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Title of Presentation

Exploring the Motion Space: An Application of the Laban-Bartenieff Work in an Architecture and Design Program at the Bauhaus Dessau

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Abstract

The research project *Exploring the Motion Space* aims to 1) explore how movement research can be fruitfully applied to the designing of living spaces and artifacts, and 2) develop a curricular unit that incorporates movement in the training of architects and product designers. In an experiment towards fulfilling these aims, LBMA-based movement sessions were conducted with students at the Bauhaus Dessau, Germany, which was a locus for avant-garde artists, architects, and designers in the late 1920s. The paper shows how LBMA was applied in this context and focuses on how Laban's concept of *Spannung* (tension) in the moving body may be related to Richard Buckminster Fuller's concept of *tensegrity* and his *Jitterbug Transformation*.

> Movement is, so to speak, living architecture,
> living in the sense of changing emplacement as well as changing cohesion.
> (Laban 1966: 5)

The starting point

In everyday life, architecture may appear to be a passive entity. Built environments may be viewed as configurations of containers that statically encapsulate space and occupy a certain amount of territory, thus separating the space inside and outside the solid boundaries they define. In the project *Exploring the Motion Space* we challenge this view by claiming that space is created as we move and *interact* with our environment. Hence, like Rudolf Laban, we consider movement to be a "fundamental aspect of space" (Laban 1966: 4). We see the three dimensions of geometric space as being inherently linked to the forth dimension of time and affirm that "space-time configurations unfold" in a "dynamic rhythm" (Laban 1966: 136) according to how we move in relation to where we are.

We aim to 1) explore how movement research can be fruitfully applied to the designing of living spaces and artifacts, and 2) develop a curricular unit that incorporates movement in the training of architects and product designers. This is the point of departure from which we set out to discover how movement may be consciously taken into consideration when designing built environments and artifacts of the future.

The team

The project team comprises Mary Copple, Michael Friedman, Sabine Hansmann, Joachim Krausse, and Friederike Schäfer, whose research interests cover diverse disciplines: architecture, design theory, art history, mathematics, philosophy, and dance. Laban-Bartenieff Movement Analysis (LBMA) is one of our prime resources because it provides tools for a systematic exploration of space as a dynamic entity and for opening up avenues along which space can be seen and felt to emerge and take shape through movement.

The venue

The roots of the Laban-Bartenieff tradition are contemporary with those of the Bauhaus, a locus for avant-garde artists, architects, and designers who were seeking to radically reshape European society in the aftermath of World War 1 by making good design in a modern sense. The Bauhaus school of design was founded by Walter Gropius in Weimar, Germany in 1919. In 1926, it moved to Dessau, where Oskar Schlemmer, Johannes Itten, László Moholy-Nagy, Lyonel Feininger, Wassily Kandinsky, and Paul Klee were among the first generation of master teachers.[1] It was there that Schlemmer conducted choreographic experiments on the *Bauhausbühne* (Bauhaus Stage), and it is there that our way of "exploring the motion space" began to materialize.

The content

Our team came together through the *Bauhaus Open Studio* workshop entitled *Rudolf Laban's Notation*, which took place in March 2016 and comprised an LMBA-based movement session followed by talks on Labanotation in relation to movement choirs (Mary Copple, CLMA), Platonic solids (Michael Friedman), and the visual arts (Anja Pawel). A year later, in April and May 2017, we began testing our emerging ideas in a three-day workshop within the framework of the COOP Design Research Master program run by the Anhalt University of Applied Sciences and the Bauhaus Dessau Foundation, in cooperation with the Humboldt-Universität zu Berlin.

In the mornings, closed LBMA-based movement sessions with the students were conducted by Mary Copple on the Bauhaus Stage. These were complemented by Friederike

[1] For details of the history of the Bauhaus, see http://www.bauhaus-dessau.de/en/history/bauhaus-dessau/the-bauhaus-dessau.html (posted August 21 2017).

Schäfer's reenactment of sensory awareness exercises developed by the visual artists and movement researchers Judy Padow, Suzanne Harris, and Susan Perlstein for architecture students at the Pratt Institute in New York in the 1970s.

In the afternoons, invited speakers gave public lectures on the topics of the Bauhaus Stage as a movement laboratory with reference to Schlemmer and Laban (Torsten Blume), Klee's concept of movement as the basis for the visual arts (Fabienne Eggelhöfer), and the notion of *pathwaying* as the materialization of movement within the built environment, using the example of museums such as the Guggenheim in New York (Tina Zürn). The team gave talks on spatial models and reference systems from a historical perspective, covering a comparison of Frank Bunker Gilbreth, Laban, and Richard Buckminster Fuller (Joachim Krausse), and 19th and 20th century methods of codifying and reading movement patterns using mathematical concepts (Michael Friedman). These historical considerations were linked to the present day by retracing the merging of dance and sculptural-architectonic practices within the arts back to these origins (Friederike Schäfer), and by proposing an interactional approach to architecture through the concept of *spacing* (Sabine Hansmann).

In the three LBMA-based movement sessions, theory was linked to praxis as Motif symbols were projected onto the screen of the Bauhaus Stage while participants physically explored their meaning. Key theoretical issues underpinning the central topics of these sessions are presented below.

Topic 1: Notation

Systems for notating movement play an important role in our curriculum because they pin down key aspects of human movement that may guide the process of envisioning how we may harmoniously interact with architecture and artifacts. The first movement session recapitulated the *Open Studio* workshop in that it gave an overview of the LBMA movement categories of Body, Space, Effort, and Shape using Motif Writing and thus introduced the major aspects under which LBMA enables movement to be viewed and creatively explored.

A glance at the history of the development of Labanotation reveals Laban's struggle to pin down what he considered to be the key aspects of human movement (cf. McCaw 2011: 97-102). In *Die Welt des Tänzers* (Laban 1920: 16) he announced the forthcoming publication of his notational system "die Schrift des Tänzers" (the script of the dancer), which appeared six years later in *Choreographie* (Laban 1926a), only to be superseded two years later by a completely different one: "Kinetographie Laban" was first presented at the Dance Congress in

Essen and published in July 1928 (Laban 1928a). Concurrently, the journal *Schrifttanz* was launched, and in which articles pertaining to "Kinetographie Laban" appeared.

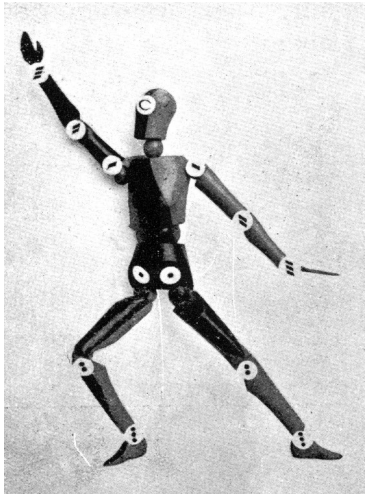

Figure 1. *Schrifttanz* 1928, no. 2: annex, figure 8

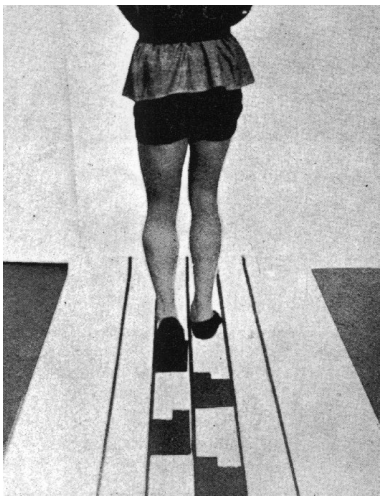

Figure 2. *Schrifttanz* 1928, no. 2: annex, figure 3

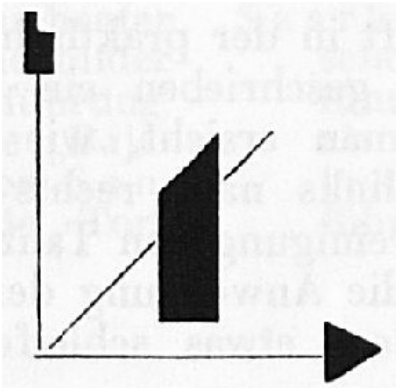

Figure 3. *Schrifttanz* 1928, no. 2: 29, figure 6

A fundamental difference between these two notational systems is that the first is based on the four quadrants ("zones") of the body and corresponding, amalgamated spatial-dynamic attributes of movement, whereas the second is based on the *joints* and *segments* of the body (Figure 1) and the *direction* of movement (Figure 2), signified by geometric shapes (Figure 3) derived from and including the rectangle, and differentially shaded to indicate level. These abstract symbols are extendable lengthwise to capture movement *duration*, an idea attributed to Dussia Bereska (Laban 1956: 7-8), and depict "the image of the *spatial rhythm* and the *directional harmony* that maintains the balance [of the body] during movement" (Laban 1928b: 5)[2]. These pictographs endure as a basic feature of Labanotation. Irmgard Bartenieff remarks on its economy as follows:

> Labanotation – Kinetography does not merely describe changing joint angles from position to position with some indication of time value, but through its description of visible path, body part and their relationship to weight shift and duration caught in one symbol, he [Laban] comes closest to writing movement. [...] Through making use of geometry, dynamics and anatomical concepts, he goes on to define the phenomena of

[2] My translation and emphasis. Original German: "das Bild des Raumrhythmus and der Richtungsharmonie, die das Gleichgewicht während der Bewegung erhält."

> movement for the first time in kinetic terms and by abstracting them into pictorial symbols. (Bartenieff 1970: 14)

One of the advantages of Laban's notational system is that it captures the transformational pathwaying of the body as "space-time configurations" that "unfold" in a "dynamic rhythm" (Laban 1966: 136). The transformational patterning of movement in relation to geometry leads us to our next topic.

Topic 2: Tension and Tensegrity

Our second movement session on the Bauhaus Stage focused on the LBMA categories Body and Space. A central concept running through all of Laban's written works is the *Spannung* (tension, cf. Bartenieff 1970: 17-18, McCaw 2011: 58-61, 361) that changes in the body as it moves, and which is a concept that underlies his Space Harmony theory:

> The individual parts of every movement, every gesture are: *body tensions united with the arousal of feelings*. The body tensions vary according to the spatial directions in which they are performed. [...] It is absolutely beyond doubt that the most important and most meaningful element of bodily movement is the *spatial direction*. All bodily movement affects our experience through the direction of its deviations from the vertical. (Laban 1926b: 67)[3]

Laban's concept of *tension* was explored in connection with Fuller's (1958) concept of *tensegrity*, that is, the principle underlying his continuous tension–discontinuous compression structures:

> The word tensegrity is an invention: it is a contraction of tensional integrity. Tensegrity describes a structural-relationship principle in which structural shape is guaranteed by the finitely closed, comprehensively continuous, tensional behaviors of the system and not by the discontinuous and exclusively local compressional member behaviors. Tensegrity

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[3] My translation and emphasis. Original German: "Die einzelnen Teile jeder Bewegung, jeder Gebärde sind: mit Gemütserregungen vereinte Körperspannungen. Die Körperspannungen sind verschieden, je nach den Raumrichtungen, in welchen sie ausgeführt werden. [...] Es ist ganz zweifellos, dass das wichtigste und bedeutungsvollste Element der Körperbewegung die Raumrichtung ist. Alle Körperbewegung wirkt durch die Richtung ihrer Loslösungen von der Senkrechten auf unser Erleben."

> provides the ability to yield increasingly without ultimately breaking or coming asunder. (Fuller 1975: para. 700.011)

Bartenieff was clearly familiar with Fuller's work and recognized his ideas on tensegrity being as consistent with Laban's ideas on tension as an underlying architectural principle of bodily movement:

> There is a contemporary of Rudolf Laban (though considerably younger) who speaks of architectural principles in terms of *cohesive tension*, with the triangle as its basic unity, in contrast to vertically oriented static architecture: this is Buckminster Fuller, who promotes the cohesiveness of geodesic forms. For both Laban and Fuller, the base for dealing with form and energy is the cohesive tension within a triadic relationship – a tension principle found in nature, both animate and inanimate – in crystals, rocks, shells, honeycombs, seeds and seedpods – in contrast to masses arranged in a simple opposition to the force of gravity in Newton's physics. (Bartenieff 1974: 38, emphasis in the original)

The tensegrity principle is an abiding tenet of the Laban-Bartenieff tradition. It is the attribute of the human body underlying the dictum: "Change in one part changes the whole" (Hackney 1998: 39). Hence, "the whole body participates in any movement: Different parts either serving as movers or supporters of the movement" (Bartenieff, unpublished *Gems*: no. 9). And Laban himself is alluding to the tensegrity principle when he describes human movement as "living architecture" composed of dynamic "trace-forms" because it ensures that "changing emplacements" are in tandem with "changing cohesion" (Laban 1966: 5).

In our movement session, "trace-forms" were made visible by LED-armbands worn by participants improvising with elements of Laban's scales. Photographic documentation of the results (Figure 3) was inspired partly by Étienne-Jules Marey's experiments with chronophotography in the 1880s and partly by Klee's aphorism: "Art does not reproduce the visible; rather, it makes visible" (Klee 1920: 1).

Figure 3. Trace-forms made visible (photos Sabine Hansmann)

Additional parallels between Laban and Fuller can be seen in their respective dynamic use of Platonic solids as spatial models.[4] Laban favored the icosahedron as "the scaffolding of the kinesphere in practising movement" (Laban 1966: 108). He recognized that its geometric properties are also found in the anatomy of the body: 1) relations between certain icosahedral lines and between certain bones correspond to Golden Section proportions, and 2) there is a "correspondence between the angles of the icosahedron and the maximum angles through which the limbs move" (Laban 1966: 108; cf. Laban 1920: 90-92, 1926b: 90). Hence the icosahedron and the architecture of the body are congruous regarding the proportional lengths of their segments and how these are joined (or *jointed*) together and articulate with each other. Laban emphasized that he discovered these congruities primarily through movement experience rather than through abstract knowledge and reasoning (Laban 1966: 108 footnote). This indication is echoed in our project since we aim to sensitize students of architecture and design to the structural affordances and experiential dimension of the human body as it moves through, indeed creates space, thus generating visceral knowledge that they can relate to their own field of expertise.

Although Fuller may have taken the inverse route – via abstract knowledge and reasoning – to his discovery of how the Platonic solids can metamorphose into one another, "Fuller's radical experimental access to geometry and designing would not be understandable without the dimension of physical experience and the refinement of an 'intuitive dynamic sense' that he cultivated like an athlete or a dancer" (Krausse 2000: 204)[5]. For him, the icosahedron was a geometric form found in nature and obtained by the *rotation* and *contraction* of the cuboctahedron, thus creating an inward spiraling of its corners. In turn, rotation and contraction of the icosahedron obtains the octahedron and then the tetrahedron. He called these transformational patterns – from cuboctahedron, to icosahedron, octahedron, and tetrahedron – and back again – the *Jitterbug Transformation* because, for him, the movement of transitioning from one form to another had a rhythm – the *pulsing* rhythm of the Jitterbug, a dance that was popular in the 1940s.

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[4] See Krausse (2000) for a comprehensive treatment of compatibilities between the theories of Fuller and Laban.

[5] My translation. Original German: "Fullers radikal experimenteller Zugang zur Geometrie wie zum Entwerfen ohne die Dimension der Körpererfahrung und die Vervollkommnung eines 'intuitiven dynamischen Sinns', den er wie ein Athlet oder eben ein Tänzer ausbildet, nicht verständlich wäre."

There are striking parallels between Fuller's *Jitterbug Transformation* and Laban's description of how the octahedron and the cube are dynamically related to the tetrahedron:

> These two regularly structured crystals are dynamic variations of the simplest plastic form, the tetrahedron, from which all other polyhedric or crystalline forms derive. The transformation into a new form can be imagined in dynamic crystallography to be effected by movements of the edges of both their inner and outer planes. Such deviations are caused by *pressing* and *rotating* movements so that one is transformed into another. (Laban 1966: 103, my emphasis)

Unlike Fuller, Laban does not give a systematic description of how such "pressing and rotating movements" transform the Platonic solids into one another. He just states that "the intermediary form between the octahedron and the cube is the cuboctahedron" (Laban 1966: 104), and that the icosahedron is an "adaptation of the cuboctahedron" which makes it "more spheric" (Laban 1966: 105). Most likely, this sphericity of the icosahedron is a further reason why he favored it as the most apt model for scaffolding the body's natural range of movement possibilities in the kinesphere. Moreover, it is perhaps because he recognized the transformational patterning inherent to the Platonic solids that he claimed: "We can understand all bodily movement as being a continuous creation of fragments of polyhedral forms" (Laban 1966: 105).

Topic 3: Connectivity patterns

The third movement session focused on activating the Patterns of Total Body Connectivity (Hackney 1998) as the body's evolutionary solution to the challenge and affordances of moving in the earth's gravitational field. Each pattern was explored individually through warm-up exercises and guided improvisations followed by the sketching of impressions they evoked. In the Laban-Bartenieff tradition, drawing in response to movement experience is a routine feature of LBMA training programs. It seemed particularly appropriate to incorporate this practice into our workshop because it was conceived for architecture and design students, who are generally gifted at visualization and skilled in creating imagery.

Activating the Patterns of Total Body Connectivity with varying Effort and Shape qualities, the themes of Mobility↔Stability and Inner↔Outer were explored as polarities in Laban's sense of continuums rather than contrasts (cf. Bartenieff 1974: 38). Both themes are familiar to architecture and design students, who normally consider them with regard to buildings and artifacts, but – perhaps for the first time – they explored them with regard to the

architecture and design of their own bodies in relation to the space in which they were moving. The deep-felt connection between the reality of movement experience and the imagination is evidenced by the participants' drawings. Turning their inner eye towards this connection rounded off our workshop series on the Bauhaus Stage.

Acknowledgements

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