human bodies operating in outdoor environments.

CONCLUSION

Transdisciplinary practice lies at the heart of this research, offering an in-depth exchange of knowledge where each discipline contributes to the advancement of the other. New methodologies evolve from variations in disciplinary language that must be learned, accepted and adapted during the collaborative process. With the moving body as the common thread, occupational therapy provides a sensory-motor lens through which to understand how humans move whereas dance reminds us that the body is an expressive and spatially rich medium. By bringing the disciplines together the designer has the ability to bridge the varying facets of knowledge through the act of space-making.

Designers who rely solely on architectural standards to determine spatial needs are disregarding large segments of the population. Universal Design advocates are critical about the inflexibility of standardized environments to respond to corporeal variations.[18] While Universal Design tends to settle for the lowest common denominator in order to achieve 'universality', variable space focuses on creating environments that encourage varying degrees of challenge and open up possibility for enhanced movement quality. I argue that these conditions cannot be achieved through a singular solution but rather a gradient of spaces across which movement unfolds. As such, designers might call into question whether design standards, while useful for setting a baseline, in effect limit variability. Thus, designers need to develop a new set of methods and tools for creating optimized variable environments.

Variable space can be applied to many different disciplinary speculations. For example, dancers value variable space because it increases the possibility of enhanced quality of movement in every day life. Occupational therapists are drawn to variable space because it seems to facilitate playful movement, as part of the necessary balancing act between rest, sleep, work and play. The choreographic and spatial methods of analysis developed through this research, based on LMA and movement-driven spatial explorations respectively, plant the seeds for continued research involving the testing of built constructions. As new forms of variable space and methods of analysis are developed and applied to different sites and programs, a more nuanced conversation between architecture, landscape and the body is expected to emerge and evolve.

ENDNOTES

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