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Rudolf Laban and topological movement: a videographic analysis

Abstract

This paper explores the somewhat neglected theory of topological movement developed by the Hungarian artist researcher Rudolf Laban. The piece begins with an examination of Laban's understanding of Space in relation of the notion of the kinesphere. I argue that Laban's idea of Space is essentially derived from a rationalisation of outer movement (geometry), which enables him to break movement down into analytical units, and re-arrange these into a meaningful syntax, a language (dance, mime, or theatre). I then go on to explain Laban's idea of a synthesis between outer movement, and another sphere of movement known as dynamospheric (which refers to more fundamental inner forces that involve psychological and emotional dynamics). Crucially, these dynamic forms are modelled by Laban through the use of topological surfaces. I further support my analysis by an investigation of Laban's unpublished book *Effort and Recovery*, and also by taking a videographic approach to a number of important filmic studies of topological movement observation. The article concludes with the idea that Laban's graphic approach to movement analysis can be further enhanced, particularly within the study of topological dynamics, with the help of vision technologies like film, video and computer animation. I briefly discuss William Forsythe's reinterpretation of Laban's analysis via moving-image technologies, before concluding with a short description of a video study entitled *Labanimations*, which I carried out recently with video artist Sebastian Melo, and in which I re-examine Laban's artwork through video techniques like long exposure photography and slit scan.

Biography

Salazar Sutil is a Lecturer in Dance and Digital Arts at the University of Surrey. He is also a performance theorist and practitioner, whose work focuses on interdisciplinary research combining symbolic languages (computer code, mathematics) and movement studies. Salazar Sutil holds a PhD in cultural studies from Goldsmiths College, having completed a thesis on mathematical thinking in avant-garde performance in 2010. He trained as an actor in the Malgrem-Laban system of character analysis at the Drama Centre London, and at the Universidad de Chile. He has worked as a visiting lecturer and director at Brunel University and at the University of Essex (East 15), and he has been a researcher fellow in various projects related to sci-art collaboration and technology development at the London School of Economics, Goldsmiths College, and University of Surrey. He is the artistic director of C8 Project, a dance-theatre company that works on mathematical models in digital performance, and a director of Performance Studies international. He is the author of the upcoming book '*Theatres of the Surd: mathematical influences in avant-garde theatre*'.

Rudolf Laban and topological movement: a videographic analysis

Introduction

Rudolf Laban has gained a world-wide reputation for having created one of the most extensively used movement notations available today, known as Kinetography Laban or Labanotation (depending on the regulatory body). Laban is also well-known for having developed a comprehensive system for the analysis of human movement known as Laban Movement Analysis (LMA), which serves as one of the most powerful methods for describing, visualising, interpreting, and documenting human movement. Labananalysis, which is the term I will be using throughout this article in place of LMA,¹ is an analytical framework in movement studies that uses a multidisciplinary and integrative approach incorporating contributions from anatomy, kinesiology, psychology, philosophy and many other fields. Whilst usually subdivided into areas of study such as Body, Space, Effort and Shape, Labananalysis is most commonly concerned with Laban's practical study of harmonic space (choreutics) and his theory of Effort Actions, which are extensively taught in actor and dancer-training schools worldwide. Labananalysis also has important current applications in dance improvisation (through Forsythe's *Improvisation Technologies*), actor-training (through the Laban-Malmgren system of Character Analysis), work efficiency studies (via the Laban-Lawrence theory of industrial rhythm), management consultancy (via Warren Lamb's action profiling), and physiotherapy (via Bartenieff's Fundamentals).

This paper presents a more manageable discussion of what is without doubt a monumental lifework. My immediate aim is to introduce my readers to one particular notion that is key to understanding many aspects of this approach, namely Laban's understanding of movement as a topological dynamic. Drawing on a reading of Laban's books *Choreutics*, and *The Mastery of Movement*, as well as an unpublished document housed at the Laban Archive entitled "Topological Explanations- Qualitative aspects", my aim is to extract from these three key readings what might constitute a theory of topological human movement in the work of Rudolf Laban. To do so, I will focus on a videographic analysis of Laban's space theory, and I will subsequently respond to Laban's theoretical argument by referring to a series of video studies entitled *Labanimations*, which I carried out in collaboration with video artist Sebastian Melo in

¹ The term Laban Movement Analysis (LMA) is closely associated with the various governing bodies that preside over the teaching of Laban's ideas, and the certification of Qualified Laban Movement practitioners, also known as "Certified Movement Analysts" (CMAs) or "Certified Laban/Bartenieff Movement Analysts" (CLMAs). Since my aim here is to speak of Laban's analytical approach, and not the various Laban-related governing bodies, I will use the more inclusive term Labananalysis.

June 2012, and which were intended to be practical responses to some of the research questions posed in this paper.

Firstly, it is important to clarify what Laban means by space, and by extension, what he means by harmonic space. Laban realised that it was necessary to consider space in somewhat narrow terms, that is, in terms of the space occupied by a moving human being. So his idea of choreutics, or the practical study of space harmony, is based on a distinction between general space, in the way geometry or topology might define space, and space as a field of relations produced by the moving body. For Laban, space is therefore the volume occupied by an outreaching body- what he calls a 'personal space' (1966, p. 10). Laban spoke of space specifically in terms of an area within reach of the body's extended limbs, which when projected in all directions from the bodily centre can be conceived as a totality of movement or a sphere of movement.

Secondly, Laban's approach makes a further distinction between an understanding of movement as a continuum, on the one hand, and movement that can be captured and thus perceived as a standstill. Rather than seeing human movement intuitively, that is, as an indivisible flux of change, Laban's analysis imposes a conceptual projection on this flux in terms of an infinite series of divisible and measurable points. Movement analysis therefore encourages us to rationalise movement as a series of snapshots, which can be ordered, structured, formalised as part of a meaningful and codified bodily language (sports, mime, dance, acting). As Laban himself asserts: 'this illusion of a standstill is based on a snapshot-like perception of the mind which is able to receive only a single phase of the uninterrupted flux' (1966, p. 3). But whilst the mind produces only a representation of movement, which in Laban's Platonic philosophy is an 'illusion', what the mind perceives is nonetheless enough to fabricate meaning from this universal flux (CH 3). What matters for Laban is not so much the meaninglessness of flux but the way the mind can extract signification out of nothing, by joining together snapshots to create a sensible sequence. From this perspective, space is no longer a generalisation, but a human representation.

Thirdly, the approach in question may be characterised methodologically by its use of 2D and 3D modelling based on the use of elementary geometric properties of space. Laban's approach is therefore similar both to the plastic arts (sculpture and architecture), and to computer graphics. Indeed, it is worth noting that Laban was a trained visual artist and that he (allegedly) studied architecture before turning to dance, which might explain the use of a distinctly *graphic method* (partly based on mathematical visualisations) throughout his life.² Laban's

² For a discussion of Laban's personal history as a visual artist and the way this might have influenced his conception of dance and movement analysis, see Valerie Preston-Dunlop's biography *Rudolf Laban: an Extraordinary Life* (1998).

modelling frequently represents the three-dimensionality of the human body by using a collection of points in 3D space connected by various geometrical entities such as lines, shapes, planes, etc. The most common model used by Laban is the solid geometric model (more of which to come), which he used in order to create a volumetric display of so-called outer movement. Crucially, modelling allows Laban to *see* movement, and to engage in the study of movement via a visual analysis. As I will explain shortly, the method employed by Laban is heavily influenced by the graphic media utilised in the process of capturing and inscribing the movement (i.e. notation, diagrams, graphs, drawings, analytical sketches, photography, and film).

Finally, it is worth clarifying that Labananalysis is an example of a multimodal *visual methodology*, or rather, a multisensory one. Choreutics is a vision of space movement that involves a multisensory perception: vision is not only trained to produce sight perception, but also a motional perception (proprioception), as well as an audial-spatial sense. Laban claims that when seeing space harmonically he is also thinking space in terms of sound relations or musical harmonic relations. Laban's conception of harmony is therefore key to understanding to what extent his approach crosses over modalities of sensation as well as artistic disciplines. Laban's theory of harmonic space integrates music theory, colour theory and movement theory. Indeed, space harmony allows Laban not only to see movement, or see colours, or to see sounds, but also to see numbers. Indeed, what unifies all three sense perceptions is the different number systems upon which the notion of harmony is based, in Laban's conception. Thus Laban sees seven cross-sections of space (three dimensional plus four diagonal), to reflect the use of seven notes in musical theory. It is by linking the distances between the seven cross-sections that dance scales can be devised, in the same way that musical notes also form scales. Laban proposed the use of diaformic or seven-point scales, as well as a chromatic or twelve-point scale (1966 p. 118-119). The latter number also helps associate twelve-colour circles or scales (colour theory), with the twelve-tone chromatic scale in music theory.³ Harmony thus refers to specific relations of vibration (light and sound) expressed in primary numbers, and organised within scaling systems for their better understanding. In other words, harmony is an organisation of relations in musical and colour theory in terms of primary numerical relationships between certain vibrations of light

³ Laban constructed a number of scales for the practice of harmonic relations, including dimensional scales, diagonal scales, diametral scales, axis scales and the well known 'A' and 'B' scales, which are comprised of twelve signal points or vertices that correspond to the four corners of the 3 planes of the body's dimensional cross (up-down, back-forth, right left). Laban considered the 'A' scale to be in the minor key in contrast to the major key of the 'B' scale (see Newlove and Dalby 2003)

and sound. In his book *Choreutics*, Laban writes that the purpose of his investigation is 'to point out the possibility of discovering similar relations in the trace-forms of movement' (1966, p. 29).⁴

Laban's dualistic approach

Laban's theory of movement is profoundly dualistic, which is not entirely surprising given the pervasiveness of dualistic conceptions in dance theory. This might stem, at least according to Sondra Horton Fraleigh's reading, from an enduring division of body and mind in Western dance analysis.⁵ Like many dance theorists before and after him, Laban's key movement concepts come in pairs of opposites, stemming from principal oppositions like inner/ outer, and stable/mobile. This illustrates one of the fundamental aspects of Laban's philosophy: namely, that dynamic tension produced by opposition is the driving and originating force of all things, a prime cause, might I add, that is perceived by Laban as an event out-of-nothing.⁶ Laban presents movement as a universal duet, a pairing of opposites in whose tension the drama of self-emergence plays itself out, at once mindless of any Prime Mover or Unmoved Mover (in the Aristotelian sense), and mindful of the way in which human beings can apply a logic to this, in order to turn movement flux into a communicable language.

Following on this dualistic approach Laban speaks of human movement in terms of two domains of personal space, or 'two infinities' (1966, p. 100). By extension, it is necessary for Laban to develop two different types of personal spheres of movement, and two different sets of movement models. Labananalysis is thus a consideration of movement phenomena within a spectrum that is infinite in two very different ways. Human movement can be focused inwardly to reveal countless points or stillnesses and zoomed outwardly, revealing an infinity of potential movements, which Laban speaks of as the endless 'reservoir of movement' (1966, p. 28).

It follows that within this approach lies a consideration of human movement as a paradox (1966, pp. 91, 100), a mirror that reflects itself, where two domains are thus reflected: the inner and the outer, both of which are made up of an 'infinite number of changing situations' (1966, p. 22). The outer relates to the movement produced by the head, torso and limbs, that is, by the anatomical body, particularly in terms of the trajectories that these body parts takes up in the personal space of the mover. The inner, on the other hand, relates to stresses and intensities

⁴ For an examination of Laban's cross-disciplinary study of harmony see Carol-Lynne Moore's excellent book *The Harmonic Structure of Movement, Music, and Dance According to Rudolf Laban: An Examination of His Unpublished Writings and Drawings* (2009).

⁵ For an examination of dance and dualism see Sondra Horton Fraleigh *Dance and the Lived Body* (1996)

⁶ See Salazar-Sutil's *Laban's choreosophical model: Movement visualisation analysis and the graphic media approach to dance studies* (2012).

linked to psychological and emotional drives. Between these there is what Laban calls a 'transference' (1966, p. 61), so that outer actions affect inner actions and vice versa.

This categorical distinction is crucial to Laban analysis, and yet highly problematic, as I will explain shortly. The outer sphere, which relates to quantitative aspects of movement, is better known in Laban's terminology as the kinesphere. Laban described this object as the 'sphere around the body whose periphery can be reached by easily extended limbs from that place which is our point of support or stance' (1966, p. 10). Laban explained that we are able to outline the boundary of this 'imaginary sphere' with our feet as well as with our hands, much like a 3D version of Leonardo's Vitruvian Man. This sphere constitutes an unchanging realm of movement in the sense that when we move out of the limits of our original kinesphere we create a new stance, and transport the kinesphere to a new place (1966, p. 60). Elsewhere, Laban described the kinesphere as contractible and extendable depending on the stretch of the limbs (1971, p. 39). What is key to the understanding of kinespheric actions, as I will explain shortly, is that they are produced as outer movements, and that these movements are quantifiable or countable in space and time- equally in terms of the number of limbs involved, the angles of the movement, the duration of movement, and the number of units of movement involved.

The inner domain, on the other hand, relates to what Laban calls the dynamosphere, containing the dynamic stresses of an action. At the heart of Laban's notion of dynamospheric actions is his theory of efforts. Thus, to understand a dynamospheric movement one has to consider dynamics which Laban categorised in relation to the four basic properties (effort factors) of any effort-action, that is, Weight, Space, Time and Flow - each of which is in turn divided into a subcategory of oppositions known as effort elements (heavy-light, direct-indirect, quick-slow, free-bound). Combinations of these qualitative aspects of movement make up Laban's famous eight effort-actions (floating, punching, gliding, slashing, dabbing, wringing, flicking, and pressing). These effort actions are related to inner intentions, and they are used to understand fundamental qualitative differences in human movement. Thus, the difference between punching someone in anger and reaching for a glass is slight in terms of body organization - both rely on extension of the arm and the same spatial direction of the movement. The weight of the movement and the intensity of the movement are very different, though.

Trace-form and shadow-forms

Seeing as the approach in question is essentially a multimodal visual method, Laban sees harmonic movement as a production of visual forms. The outer forms or kinespheric actions

constitute what Laban calls *trace-forms*, that is, points linked up into a line or pathway that is the trajectory made by a moving body as it traverses kinespheric space. Laban then speaks of *shadow-forms*, which are derived from what he calls action-moods, which in turn are actions that are expressions of inner drives (emotions and psychological forces), and which are closely linked to the eight effort actions described above.

Following Laban's thesis, trace-forms are best understood in terms of metrical rhythm. The body is a tetrapodic machine: it has four limbs, two arms and two legs. Insofar as kinespheric action emerges from a bodily anatomy that is inherently discrete and countable, so outer moves or extensive bodily actions are committed by body-parts that impose these very same quantitative measure-relations on kinespheric movement. In other words, when one moves in kinespheric space, numerable space relations are created 'naturally' by the anatomical body. This kind of movement can be described in terms of units like the half-step, step or double-step (1971, p. 65), comparable to the standard unit of the pace. This means that when one moves kinespherically, one can describe the movement, for example, as *three* steps forward, as a movement in *three* beats, as a *three-quarter* turn on *one* foot, etcetera. In addition to the creation of rhythms in space, there is the question of inscribing trace-forms within an established time-rhythm, whether musical or not, most commonly in terms of an arrangement of four or three instances of emphasis per measure. Furthermore, there is the question of overlapping (or not) space-rhythms and step-units with the corresponding beats of a time-rhythm (1971, p. 43).

Unlike trace-forms, shadow-forms create relations that are not extensive, but intensive. Thus, to understand a dynamospheric movement one has to consider positions that are constantly changing within the inner dynamics of human beings. These inner stresses are expressed as shadow forms, which according to Laban peak and decline. What is key to understanding these inner forms is not how many of them are produced, or how many body parts are used, or how long it takes to execute them. What is important is the quality of movement it produces, that is, whether the movement is strong, whether it is light, whether it is bound or free flowing, etc. The most characteristic of these forms, according to Laban, are those which strike us by their spatial appearance in the kinesphere, 'but we must remain aware of the fact that those selected for description are connected with one another by numberless transitory positions'. (1966, p. 28)

Let us take, for the sake of clarification, the imaginary case of a movement carried out by a five-year old boy who raises his arm to ask permission to go to the toilet during a school lesson. Whereas a kinespheric consideration of this movement can be described in terms of the raising of one arm in one beat (as a quantitative relation), the dynamospheric stress behind this

movement can be described as a 'punching' effort-action (quick-direct-strong), following Laban's theory of efforts. The shadow-form is a highly mobile shape generated in the child's dynamospheric domain, which in this case, is constituted by a highly regulated and enclosing social space coupled with a situation of utmost mobility and urgency. And whilst the situation may generate shadow-forms such as twitches and repetitive leg-movements, dynamospheric activity peaks in an intensive expression of the child's sense of urgency, leading to a recognisable and codified outer movement (arm-raising) with a particular dynamic stress.

Laban's kinespheric models: solid geometry and the theory of crystalline movement

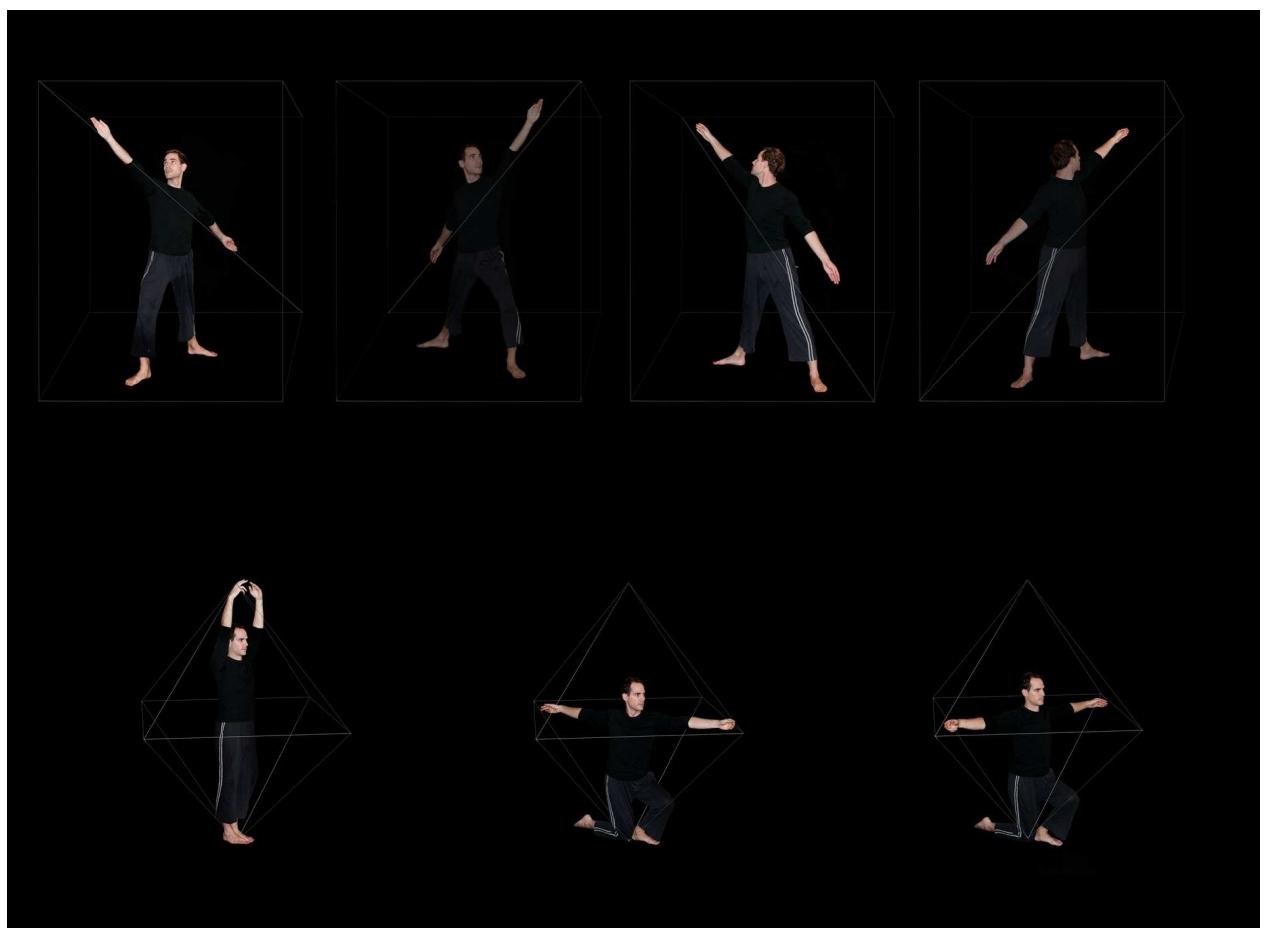
The analytical conceptualisation and visualisation of kinespheric space is based on Laban's understanding of space through the language of solid geometry. More specifically, Laban makes use of the five regular convex polyhedra or Platonic solids⁷ in order to better understand space in terms of regular, convex polyhedral arrangements or 'scaffoldings'. Laban thus conceptualises and visualises the space within one's own reach as congruent, regular and symmetrical, which enables the trained body to find harmonic relations, and thus move in a meaningful and aesthetically-pleasing way. The fact that there are only five objects that obey such elegant geometric rule allows Laban to allocate each one of these objects a specific function in the description of harmonic relations, as part of Laban theory of crystalline movement. Laban uses the notion of crystals, as opposed to regular solids, because crystals grow in regular polygonal patterns, and this enables him to connect his theory of human movement with growth patterns in natural organisms.

Laban chooses the tetrahedron to illustrate the basic tension or opposition arising from the body's symmetrical composition in a four-directional pull (upward-downward, left-right). More simply, the tetrahedral form of the kinesphere represents the image of a walking body, with both arms raised. This, according to Laban, is the simplest plastic form having four corners (1966, p. 20). From this form, all other crystalline forms of human movement derive. The next Platonic solid in line (we are making our way from the least to the most volumetric) is the six-faced hexadron or cube, which Laban uses to describe the three *diagonal* orientations of movement in three-dimensional space. Simply put, the model represents a human figure exploring diagonals in space, like the line drawn by a bodily line from a right leg stretched

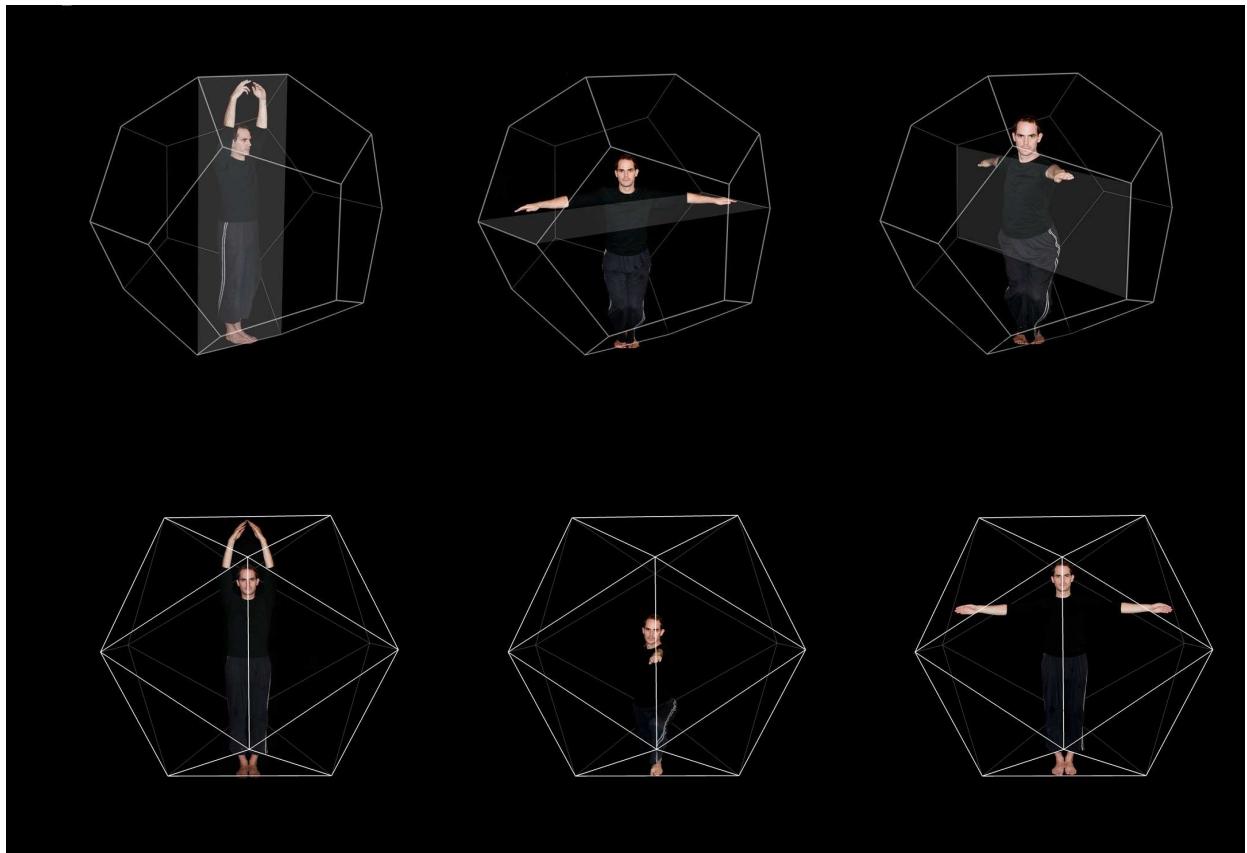
⁷ The five Platonic solids are the tetrahedron (four faces), cube (six faces), octahedron (eight faces), dodecahedron (twelve faces), and icosahedron (twenty faces), every one of which is made up of the same regular two dimensional shape (a triangle, square or pentagon), which when connected in a three dimensional configuration, make up a regular three dimensional solid.



Fig 1. Tetrahedral form of kinesphere, Laban's basic form of plastic human movement



Figs. 2 and 3 Cubic and Octahedral forms of the kinesphere, representing diagonal orientations (mobility) and dimensional orientations (stability)



Figs. 4 and 5. Dodecahedral and Icosahedral forms of the kinesphere, representing the three cardinal planes (vertical, horizontal and sagittal)

backward, to a left upstretched arm. The octahedral form of the kinesphere illustrates a similar idea, only in terms of *dimensional* orientations in three axes (upward-downward, right-left, forward-backward), and which Laban used in order to develop dimensional scales and the so-called defense scale.⁸ The next two solids are so closely related, in geometrical terms at least, that they cannot be treated separately in Laban's thesis. But because the dodecahedron has less volume than the icosahedron, and because it encourages smaller and inward movements that relate to stability, Laban all but does away with this particular object. The icosahedron, on the other hand, is elevated by Laban as the ideal Platonic solid wherein to train and gain knowledge of harmonic relations in space, insofar as it contains all other solids within it. According to Laban, the icosahedron provides the most complete space model for the practice and training of space harmonic relations, not least because the icosahedron offers the appropriate volume and the appropriate angles to match the possibilities of movement of a human body within regular polyhedral space. Finally, Laban found that certain proportions within the icosahedron follow

⁸ A film footage contained at the Digital Dance Archives entitled *Video 1, canister 2: Art of Movement Studio, Addlestone, Surrey*, shows Laban constructing a paper model of the octahedron, and then doing a practical demonstration of the dimensional scale. The use of film, as I will explain later on in this paper, is a crucial tool for the graphic analysis of harmonic movement, both in Laban analysis and movement analyses post-Laban. See Digital Dance Archives <http://www.dance-archives.ac.uk/media/12387>

the laws of the Golden ratio, which further reinforced the idea that this solid provided ideal proportional relations in space, within which the body could move in harmonic and well-structured ways.

Laban's dynamospheric models: topological shaping of human movement

Now, whilst much has been said about the use of solid geometry in Laban's work,⁹ little has been said about his use of topological models to describe the dynamic efforts contained in human movement. Indeed, many authors who have dealt with these solid geometric models have not even recognised that some of the mathematical objects used by Laban in his book *Choreutics*, are in fact developed from non-geometrical theories of mathematical space. In addition to the geometry of the five Platonic solids, Laban also used 3D models that are inspired by topological objects in order to better understand, and visualise, human movement of a dynamospheric kind. Inner movement can be modelled, according to Laban, using the lemniscate, inverted circle and knot-forms of the dynamosphere.

One of the three main topological objects used to model the dynamosphere is the three-part knot, which Laban also associated with the defense scale, the attack scale, and the transversal standard scale. Laban frequently used knots in relation to standard forms, that is, universal forms that indicate not only rationalised spaces (geometries) conveyed in solid three dimensions, but also more fundamental notions of movement involving universal notions like continuous change, inner-outer relations, and so on. Within this category of topological movement, Laban also makes use of the lemniscate model (an erroneous term used to denote the figure of the Moebius strip). Although the precise use of this topological object is not clear, it appears to be basic to Laban's choreutic conception and thus attests to the centrality of topological surfaces in choreutics. What is rather obscure, is whether the model refers to shadow-forms or trace-forms, or both. Interviews with Laban's students (Longstaff 1996) supports the interpretation that the lemniscate was used as a metaphor for the sequence of 'inside-outside-inside-outside' rather than as a strict geometric shape of a kinespheric path.

A rare film footage contained at the NRCD and displayed at the Digital Dance Archives shows Laban and a student at the Art of Movement Studio in Addlestone (Surrey) analysing a seven-link mobile chain, which is effectively a Moebius strip made up of seven linked tetrahedrons. This intriguing object was devised by Laban as a way of transposing the musical

⁹ See Valerie Dunlop Preston and Anna Carlisle *Living Architecture: Rudolf Laban and the Geometry of Dance*. (2008). Directed by Becky Edmunds. (C.f. Maletić: 1987, Goodridge: 1999, Newlove and Dalby 2004).

notion of the diatonic scale to a spatial scale, which he called the diaformic scale. Based on the seven-part series of the diatonic musical scale (five whole intervals and two half intervals), Laban visualised his diaformic scale as a Moebius strip made up of seven angles, five wide and two narrow. Laban's theory of seven-ring movement, whilst relatively unknown, is key to understanding his theory of topological motion as an appreciation of universal forms, where inner and outer are related in a continuous and ongoing way. J. S. Longstaff quotes an unpublished letter by Laban where he explains how in movement analysis, the simplest unequal proportion between inner and outer is two movements + three movements, and how observations reveal there is always one movement transition inner-to-outer, and one movement transition outer-to-inner, totalling seven motions in entirety (Longstaff 2004). This sequence of inner-to-outer and outer-to-inner creates a continuous circuit in the form of the seven-part Möbius band, as shown in the aforementioned video footage.¹⁰ What is central to topological modelling in Laban's theories, is that they attest to movement functions that escape the rational spatiality of the kinesphere. This is why Laban theorises topological shapes not only in relation to a personal human space, and a rationalisation of movement around the human body, but also in relation to physical space in a general sense, in order to reveal within human movement properties of movement that are found in any form (organic or inorganic). Movement topology is derived from an alogical movement relationship established between inner and outer or between stable forms (knots) and mobile forms (inverted circles), via the intermediary forms of the lemniscate (dynamospheric balance). These forms are not represented by the rationalised movement of the human body in outer space, but by the inner dynamics that feed into outer movements, and thus create the ongoing relationship between outer and inner that constitutes the paradox of movement.

When looking at Laban's topological models of the dynamosphere I am reminded of Jacques Lacan's analysis of the psychic subject, which is also modelled in relation to topological surfaces.¹¹ For Laban, however, the use of topological figures is useful to show two key features

¹⁰ The film is entitled *Video 1, canister 3: Art of Movement Studio, Addlestone, Surrey*. See Digital Dance Archives <http://www.dance-archives.ac.uk/media/12388>. J.S Longstaff argues that Warren Lamb, one of Laban's closest colleagues in England during the 1940s and 1950s, offers an additional intriguing perspective on Laban's Moebius band model. In Longstaff's interview Lamb recounts how Laban would offer a model of the seven-link chain to be held in the hands. While the model was rotated and turned through its many orientations Laban would observe the mover, making notes and concluding with an analysis of the person's movement style and characteristics. Hence, its designation as the "movement indicator". Lamb's explanations seem to agree with this particular footage, where Laban is seen holding a seven-link movable chain in his hand and muttering, while students move in relation to it. It appears Laban used this Moebius strip or movement indicator as a lens to read people's movements in terms of combinations of inner and outer relations, that is, in terms of topological properties of human movement.

¹¹ In Seminar XII Lacan introduced his 'topological schema' for the modelling of the psychic apparatus, featuring a somewhat intriguing use of boundless surfaces as described in a number of topological objects

of dynamic movement (1) that these processes create no division between oppositional properties like inside and outside, and (2) that the key function of this type of movement becomes transformation or continuous change. Whilst two bodies cannot possibly share the centre of the same kinesphere, one crystalline shape can transform continuously into another crystalline shape, which means that the crystalline formation of movement is guided according to Laban by a fundamentally topological function, that is continuous change, and continuous transference between opposites (inner to outer and vice versa). Whilst at the local level of a single crystalline shape, say a tetrahedron, a limited number of transformational operations is possible, according to Laban's topology, the change between this shape and the cube is continuous, so the transformational operations across all crystalline forms are limitless. And in the same way that one crystalline shape can morph into another *ad infinitum*, so the shapes of dynamospheric actions are continuous and ever-changing, guided by the flux of human emotions and psychological drives.

Laban scholar J.S Longstaff has produced a number of interesting developments in this area, suggesting that the map-like images of the kinesphere, as they are structured within the polyhedral shapes discussed above, can be transformed one into the other with various physical operations (rotation, reflection, sizing, etc). Longstaff argues that a mathematical puzzle like the one famously devised by Euler in his 'Seven Bridges of Konigsberg' problem¹² can be transferred to the question of how one crystalline shape morphs into another in the activity of continuous human movement. Longstaff thus argues for a choreutic principle of 'deflection' across various kinespheric nets. This deflection of one shape into another constitutes for Longstaff a

including the Moebius strip, the knot, the torus, and the Klein bottle. For Lacan, it seems, topology enabled him to study the psychoanalytic subject 'as being the subject of the word, the subject in so far as he is determined by language'. Lacan makes use of topological shapes to speak of a relationship between the inside/outside of topological objects as an analogy of the psychic subject, whose inner self (the unconscious) is contained within the space of the Other (that which lies in the field of shared experience and knowledge). Lacan introduces topology also as a way of describing this relationship as a continuous cross-cap, the continuous function being in this case the desire principle. To the extent that the model refers to a spatial representation of the subject as a movement of inside/outside space-relations determined by language ('space qua locus of the word'), so the operation bears some resemblances with Laban's use of topology. Laban also sees human movement represented in a topology of language determined by relations of continuity (from to inner to outer and back); albeit not through word-based but body-based languages. See Jacques Lacan's Seminar XII *Crucial Problems for Psychoanalysis 1964-1965* Translated by Cormac Gallagher from unedited French manuscripts, available at <http://www.lacaninireland.com>

¹² The Seven Bridges of Königsberg is a historically notable problem in mathematics. It was solved by the negation of its proposed hypothesis in 1736 by the Swiss mathematician Leonard Euler. The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands which were connected to each other and the mainland by seven bridges. The problem was to find a walk through the city that would cross each bridge once and only once. The islands could not be reached by any route other than the bridges, and every bridge must be crossed completely every time; one could not walk halfway onto the bridge and then turn around and later cross the other half from the other side. The walk need not start and end at the same spot. Euler proved that the problem has no solution. In addressing the problem, Euler developed some of the first mathematical notions of what was to become mathematical graph theory and mathematical topology.

topological theory of movement, which suggests for this author the possibility of a re-engagement with Laban studies, in such a way that an interdisciplinary link between choreutic studies and topological theories of cognitive science can be achieved. Although, as we will see, Laban was well aware of the concept of mathematical topology, he does not refer to the transformational dynamic of crystalline movement in these terms. Rather, he called this idea a 'dynamic crystallography', a key feature of his theory of crystalline movement. Laban also argues that dynamic crystallography recognises spatial tensions and transformations, which are examined in a way similar to that undertaken when investigating those which occur in the building of matter, which is why he too recognises an interdisciplinary link with scientific theories of growth and natural crystalline formation (1966, p. 103).¹³

Laban on topologic movement observation

'Topological Explanations, Qualitative Aspects' is an original typed manuscript by Rudolf Laban dealing with the application of topology to the concept of effort and effort-training, intended as Chapter Four of his unfinished book *Effort and Recovery*. As in the case of his previous book on effort, Laban wanted to understand how certain characteristics could be analysed in relation to the kind of movement he had observed in factories and other workplaces during his research collaboration with management consultant F.C. Lawrence during the war years.¹⁴

In this unpublished manuscript,¹⁵ Laban draws on what he calls 'the mathematical science of topology', in which, according to the author, 'non-metric spatial relationships are investigated'

¹³ Strong links could be made, in this respect, between Laban's dynamic crystallography theory and D'Arcy Thompson's hugely popular book *On Growth and Form* (first published in 1917), particularly Thompson's celebrated theory of topological transformation of animal form, dealt with in chapter XVII of this book ('The Comparison of Related Forms').

¹⁴ Whilst resident in Manchester during the war years, Laban worked for W.C Holmes and Co., a foundry in Huddersfield (1942-6), designing a measuring test for speed, skill, attitude and reliability, appropriate for each part of the assembly line. Laban was concerned with getting each factory worker into a part of the line for which he or she was compatible in terms of effort. Laban also worked for Hoover Ltd. And St Olave's Curing and Preserving Co., all of which served in his development of his theory of industrial movement. The research provided an alternative to taylorite methods and time-motion studies, and it was consolidated in Laban and Lawrence's 1947 book *Effort: an economy of human movement*.

¹⁵ The document is contained at the Laban Archive, National Resource Centre for Dance (Reference number: L/E/56/10). It was apparently intended as Chapter 4 of a follow-up book to Laban's *Effort: an economy of human movement* (with F.C.Lawrence, first published 1947). In the early fifties Laban started working on a follow-up book to be called *Effort and Recovery: Seventeen Studies of People in Motion* (the inscription E + R is written in pencil on the top-left hand corner of the first page of this document). The pages are numbered, presumably by Laban himself (118- 142), and they are dated c. 1953. In April 1953 Laban sent a draft of the book to his publisher John Macdonald, and explained in an accompanying letter that the book still needed 'efficient care'. He also points out that he delayed in the writing of this work by serious illness. It is quite possible that the book was deemed unfinished, which is why it was not published. Excerpts from *Effort and*

(*Topological Explanations* p. 3). Laban's aim in his unpublished *Effort and Recovery* was to present an analysis of everyday movement, especially work-related movement,¹⁶ based on observations and graphic descriptions of everyday activities which exemplified the idea of how people expend and then recover energy. Each chapter featured a scene depicting the book's main thesis, which Laban then used as an empirical basis on which to support various new ideas he was developing in relation to movement studies, particularly drawing on Carl Jung's mental factors of thinking, intuiting, sensing and feeling, and Kurt Lewin's principles of topological psychology.

"Topological Explanations"¹⁷ describes a meeting between three people, two of whom had quarrelled prior to the meeting, and the resolution or recovery of the two adversaries' harmonic relationship via the mediation of a pedantic instructor. The chapter develops a theory of non-quantitative and non-measurable properties of movement based on this observational study. Laban argues that to understand effort one has to observe a free flow of energy which shows itself in the inverted tendency toward recovery, and which serves as the absorption of energy by the individual. Laban's thesis, therefore, is that movement is a production of energy moving toward an outer expenditure of energy and inward toward some form of inner recovery, and that to understand such process one has to pay attention not only to outer and measurable movements, but also shadow-moves accompanying these functional actions. Topologic movement observation is thus a study of inversions of the flow of energy interpolated into the everted flow- that is, inner moves establish the necessary balance between effort and recovery.

Laban begins the text with a description of mathematical topology in terms of a study that deals with properties of position which are not altered by the size or shape of the object in which such properties are present. According to Laban, such properties remain the same in spite of any stretching or bending of an object (*Topological Explanations*, p. 3). The definition is fairly accurate as a general description of mathematical topology.¹⁸ Laban then gives two examples of a topological operation by arguing that a right-hand glove can be turned inside out in order to fit

Recovery have recently appeared in Dick McCaw's (ed.) *Laban Sourcebook* (Routledge 2011). This publication does not include the unpublished chapter on topology discussed in this essay.

¹⁶ Laban's topologic movement theory relates the study of qualitative properties in the relational dynamic between, for example, operator and tool in the industrial workplace, and to the design of an efficient workplace where the network of bodily movements is carried out in a definite correspondence with the network of positional relationships of the objects in space (TE 20).

¹⁷ The Laban Archive also contains an earlier, undated version of this text, which bears the title 'Topologic Movement Observation' (Ref: L/E/8/9)

¹⁸ Compare with the more formal definition: 'topology is the study of qualitative properties of certain objects (called topological spaces) that are invariant under certain kind of transformations (called continuous maps), especially those properties that are invariant under a certain kind of equivalence (called homeomorphism)' (Shick 2007: 1). In popular accounts of topology, this mathematical concept is often demonstrated by way of a joke. A topologist cannot tell the difference between a doughnut and a coffee mug because these objects are topologically equivalent. Despite the concrete differences between actual doughnuts and coffee cups, their topological counterparts, abstractly taken as but continuous surfaces with single holes, are regarded as the same object (Rosen 2006: 4).

on a left hand, and that a furry hide, which in animals grows outwardly, can be inverted when turned into a coat. Both cases illustrate a property-preserving relation (right-handed to left-handed and outside to inside). Both cases exemplify, following two different topological operations, that the objects in question remain functionally the same.

Laban's theory of topological movement focuses on the concept of a 'definite movement function', which remains the same despite differences in size and shape. For instance, human movement shows many types of circuits where inside and outside are transformed one into the other, or where left and right are transformed seamlessly as part of the same continuous operation. Take a function like feeding, for instance. Whatever the size and shape of the organism, feeding remains essentially the same function: to incorporate an external element (food, nutrients, etc.), into an internal bodily system. Feeding actions are therefore constant functions, and to understand them, it is not necessary to define them in terms of the size and shape of the movement, or the outer movement as drawn in geometric space. To understand these movement functions one has to look at shadow-moves that relate to the inner, recovery preserving processes of all living movement. This applies to any action of incorporation, of bringing that which lies outside the body inside: thus, the movements of gripping, scooping, grasping, have the aim of bringing something from the outer surroundings inwards to the body (*Topological Explanations*, p. 10). This category of movement, which is so characteristic in human beings and animals, can be coupled, conceptually at least, with movements that have the opposite function. Thus, in Laban's theory, there is also a category of movement whose function is to eject, push away, or scatter material out of the body into external space. In sum, and because most living organisms, if not all, engage in such ways with their surroundings, Laban argues that topological movement is a means of analysing movement that is applicable to the movement patterns of an amoeba as much as to a man (*Topological Explanations*, p. 10). Topological movement typifies the effort made by living beings resulting in living functional movement (*Topological Explanations*, p. 12).

Topological movement (psychological aspects)

Much of Laban's intention behind *Effort and Recovery* was to expand on his effort theory by drawing on the field of psychology, which is why 'Topological Explanations' turns to a discussion of the psychological aspects of topological movement, at which point the manuscript veers toward the writings of Kurt Lewin, particularly his book *Principles of Topological Psychology* (first published in 1936). Lewin's work opens a number of interesting contributions to a theory

of topological movement complimentary to Laban's, and it is important to mention, at least briefly, Lewin's contributions. Central to Lewin's theory is the idea of *locomotion*, which he breaks down into the distinct categories of psychological locomotion, bodily locomotion and social locomotion. So in addition to bodily and psychological forms of movement, Lewin identifies another type of human movement across social fields- an example of this being the movement of a sixteen year-old boy from school to college in his trajectory toward becoming a 'physician' (1936, p. 48).

Lewin sees social locomotion as possessing spatial characteristics similar to those discussed by Laban, insofar as social locomotion is a type of directional movement, which is prone to conflict and to tension brought on by directional opposition. Like bodily locomotion, social locomotion is driven by a psychological drive that establishes a path, which according to Lewin, is to be coordinated mathematically to each psychological locomotion (1936, p. 95). Insofar as all locomotion is therefore the production of paths that are drawn psychologically, people could be said to move physically and socially in relation to conditions of location that impose upon the psychological field a series of spatial properties. Thus, a person can be described in terms of a 'position' within a 'region'. In addition, topological psychology makes use of notions like boundary and structured space to define the composition and properties of people within their given life-space.

Laban argues that topological psychology (presumably, he means Lewin's principles), deals with the localisation of mental processes in a topographic – not topologic- way (*Topological Explanations*, p. 13). In the absence of a definition of these terms, one is left wondering what Laban means by this. It is possible that Laban's criticism of Lewin's psychological approach is that it makes topographic descriptions of mental processes occurring in the 'life-space' (the term, used by Laban, is of course Lewin's). In other words, Laban is not interested in arbitrary graphic representations of topological movement, for the simple reason that he is not interested in seeing the movement in this occasion, but describing it. More likely, what Laban is interested in is in finding a way in which movement topologies can be observed, rather than conceptualised and turned into graphic models.

For Laban, topological movement observation is a task that focuses the attention of the analyst on the logical complexity of the moving body. Graphic representations of Laban's 'topological explanations' would have demanded a more sophisticated or powerful medium of graphic representation and observation. Laban also departs from Lewin in that he is above all interested in transformational operations, particularly in the transformation of inner into outer and vice-versa, which is why drawings and diagrams are a somewhat limited medium, and which

is why, I insist, Laban's theorisation could have only taken a visual approach if it had been developed using motion-graphic technologies.

Laban finishes off this unpublished chapter by arguing that rhythm must be taken into account also in terms of non-metric relations. According to Laban: 'in its essence, rhythm is a non-metric entity' (*Topological Explanations*, p. 20). Whilst rhythm is typically given a representation as a set of proportions that are established quantitatively (as seen in my earlier discussion of kinespheric trace-forms and their metric properties), Laban is here concerned with the qualities of rhythm, and with happenings in space that are the result of successive changes of non-metric spatial relationships. Instead of determining the exact relation between longer and shorter parts within an arbitrary sense of the whole, Laban is concerned with everything that is preserved in a state of change. Instead of duration, which Laban considers to be a metric determination of time and time-rhythm, he proposes the term *protensity* to describe temporal quality, and the movement of time in non-metric, that is non-chronometric, but possibly chairiological terms. Thus, Laban argues that protensity is a non-metric relation to time, a positional property independent from any size or length of duration. The example provided by Laban is time taken up by waiting: 'it is irrelevant' Laban writes, 'whether the waiting has a longer or shorter duration, or whether it takes any exactly measurable period of time at all' (*Topological Explanations*, p. 22). The period in question remains always waiting, and it is implied in the postponement of the production of a change. Like waiting time, urgency and sustainment are qualities of time independent from sizes of time-durations.

Geometrical to Topological Media

To finish, I will argue that it is within the ambit of graphic-motion and computer-motion analysis that Laban's idea of topological movement observation can be fully developed. Indeed, the critique made by Laban in respect to topological psychology, namely, that it is topographic, is only partly true, particularly since Lewin's experimental use of film as an observational methodology enabled him to record psychological fields in a way that established a very different experience of seeing movement, as part of a new observational approach to the study of social and bodily locomotion. Like Lewin, Laban was fascinated by the use of film as a medium both for dance education and artistic expression. Unlike Lewin, however, Laban did not explore the possibility of using film to test his theory of topological movement observation, and indeed, to record the kind of daily movement activities and group dynamics he described in so much detail in his unpublished book *Effort and Recovery*.

It is unclear whether the work Laban had carried out in the twenties in the area of educational dance film¹⁹ might have been taken up once more in the late fifties in order to develop a film studies approach to topological movement observation. Although Laban was well aware of Lewin's theoretical study of topological psychology, and he was prompt to criticise Lewin for trying to draw conceptual models of topological locomotion, many of the practical film works conducted by Lewin illustrates quite neatly, in actual fact, the key ideas put forward by Laban. In his film *Field forces as impediments to a performance* (1925), for instance, Lewin studies a child trying to sit down on a stone, an action which involves turning round in a direction contrary to the goal. The film shows the child facing the stone, and thus unable to understand the function of 'turning round', which leads to the child's failure to achieve the intended movement. Topologically speaking, it does not matter what type of seating the child chooses (the film then shows the same operation but with a chair instead of a stone). The function remains the same: the child has to turn her back to the chair in order to sit down regardless of the type of seating placed in front of her.

As Evelyn Dörr points out in her essay *Rudolf Laban's dance films*, 'Laban was excited by the technical and dramaturgical possibilities of film: particularly by the combination of cross-fades, close-ups, time-lapses or cuts' (in McCaw 2011, p. 168). Laban himself wrote in the manuscript *Tanz in Film* (1929) that film and dance are related. According to this reading, both art forms have a common basis in the use of rhythm. Laban argued that the filmic processing was not the most appealing way of making the two art-forms interact, but that film could lead to new approaches to artistic experimentation. It seems Laban was planning to develop a type of film script written in Labanotation (in McCaw 2011, p. 174), in the belief that a new experimental form of film could be developed in which narrative rhythms proper to conventional film could be replaced by dance-rhythms. Although film appealed to Laban more as an artistic medium, and also as an educational tool, it seems to me that it is precisely as an analytical tool, as used by Lewin in his 1925 film quoted above, that topological movement observation becomes fruitful as a visual approach. Thus, in addition to writing film-scripts, and planning Labanotation scripts for film, Laban could have taken his cue from Lewin to develop a filmic analysis of topological movement, which would have enabled him to show graphically the kind of detailed observations laboriously described in his unpublished book *Effort and Recovery*.

¹⁹ Together with film director Wilhelm Prager Laban staged a pantomime for the film *Drachentöterei* in the mid 1920s. Laban then embarked on a number of educational dance film projects including *Das Lebende Bild* (The Living Image) and *Gruppenform-Lehrfilm* (Group Form educational film). Also during this period Laban wrote more ambitious screenplays including *Tanz der Menschheit* (Dance of Mankind) *Tanz ist Leben* (Dance is Life) and *Die Befreiung des Körpers* (The Liberation of the Body). For a study of Laban and film see Dick McCaw (ed.) *Laban Sourcebook* (2011).

One could argue that videographic and computer graphic approaches to Labananalysis provide powerful tools for the analysis of movement in a way that retains Laban's consistent use of graphic approaches, and expands on these, by making use of technologies that can capture movement not only as stills (diagrams, drawings, graphs, etc.), but also as moving images. This would imply that moving-graphic media, and computer graphics in particular, have the capacity to do what description does not. A book like *Effort and Recovery* fails precisely in the limited power of verbal description to develop the right analytical approach to the kind of topological movement identified by Laban. Observation and description in this case lead to a rather anecdotal and analytically unconvincing report of topological movement. With video, film or computer graphics, a vast array of movement transformations and movement functions can be visualised that would help understand the kind of qualitative aspects that appear to be so elusive when captured in Laban's unconvincing prose.

The remediatisation of Labananalysis

One contemporary practitioner whose work is greatly concerned with the re-mediatisation and the re-thinking of Labananalysis in terms of an observation of movement via moving-image technologies is the American dancer, choreographer and educator William Forsythe. Forsythe's exploration of how moving bodies think, and how this form of 'physical thinking' can be analysed, is developed into a more de-centered, fragmented and ultimately non-harmonic approach to the dance. Forsythe does not depart fundamentally from Laban's premise that the dance can be analysed for its better understanding, nor does he dispute that this analysis is better served following a multimodal visual approach. Unlike Laban, however, who looked to the moving image only as far as an artistic and educational tool, Forsythe has used the moving image for both these purposes whilst making further use of vision technology as an analytical tool. Forsythe's hugely popular and successful *Improvisation Technologies: A Tool for the Analytical Dance Eye* (first released in the medium of CD-ROM by the Centre for Art and Media ZKM in 1994), completely transforms the process of analysis through the introduction of the camera eye.

Whilst conventionally a dance might take place in a continuous, lived-in space, an educational film-dance like Forsythe's *Improvisation Technology* takes place in a discontinuous and projected space. The camera eye immediately introduces analytical notions of space: the front view of the dance, the fixed angle and position of the camera, the duration of the recorded action. These three features of the camera eye allow Forsythe to present a clear, unimpeded and uncomplicated frontal view of his movement exercises, which are presented in very short clips,

each one addressing a particular unit of dance analysis (isometry, parallel sheering, complex linear operations, etc.). Forsythe's movements are visualised as linear trace-forms by computer generated graphics, which in turn open a powerful new analytical dance eye that enables the viewer to better see (think) the dance. Two further roles or authors are introduced to this process of analysis, the film-maker and editor, on the one hand, who frames the vision and cuts it up into a temporal and spatial rhythm, and the programmer, who renders Forsythe's movement visible via the development of a computer-generated image of the choreographer's trace-forms.

More recently, Forsythe has launched *Synchronous Objects*, a computer graphic analytical approach to his choreographic work *One Flat Thing, Reproduced* (2009). *Synchronous Objects* is an interactive web project developed in collaboration with The Ohio State University, which explores once again the question of how physical thinking can be seen, by delving into the systems and conceptual frameworks that organise the dance. The aim of *Synchronous Objects* is to extract key information from the dance itself in the form of data, so that new manifestations of the dance can be generated as visual objects for screen-based media. The process of capturing the dance as data and then rendering this information into new forms of computer-generated dance objects is at once artistic and analytical, thus collapsing the distinction between art praxis and analysis that Laban began to break down, but which remain somewhat inflexible in his dualistic approach.

As a practitioner myself, it has been important to develop my own practical studies of movement analysis in order to respond to Laban's idea, and develop them through the use of new media and technology. To do so, I became interested in the possibility of re-engaging with some of Laban's own artwork (primarily artistic drawings depicting notions of harmonic space). In order to address some of these questions I embarked on a videographic study entitled *Labanimations*²⁰, in collaboration with video artist Sebastian Melo, and the Laban Archive (National Resource Centre for Dance). The studies make use of long exposure photographic video and slit-scan video treatment in order to re-interpret three of Laban's original drawings, currently housed at the NRCD. The aim of the project was to *see* the drawings again, but through

²⁰ EPSRC funded project: *Visualising Motion in 3+D* (PI Rachel Fensham).

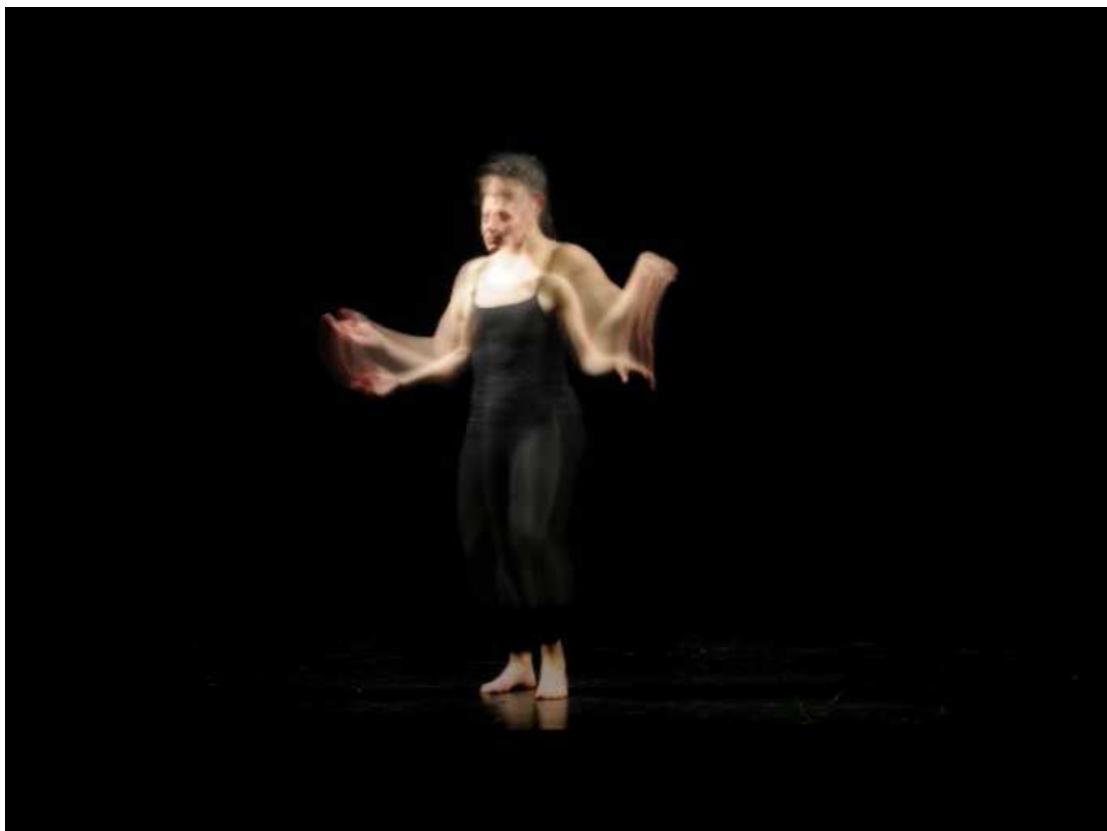
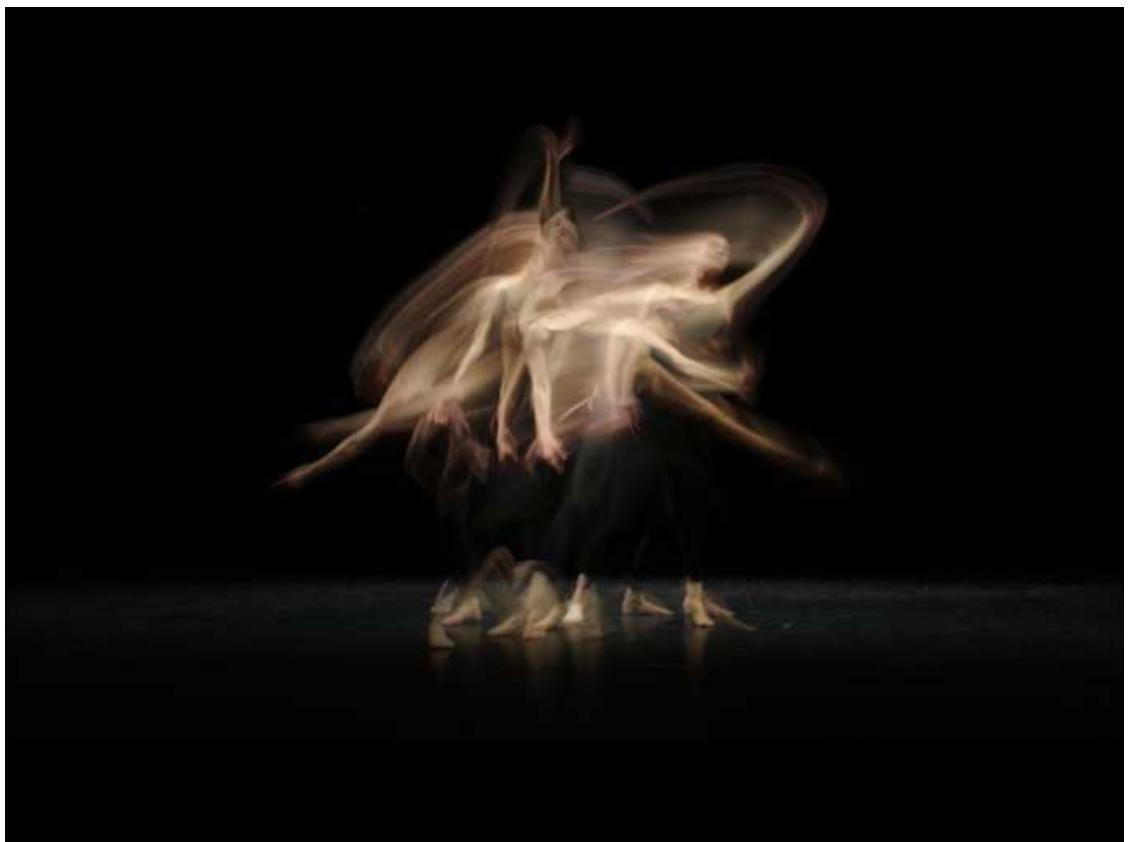


Fig 6. *Labanimations* 1 (study of shadow forms)

the eyes of a completely different medium capable not only of recognising the added variable of time, but also treating this variable in novel ways.²¹ If, in this process of media-translation, a new thinking and a new set of processes for physical thinking are also activated, one has to ask oneself what kind of thinking comes into view as a result of seeing through cameras or computer-generated vision that enable us to see the human body as a moving, and ultimately a topological, object.

The aim of *Labanimations* is not to shift the analyst's perspective from a naked to a digital eye for the sake of digitalisation, but, as in Forsythe's case, to explore the transformational operations available within new vision technology. Thus, the aim is not only to film the dancer interpreting the harmonic relations depicted in the drawing, but also to intervene in the process of *seeing* a movement by exploring techniques available within the medium itself that enable the image to be transformed in new ways, and in operations which drawing and other still-image

²¹ Both techniques used in this project relate to treatment of time in video. Long exposure photography or time-exposure photography involves using a long-duration shutter speed to sharply capture the stationary elements of images while smearing or obscuring the moving elements. The paths of moving light sources become clearly visible. Slit scan photography, on the other hand, is an animation technique created image by image, and pioneered in the final sequences of Kubrick's *2001: Space Odyssey*. Its principle is based upon the camera's relative movement in relation to a light source, combined with a long exposure time, producing deformations of the image that are highly evocative of topological deformation.



Figs. 7 and 8 *Labanimations 2 and 3* (studies of dynamic stress)

techniques cannot achieve. Nor is this just a question of using video to record a movement, to document it for archival purposes. It is in this regard that a whole new set of opportunities for the analytical thinking and creative exploration of movement opens up. As in the case of Forsythe's work, *Labanimations* is intended as a more extended process, involving many different agents in the process of analysis. The layers of translation and interpretation needed are, in part, the instigation and instructions of the method explored, which are consistent with the idea that movement is method.

Finally, the moving image and the digitalisation of these images open up additional modes of communication (online, CD, or in the case of Laban-inspired tools like *Moving Space*, they can be disseminated in the form of downloadable apps to be used in iPhones or iPads). This decentering of the act of analysis breaks with a sense of the analyst as author, and the singular position from where the analysis itself takes place. For even though the camera can function as a singular angle and a single eye cast on a movement, as in the case of *Labanimations* or *Improvisation Technologies*, the dissemination of the images via different media and different interfaces produce myriad forms of engaging with the material, thus decentering and endlessly respatialising the way in which the seeing of physical thinking is produced and experienced.

This multi-layered approach becomes a palimpsestic experience, in which movement can be thought out through layers of preceding thought-processes and image-processes. There is an acknowledgment here of the fact that making up new images of physical thinking is not possible as an instantaneous result in the way a Polaroid print might be, not least because thinking is a much more dialogic and layered process. So rather than taking a snapshot of a movement in the manner of a diagram or analytical drawing, as Laban's graphic approach shows, *Labanimations* argues for an understanding of the graphic object as a chain of responses, a process made up of many stages in which the information that makes up a thought is transferred from body to body, becoming multi-layered and nuanced in the process. My argument is that physical thinking occurs in this transference of information between bodies, and not from a bodily singularity. Physical thinking and its visualisation demands a process of sedimentation of visions superimposed one on each other, a chain of memory and interpretation that implies that for every image there is an archaeology, a set of historical layers of preceding versions of that image in various formats and media.

In conclusion, topological movement theory demands a more suitable methodology than mere observation and description, which are the methods used by Laban in his unpublished book *Effort and Recovery*. The method proposed here as an alternative seeks to further collapse

distinctions made between process and result, or between inner process and outer movements as presented in Laban's dualistic theory of kinespheric and dynamospheric movement. New media enable contemporary visual artists/thinkers to create such transferences by making use of powerful new analytical eyes that allow us to see (think) not only in real-time, but also in synchronous times – and in multiple or multi-layered spaces as well. This sense of multiplicity also invites a durational or indeed 'protensive' aspect of the observational experience, in the sense that it takes qualitative time to process the image (which is also the thought), before it can come into view. And it never does, because the view (or thought) is simultaneously coming into focus and receding. It is within this protensity that analysis and creativity cease to be seen as separate, and where the polaroid approach is abandoned in lieu of a topological way of seeing and thinking.

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Videography

Field forces as impediments to a performance. 1925, about. Film. Directed by Kurt Lewin. 9:04 mins.

Available at <http://vlp.mpiwg-berlin.mpg.de/library/data/lit39546>

Labanimations. Conceived by Nicolas Salazar-Sutil. Directed by Sebastian Melo, with choreographic studies by Melina Scialom and Nicolas Salazar Sutil. www.moveresearch.net

Living Architecture: Rudolf Laban and the Geometry of Dance. (2008). Written by Valerie Preston-Dunlop and Anna Carlisle. Directed by Becky Edmunds. Film. DWE Trust.

One Flat Thing, Reproduced. 2009. Film. Choreography by William Forsythe. 16:09 mins. Available at <http://vimeo.com/39875376>

Solid Sense, Laban's Geometry of Dance. Directed by Nicolas Salazar Sutil. Choreography by Sarah Rogers and Lucille Teppa. Presented at PATS Studio, University of Surrey, June 2011.

<http://www.youtube.com/watch?v=564SIU16XjQ>

Video 1, Canister 2: Art of Movement Studio, Addlestone, Surrey. c. 1955. 1:52 mins. Film footage of Laban building an octahedron, and practising the dimensional scale. Digital Dance Archives <http://www.dance-archives.ac.uk/media/12387>

Video 1, Canister 3: Art of Movement Studio, Addlestone, Surrey. c. 1955. 3:35 mins. Film footage of Laban teaching the use of a seven-link movable chain or movement indicator. Digital Dance Archives <http://www.dance-archives.ac.uk/media/12388>

