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Space, Time, Weight, and Flow: suggestions for enhancing assessment of creative movement[1]†

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Background: Performance evaluation in the context of creative dance or expressive movement is often a challenging prospect for educators. Nonetheless, the process is a necessary one, not least of all because of the potential as a stimulus to growth. Ideally, assessment becomes a part of the feedback process, assisting teachers and students to clarify goals and to identify interpretive differences. Finding user-friendly ways of characterizing the body in motion is thus of potential interest in a variety of classroom situations.
Purpose: To introduce a terminological system designed to focus observations of expressive movement, with the intent of highlighting stylistic differences and subconscious limitations. The concepts behind the system are essentially choreographic, but have been operationally defined through reference to standard kinematic principles (position, speed, acceleration, and jerk).
Participants and setting: An interdisciplinary program for the investigation of the creative process, associated with the Theatre Studies department at the University of Malta.
Intervention: A search of the theatre literature for tools to assist in characterizing creative movement led to the writings of the choreographer Rudolf Laban. In particular, his system of 'Effort Actions' was chosen as a suitable point of departure, due to its focus on expressive range, and its congruence with elements of contemporary kinematics. The terminology was partially redefined, and then applied to the creation of movement charts, to assist with performance evaluation.
Research design: The development process consisted of a review of the theatre literature from the perspective of performance assessment; the identification of Laban's Effort Actions as potentially relevant for evaluative purposes; the redefinition of terms to suit more objective aspects of movement analysis; the creation of observational charts based on the resulting terminology; application of the system to subjective and objective data analysis; and finally, reflection on the effectiveness of the results.
Data collection: Charts similar to those provided in this paper were used to assist with subjective evaluations of individual performances in a classroom/theatre laboratory setting. More rigorous versions were also applied to the analysis of motion capture data, recorded to investigate the

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†Disclaimer: anyone beginning an exercise program (including the activities implied in this article) should always seek medical advice.

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effects of actor training on nonverbal personality. (Details are beyond the scope of this terminological overview.)
Data analysis: As the focus was on development of evaluative terminology, analysis consisted of the identification of correlates between elements of the choreographic literature and objective principles of contemporary kinematics. Specifically, Laban's category of Space Effort was analyzed from the perspective of trajectory profiles; Time Effort from the perspective of speed profiles; Weight Effort from acceleration profiles; and Flow Effort from charts of the derivative of acceleration (a measure of smoothness referred to as 'jerk'). Operational definitions were then re-examined for congruence with a sample field of application (sessions of theatre laboratory), resulting in the charts provided.
Findings: Based on the experience at the University of Malta, the terminological system described in this paper was deemed a successful choice for the assessment of creative movement. Specifically, the associated movement charts were found to assist the educator in focusing on fundamental aspects of expressive range in presentation. They were also sufficiently flexible to accommodate additional material for treating group interaction and other topics not addressed by Laban's original scheme.
Conclusions: The choreographic terms described here serve as effective organizing principles for structured observation of creative movement, particularly when conceptualized as the subjective correlates of basic kinematic principles. In particular, the polar nature of the vocabulary lends itself to the creation of 'dynamic images'—essentially snapshots of individual or group performance. Related movement charts are a powerful tool for quick appraisal of expressive tendencies, and can be used both to highlight stylistic differences, and to underscore disparities between presentation and performance objectives. The resulting awareness of habitual dynamics can in turn contribute to the selection of appropriate remedial exercises.

Keywords: *Performance assessment; Expressive movement; Creative movement; Creative dance; Laban; Kinematics; Actor training; Improvisation*

For educators in the field of movement studies, particularly those involved with creative dance or expressive movement, performance assessment can be a challenging prospect. After all, the difficulty of qualifying the human body in motion is compounded by the elusive nature of creativity, which by its very nature tends to undermine preconceptions (Boden, 1990). Nonetheless, assessment is an inherent part of most movement classes from primary school onwards, not least of all because of its potential as a stimulus to growth. Ideally, assessment becomes an important part of the feedback process, assisting the educator and students in clarifying goals, and increasing awareness of *what* is being taught, and *how* it is being interpreted (Blom & Chaplin, 1988). Adopting meaningful, classroom-friendly approaches to assessment can thus benefit the teacher/administrator and the student/artist alike.

Assessment in practice: theatre laboratory

My interest in assessment dates from my experiences at *xHCA* (Questioning Human Creativity as Acting), a theatre studies program at the University of Malta.[2] This unique interdisciplinary venue provides opportunities for research in theatre studies and cognitive science, and encourages exchanges between students and teachers in a variety of fields. Central to the philosophy at *xHCA* is the conviction that the work of the performer epitomizes the creative process in action. Actors associated

with the program participate in hours of theatre laboratory—painstaking 'research' into the expressive potential of the body in motion (Grotowski, 1968). This work typically culminates in one or more *improvisations*—not spontaneous 'happenings' as the word might suggest, but rather highly structured artistic presentations, meticulously choreographed from motifs and other elements arising during the training sessions (theatre laboratory). One of the challenges for researchers interested in creativity is to identify links between aspects of the actor training and salient elements of performance. As a graduate student at *xHCA*, my focus was on finding effective ways to qualify creative movement for use in such studies.

Movement research

Anyone interested in learning how to characterize the body in motion can draw inspiration from a wide selection of literature. In the sports world for example, measurement of kinematic parameters (including factors such as joint mobility and postural analysis) provides a means of accurately modeling physical behavior for performance enhancement and other purposes (Cavanagh *et al.*, 1983). Application of this approach however requires specialist knowledge, and recording equipment outside the purview of most educators. In the field of applied psychology, research on nonverbal personality has become increasingly sophisticated since Allport and Vernon's pioneering work in the mid-1930s (Riggio *et al.*, 1990). Unfortunately, the focus of investigation in such studies (frequency of grooming behavior, eye blinks and so on) is not generally relevant in an artistic context. There are also a number of highly elaborate choreographic schemes in the dance and theatre literature (Hutchinson, 1977). Related notation is certainly a potentially useful pedagogical device, but tends to deal primarily with the *where* rather than the *how* of presentation. This can draw attention away from dynamic range, a central element in feedback on expressive movement.

Effort Action: Space, Time, Weight, and Flow

The approach I will now outline is based loosely on the work of the choreographer and movement theorist Rudolph Laban (1879–1958). As a keen observer of physical action, Laban identified a number of recurring themes in the way people organize and express themselves through their everyday actions, ideas that continue to have an impact in fields ranging from physical therapy to childhood education (Laban & Ullmann, 1975). Laban's system of Effort Actions in particular turned out to be a useful starting point for characterizing expressive movement at *xHCA*. *Efforts* as described by Laban are the mental precursors to action—the emotional foundations of physical expression (Laban & Lawrence, 1947). In his book on the subject, Laban identifies four primary Efforts.

- *Space*: to gauge Space Effort, begin by imagining the trace lines of an object (finger, hand, limb) as it moves through space. Laban described the quality of Space Effort in terms of a polar axis, ranging between the extremes of Direct and Flexible. Direct

Space implies goal-centred action and clean, linear trajectories. In contrast, Flexible Space reflects a less attentive orientation to physical interactions—observers find it more difficult to identify starting and ending points of phrases, and the overall impression is that motion lacks spatial focus (Bartenieff & Lewis, 1980).

- *Time*: Time Effort is the most approachable of Laban's Effort terms for the layperson. Essentially the speed of motion, Time Effort is qualified on an axis running between the subjective extremes of Quick and Sustained (Laban & Lawrence, 1947).
- *Weight*: all descriptions of Weight Effort adopt an axis running from Strong to Light, but the exact nature of these terms differs somewhat depending on the writer. Sometimes the focus is on the degree of assertiveness or intended impact in performance—in this case, Strong implies a vigorous or forceful presentation, and Light a delicate or fine motion. Weight Effort can also gauge the degree of muscle tension behind a particular action. In this case, Strong represents a high state of tension and Light a more relaxed presentation, perhaps due to a relative emphasis on small versus large muscle involvement (i.e. gesture versus posture).
- *Flow*: varying between the extremes of Bound and Fluent, the Flow axis basically addresses the perceived degree of control in movement. Bound Flow describes the careful, meticulous movements of a person engrossed in learning a new manual skill. Fluent Flow by contrast suggests the wild abandon of a child at play. Discussion of Flow may also incorporate appraisals of the performer's emotional state, especially contrasts such as timidity versus boldness.

Effort and the assessment process

There is no question that arriving at precise definitions of Laban's original axes can be problematic. A key observation at *xHCA* however was the extent to which the Effort categories can be identified with basic aspects of objective movement assessment.

1. *Space Effort and Kinematics*: in general terms, identifying characteristics of imaginary lines traced by the limbs in personal space (the essence of Space Effort) is not unlike the process of analyzing changes in spatial position over time in kinematic research. In this sense, attending to Space Effort can be thought of as a kind of subjective motion capture analysis.
2. *Time Effort and Kinematics*: assessing the speed of motion in performance, the basis of the Time Effort, can be compared to drawing or deriving velocity graphs, based on changes in position across a movement trace. In Effort Theory, noting the evolution of trace lines provides information on the tempo/rhythm of performance, just as in motion capture, velocity curves follow from changes in position.
3. *Weight Effort and Kinematics*: the forcefulness of movement (as estimated from tempo changes or indirectly from the degree of muscle recruitment) is a major component of Weight appraisals. The concept of Weight is thus not far removed from the physical quantity of acceleration (itself proportional to force), an important factor in motion capture analysis. Acceleration follows from velocity, which in

turn follows from position. By analogy, one could say that Weight (i.e. force) relates back to Time (i.e. velocity), which is grounded in use of Space (i.e. position).

4. *Flow Effort and Kinematics*: the quality of Flow is perhaps the most subjective of the four Efforts, and yet even this quality has a solid physical correlate. If we treat Flow as an indicator of perceived smoothness/abruptness, then the kinematic equivalent is a characteristic of motion referred to as *jerk*. While relatively unknown outside of engineering laboratories, jerk plays a primary role in investigating the evenness of acceleration, when riding an elevator or roller coaster for example. As with velocity (Time) and acceleration (Force), it also happens to be ascertained indirectly through repeated derivation of position information (i.e. from use of Space).

Identification of these affinities made the Effort categories a natural choice for interdisciplinary studies; more importantly, it helped to establish their validity as the basis for developing new approaches to assessment. Application of this insight proceeded on several fronts: (1) creation of movement charts incorporating aspects of Space, Time, Weight, and Flow, to assist with subjective evaluations of performance in a classroom/theatre laboratory setting; (2) reinterpretation of the Space, Time, Weight, and Flow axes in terms of position, velocity, acceleration, and jerk for use in the analysis of motion capture data. While not addressed here, the latter project culminated in a successful investigation of the effects of actor training on nonverbal personality (Petersen, 2003).

The STWF movement chart

Tables 1–4 are excerpts from a chart for the assessment of expressive movement, developed through extension of the Effort categories of Space, Time, Weight, and Flow (STWF). The content of the chart is based on glossaries of Labanotation and Effort-Shape (Davis, 1975), and evolved through experience with actor training at *xHCA* over a period of months. Performance assessment as conceived here does not adhere strictly to the original axes and contrast pairs identified by Laban.

Table 1. Elements of Space in presentation

Topic	Observation	Description
Movement traces	Linearity of movements	e.g. hand movements are direct, piercing, and straight/indirect, curved, or meandering
	Scale of movements	e.g. broad/minute gestures
Reach space (kinesphere)	Symmetry of movements	e.g. one handed/two-handed gestures; emphasis on left/right side of reach space
	Elevation of movements	e.g. gestures utilize the space above the head/at chest level/at hip level/near floor
	Volume of reach space	e.g. personal space is confined/expansive
Shapes in space	Shaping of space	e.g. incorporates/does not incorporate mime
	Planes in space	e.g. posture shifts in the vertical/transverse/horizontal directions

Table 2. Elements of Time in presentation

Topic	Observation	Description
Duration	Scale of themes	e.g. motifs develop over whole session/over minutes/over seconds
Tempo	Speed	e.g. overall tempo is fast/slow
Rhythm	Recurrence	e.g. recurrence/no recurrence of motifs, mannerisms
	Synchronies	e.g. synchronies/no synchronies between gestures/between gestures and posture shifts/between performers

Rather, each Effort category becomes a kind of yardstick, assisting the educator in focusing on fundamental aspects of expressive range in presentation. The resulting movement chart is flexible enough to accommodate additional material for treating group interaction and other topics not directly addressed by the STWF scheme (Appendix 1).

Discussion: STWF in the classroom

Use of the Effort categories of Space, Time, Weight, and Flow as organizing principles in structured observation provides a means of creating 'dynamic images' of individual or group performance. Related movement charts are a powerful tool for quick appraisal of expressive tendencies, as for example when looking for stylistic differences between groups (Novack, 1988). In a classroom situation, the gathering of such images over multiple sessions also yields insight into the expressive range of students, while highlighting disparities between presentation and performance objectives. Awareness of habitual dynamics can point to subconscious limitations in the embodiment of choreography, character or role, which in turn can assist in the selection of appropriate remedial exercises. This is particularly helpful in the context of improvised movement, where shyness or lack of performance experience leads students to

Table 3. Elements of Weight in presentation

Topic	Observation	Description
Muscle tone	Perceived tension	e.g. high/low muscle tone; variable/consistent muscle tone
	Tension contrasts	e.g. torso energized while arms relaxed
Interaction with gravity	Support	e.g. changes/no changes in base of support (point of contact with floor, partners etc.)
	Resistance	e.g. resisting gravity/giving in to gravity
Tempo changes	Acceleration/deceleration	e.g. changes/no changes to tempo of individual motifs/tempo of session as a whole

Table 4. Elements of Flow in presentation

Topic	Observation	Description
Continuity	Character of transitions	e.g. follow-through/full stops
Phrasing	Expansion/contraction	e.g. radial action/no radial movements from trunk to limbs
	Segmented action	e.g. whole body energized/not energized (e.g. hand controlled but arms flaccid)
Control	Precision	e.g. precise placement of the body/ill-defined approach to space

'play it safe', resulting in over-reliance on stereotypical movements and gestures (Wolford, 1996).

A natural extension of adapting Laban's concepts in this way would be to incorporate such material at an earlier stage, as part of the process of curriculum development. Instilling children with a rudimentary knowledge of categories such as Space, Time, Weight, and Flow has the potential to enhance the sophistication of self-evaluation and to ease the acquisition of new skills. In martial arts classes for example, it has been shown that familiarity with the imagery of the kinesphere helps to counter tendencies to neglect three-dimensional space when movement objectives are complex (Honda, 1995). Effort categories are also suitable as an aspect of creative movement instruction, where they provide building blocks of action from which to improvise new material (Davis, 1975). The abstract nature of the scales is ideal for developing flexibility through exploration of dynamic contrasts, while avoiding preoccupation with mime-like gestures or other specific content. The resulting opportunities for studies in kinesthetic problem-solving, affinities between motion and emotion, and rudimentary choreography, are limited only by the instructor's imagination.

Notes

1. This article is expanded from materials appearing in the author's Ph.D. thesis (commercially unpublished) (Petersen, 2003).
2. xHCA has been largely subsumed in the EMA-PS Masters Programme.

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Appendix 1

Appendix 1. Example of chart augmentation

Topic	Observation	Description
Stage position	Stance/orientation	e.g. change/no change of stance direction with respect to the stage or audience
	Turns	e.g. separate from/combined with traveling; pivots on stationary feet/on one foot/on both feet
	Traveling	e.g. stationary/traveling; changes/no change in proximity to audience
Social factors	Floor patterns	e.g. independent/cooperative patterns (clustering etc.)
	Directionality	e.g. opposing/parallel/independent stance direction
	Proximity	e.g. small/medium/large social distance
	Themes	e.g. independent/shared material or motifs
	Interaction	e.g. movement dialogues/no movement dialogues
	Leadership	e.g. group leadership/emergent consensus/no consensus evident