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Suggestions for a Parametric Typology of Dance

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Abstract

Dance and language are produced/performed by the body and governed by cognitive faculties. Yet regrettably little scholarship applies tools of formal analysis in one field to the other. This paper aims to enrich dialogue between the two fields. We introduce an approach to dance typology formed on analogy with the parametric theory of language analysis, useful in typologizing languages. This initial exploration paves the way for a physiological typology of dance, without reference to culture.

1. Introduction

This work is the collaboration of a professional dancer and dance educator, and a linguist who was a student of dance in her youth and returned after a twenty-year lapse. We noted how dance students apply prior knowledge to a new task, affecting how they carry it out. Something similar happens with language: a second language learner applies knowledge of a first language, making predictable errors. Our continued discussion led to a systematic way of connecting observations of dancers' habits to physical properties of the (moving) body—a typology of dance that uses an approach to language typology as model.

We do not claim that dance is a type of language, nor vice-versa. It would be silly to demand of a movement event that it have an agreed-upon “meaning” in order for it to qualify as dance [1].

We do not even claim that language and dance “build on a shared cognitive architecture” [2]. We

simply recognize that both have a biological foundation [Appendix A] and the body is their expressive tool, thus applying linguistic methods grounded in biology to the study of dance might reveal insights.

Others have compared language to dance, incorporating culture [Appendix B]. Certainly, appreciation of a dance tradition demands attention to culture; esthetic judgments (partially cultural) are made by choreographers and dancers who interpret that choreography, just as in language the poet, novelist, storyteller and preacher all make culture-linked choices. Thus the task of analyzing dance is enormous; dance is artistic, philosophical, political and emotional. For this very reason it may be helpful to separate dance into components. One part is physical; the tool is the human body (although it can be augmented by props, lighting, ...). So dance has a biological foundation. Biological evolution is enormously slower than cultural, and biology transcends culture in that physical considerations limit or allow movement, thus attention first to the physical allows later attention to cultural impositions without confusion of the two. A physical approach may clarify connections among dance traditions around the globe belonging to disparate cultures.

Precisely this has happened with language: comparisons between distant languages (genetically and culturally) reveal patterns that are free of culture and, in this sense, more basic [Appendices A, C].

In the hope that a parametric approach to dance might offer something similar, this work is a narrow study of physical aspects of dance. We propose that dance types are characterized by a small set of parameters, whose settings account for the wide range of movement differences.

2. Linguistic Parameters.

Appendix C offers examples of linguistic parameters. No area of theoretical linguistics is without controversy; still, parameters are a primary way of making comparative generalizations across the components of the grammar [Appendix A]. While a parametric typology distinguishes between grammars, rather than particular utterances, the parameters are responsible for aspects of the organization of the sounds and words in utterances. Thus parameter settings are realized in utterances. This is important to bear in mind as we approach the analysis of dance – where parameters belong, arguably, to dance technique, but are realized in dance movements.

3. Existence of Dance Parameters

Seeking dance parameters is a new endeavor in dance typology [see Appendix D for approaches in other disciplines]. Establishing a parameter-based approach to dance typology requires the same level of scholarship that linguists devote to the task regarding language. It would take years of scholars studying dancers and non-dancers learning many types of dance, interviews with teachers and audience perception studies. This paper does not do that; it is a thought piece, intended to initiate discussion. Still, we can present three arguments for the existence of dance parameters.

First, choices in dance lead to movements coherent with those choices and thus characterize dance traditions. When we make these choices, we set the parameters of the traditions. Consider the fact that it is difficult to override existing movement memories [3]. In a modern dance technique class (MDTC) it is easy to tell who has prior ballet training – an observation that spurred our study. Those with ballet training will often have trouble allowing movement to follow weight shift rather than vice versa. They will maintain alignments of body parts in the face of their teacher’s demonstrations that break such alignments. Their movement quality will be balletic. Their inclination will be to turn their feet out. In sum, they carry ballet parameter settings into MDTCs; they have a dance accent. The dance student’s work here is similar to the second-language learner’s, where influence from the parameter-setting of a first language causes errors in a second [Appendix A].

Next, consider the task of circumscribing dance traditions. Some object to making distinctions between forms at all. Take, for example, Twyla Tharp on Modern and Ballet: “... the division was very artificial. It was a war zone that we didn’t need. I think that movement is movement” [4]. Further, many dance types are in flux; contemporary proponents present new directions. Here we work with gross classifications to demonstrate the potential of our approach. But even while the lines between dance forms are not clean, (these very) dancers and choreographers recognize them as they talk about “cross-over” dances and dancers; witness Twyla Tharp’s dances “Deuce Coupe” and “Push Comes to Shove.”

A third type of evidence for dance parameters is a “negative” one: When you learn a dance, some movements are easily adjusted for. We asked a class of linguistics students from seven countries

to pinch their ear lobes as they learned a new dance; no one had trouble. Further, they didn't find themselves pinching their ear lobes when they were asked to learn another dance where we made no mention of hand-ear contact. The ease of learning and absence of interference from or into other dances indicate that no previous dance experience had set a parameter for hand-ear contact (which does not preclude the existence of such a parameter – it indicates only that these students had not set the putative parameter). This contrasts to the work involved in learning to point toes in ballet and the interference of ballet point when learning other dance types.

4. Likely Dance Parameters

Scholars discuss many physical factors relevant to dance traditions, working from observations of dances [Appendix E]. In contrast, we start not from a set of dances, seeking parameters within, but from physical realities of the body at rest and in motion, realities unavoidable regardless of dance tradition.

We begin with these physical facts:

- the human body is symmetrical left to right;
- it has a most prominent facing;
- when standing at rest, paired joints are aligned vertically and horizontally;
- gravity affects the dancer;
- motion goes through space and time;
- the natural resting posture has head highest;
- motion initiates somewhere;
- motion is composed of parts, thus sequencing arises;

- motion has quality in terms of flow;
- motion varies with muscle tension.

These observations allow us to propose potential parameters below, where we often mention how a MDTC might teach the settings. This is not because MDTCs are a standard, but because we, personally, can draw from the experience we have with them.

Our discussion is sometimes of participatory dance, sometimes of performance dance, though the latter witnesses almost constant introductions of new techniques. For example, David Parson's dance "Caught" subverts expectations about gravity; the lights strobe, and, when on, the dancer is mid-leap. Here, however, we discuss unavoidable physical realities. Talking about dance seen only under a strobe is fascinating, but adds little to the understanding developed here.

(a) Prominence. Our bodies are symmetrical across the sagittal plane; maintenance of balance across that plane in ordinary activity helps avoid pain and deformity. MDTC teachers show consideration of this balance by having students do a figure "on the right," then "on the left." Evidence that students learn this balance comes from the fact that, while injuries are frequent, common causes are intensity and frequency of movement [5], not fatigue on one side. Studies of injuries rarely mention which limb gets injured, presumably because side is not significant [6].

Individual dances and even dance traditions, on the other hand, can be imbalanced with respect to sides. Studies of injuries in elite pre-professional ballet dancers do record a side difference (in

contrast to general studies of dance injuries), where the right foot and ankle are injury locales [7].

Perhaps ballet is right-side prominent (Fig. 1). We therefore suggest a **Side Parameter**.



Fig. 1. Contemporary ballet (photo in public domain, from Creative Commons Attribution-Share Alike 2.0 Generic License. Source: <http://commons.wikimedia.org/wiki/File:Grace_in_winter,_contemporary_ballet.jpg>

Second, locomotion involves a path with direction. The human body can move upright in any direction, but forward and backward are primary, where interlimb (arm/leg) coordination aids, while it does not in sideways locomotion. Forward is more primary than backward, probably because of facing (discussed below) and how the central networks function in the control of locomotion [8]. However, dancers usually do not move exclusively forward in a dance; and if they do, we expect them not to maintain a straight path and/or to turn their

backs to the audience. We therefore propose a second prominence parameter: the **Direction Parameter**. Again, it is common in MDTCs to do an exercise first “to the front” then “to the back,” and often “to the side” as well, so teachers explicitly teach the various settings of the Direction Parameter.

This naturally leads to another prominence parameter: the **Facing Parameter**. Our motor-wise orientation toward moving forward correlates with our sensory reception being largely on the body’s front facing. Additionally, non-linguistic expression of emotions is done mainly through manipulation of facial features, postures, and respiration (panting, heaving) [9], easily detected from the front, less so from the side, and least from the rear.

Evidence for prominence parameters comes from student errors—another observation that spurred our study. Generally students find one side easier—typically the right (dominant for most). If a dance sequence is long, complex and fast, we often find the following situation: A student will perform the sequence properly on the right. Then the student will attempt the left. She might perform a few phrases properly, mess up the next by performing it on the right, and from that point on the rest will be performed on the right; the student will switch parameters from left to right midway.

Prominence matters in dance traditions. In weapon dances the hand holding a sword can be predetermined—i.e., the right hand in English Morris dancing (Fig. 2). The fact that one hand holds weight with a visual extension into space while the other doesn’t affects the various (quality of) arm movements. Likewise, many dance traditions maintain continual awareness

of front, with the dancer largely facing the audience or in partial profile (as in ballet), whereas others have a 360° orientation (as in folk and western performance dances). There are even performance dances in which the back can be prominent (such as Trisha Brown’s “If you couldn’t see me,” a deliberate departure), subverting our expectation of front as conveying most information.



Fig. 2. English Morris Dance (photo by Adrian Pingstone, placed in the public domain. Source: <<http://commons.wikimedia.org/wiki/File:Morris.dancing.at.wells.arp.jpg>>)

(b) Alignment. In MDTCs the cautionary reminders “keep your shoulders over your hips” or, when in a lunge, “keep your knee over your ankle” are calls for body-part alignments. If each of the pairs of shoulders, hips, knees and ankles are aligned horizontally and vertically, we have a state of no locomotion with respect to the lower limbs. Unless we move exclusively on hands, we must throw off alignment to achieve locomotion.

Alignment has physiological effects, which might offer motivations for the parameter. Proper alignment avoids health problems; misalignment exacerbates them.

All dance traditions break some alignments, but in at least one tradition shoulders and hips maintain vertical and horizontal alignment: Irish step dance (Fig. 3). Thus there is a

Vertical/Horizontal Alignment Parameter (V/H).



Fig. 3. Irish Step Dance (photo by a U.S. Army soldier or employee, in the public domain, from <http://commons.wikimedia.org/wiki/File:Culture_adds_flavor.jpg>)

A Second alignment parameter involves orientation, which follows from the fact that some joints both flex and rotate. Men have natural foot rotation inward [10], while women have it outward [11]. This tendency might motivate the **Orientation Parameter**. In MDTCs and ballet classes one contrasts “turn out” to “parallel”. The student is taught to point toes in the

direction knees point, to protect the health of joints. Early ballet set this parameter to turn out, as default (Fig. 4).



Fig. 4. Classical Ballet first position turnout (Photo by Keitei, in the public domain under the terms of the GNU Free Documentation License. Source: <http://commons.wikimedia.org/wiki/File:First_position_turned_out.jpg>)

Throwing off alignment of any joint pairs leads to weight shift and possibilities for locomotion. Dancers can vary dynamics so that movement follows weight distribution (a hurled body part), or weight distribution follows movement (a controlled placement).

Dance traditions and individual dancers can resolve a change in alignment in a physically natural way (with flow) or in a jarring (but perhaps pleasing) way. Thus the misalignment and weight shift caused by lifting the right leg forward may be resolved by stepping forward on the right foot, but could as well be resolved by leaning torso and head backward and perhaps even falling backward.

(c) Gravity. In MDTCs teachers help students master reactions to gravity, including submission (dropping), resistance (lifting limbs), and defiance (jumping), in preparation for the ways dance traditions treat body weight. Some dance forms re-embrace gravity, working with deeply folded joints and an earth-hugging weighted-ness. Some do the opposite, aiming for flight. Often changes in weight position affect other parameters; the ballerina doing a pirouette arabesque must increase abdominal tenseness (a parameter below) to maintain vertical alignment [12].

Aerial dance allows innovations in vertical movement and changes the effects of weight shift. Ballet creates an illusion of freedom from gravity. In a leap, as the legs rise, the center of gravity rises, affecting the path of the dancer's head. What would have been a simple arc becomes a curve upward, then a straight line, then a curve downward; the dancer seems to sail. Partnering in lifts allows the appearance of weightlessness. Providing support as dancers turn extends the number of turns possible, defying laws of momentum and inertia [13].

(d) Inversion. The human body favors upright position, as the weight and shape of our bones and joints as well as the range of motions of our legs compared to our arms show. This very naturalness makes inversion noticeable – and noticeable variations, particularly those requiring skill, strength, or flexibility, are a fecund source of parameters. Unsurprisingly, in MDTCs we often invert (cartwheels, moon rolls...).

Some dance traditions are built on inversions. Capoeira and break dance place the weight on arms, head and upper back, freeing legs to kick, twist and flutter (Fig. 5). Aerial dance

removes weight and balance constraints on inversion, allowing even a finger to be the lowest part. Contemporary dancers have playfully transferred dance phrases created with arms to legs and vice versa, or taken arms from one choreographed dance and joined them to legs from another (consider the works of Sara Rudner or Trisha Brown, as in Brown's "Present Tense").



Fig. 5. Capoeira dance (photo by Joel Zimmer, originally posted to Flickr as *Aú Batido*, licensed under the Creative Commons Attribution-Share Alike 2.0 Generic license. See <http://en.wikipedia.org/wiki/Capoeira_in_popular_culture#mediaviewer/File:A%C3%BA_Batido.jpg>.)

(e) Space. Dance can involve movement in the area immediately surrounding the body as far as one reaches with legs and arms—the kinesphere—and movement across floor, air and aquatic space. Western dance traditions stretch to the edges of one's kinesphere [14]. There

may be leaps and jumps. Arms and legs thrust to fully straightened length. In contrast, Eastern dance traditions tend to cover less space, and joints are more often softly bent [15]. Each dancer rests within her kinesphere.

(f) Sequencing. Movement can be analyzed into parts, thus dancers must learn to sequence linearly, and to produce movements simultaneously. MDTCs often practice isolating movement, perhaps to help dancers understand sequencing parameters. One might make a circle with the top of the head, whole head, shoulders, ribcage, pelvis, knees or ankles. Often teachers will have students do “the leg part” without the arms, then “the arm part” without the legs, before “putting it all together.”

Sometimes linear sequencing is not a choice for physiological reasons. A plié must precede and follow a jump. Other times sequences of movement may be constrained by momentum and flow—physics in a casing of esthetics [16].

Choreographers might choose to initiate two actions simultaneously or to begin one action before the last has completed. Simultaneous actions can have different speeds, directions and energy qualities, making danced action less predictable.

(g) Rhythm. Dance moves through time, so rhythm is a parameter, where absence of rhythm is a possible setting. Teachers in many traditions count aloud (or clap, and so on) as students dance. If there is a musician accompanist, the teacher may request a certain timing. That we recognize timing distinctions in musical (or other) accompaniments independently of other auditory input [17] supports the idea that rhythm is an independent parameter.

In MDTCs teachers might repeat exercises with different timing. Even when teachers have students walk “naturally”, or tell them to do a sequence with whatever timing “works” for them, the accompanist might play. Teachers use music to guide the rhythm of movement; no surprise, given that dance and music go hand-in-hand in traditional dance.

Rhythm is so deeply ingrained in dance that untrained people when dancing adjust their movements to match a rhythm change in musical accompaniment, especially bass drums [18]. Likewise, small children are inculcated into their culture’s dance traditions at events usually featuring music. When we see a two-year old responding to musical beat, sometimes the child’s movements are typical of the developmental stage, but other times particular to that culture’s dance traditions.

(h) Initiator. Movement starts somewhere; hence we propose an initiator parameter. We must differentiate between which part of the body seems to be pulling or pushing the other parts along versus where an actual movement starts.

In MDTCs teachers might ask students to “initiate movement” with a given body part in the former sense. With this notion of initiator, any visually apparent body part could serve. These initiators are “external,” since the movement may initiate with the head perception-wise only (or also production-wise), but it then carries the whole body through space.

We can also consider “internal” (intrabody) initiators of movement. Where within the body does movement start, where does it go? MDTC teachers talk about letting the movement start from “the core” and radiate (or ripple, or move in jagged ways) to the extremities or vice-versa.

(i) *Quality of Movement.* Movement has something almost textural about it, difficult to describe—which we here call “quality”. You can prance or march. A hand can jab the air or glide through it.

Quality of movement characterizes traditions. In Cambodian Khmer dance (Fig. 6), some dancers are assigned roles based on body type and facial structure. Within each role there is a specific gestural language recognizable by movement strength or smoothness or jaggedness, and a further distinction in manner, with gradations from most to least refined [19]. In Phnom Penh, Soeur Thavarak demonstrated classical Cambodian versions of actions as done by refined, ordinary, and wild monkeys [20]. Each has its version of a scratch, a walk on four limbs, on three limbs, etc. Differences concern placement, size and tone: the wildest monkey has looser movement, more flung. The most refined monkey is slower, with smaller actions, and less seemingly involuntary repetition.



Fig. 6. Cambodian Khmer monkey dance (Photo is offered here with the kind permission of the Cambodian Cultural Dance Troupe of Cambodian American Resource Agency, San Jose, CA. Photo by Lily Kharrazi, Alliance for California Traditional Arts, 2014)

Sophiline Cheam Shapiro, director of the Khmer Arts Ensemble in Phnom Penh and a former court dancer, trains dancers to become “stars” [21]. Shapiro implies that what imbues dancers with their unique, ineffable quality is a spiritual connection to now-dead teachers and former dancers who literally possess the dancer. What are the differences one senses that make one dancer’s qualities sublime compared to another who is competent but lacks that certain something? It lies in subtleties of movement manner.

(j) Tenseness. Muscles are involved in voluntary movement. In MDTCs teachers often have students lie on the floor, arms and legs extended in an X, roll to one side, curl into the fetus position, extend fully, before taking the fetus position again and returning to the X. This is

typical of exercises meant to teach one to contract, relax and extend muscles—to master settings of the Tenseness Parameter.

Many types of dance can be partially characterized by extreme contractions in torso, or toe pointing or, alternatively, the lack of these.

5. An Approach to Dance Typology

We have suggested several possible parameters:

- three prominence parameters of Side, Direction and Facing;
- two alignment parameters of Vertical/Horizontal and Orientation;
- Gravity;
- Inversion;
- Space;
- Sequencing;
- Rhythm;
- Initiator;
- Quality of Movement;
- Tenseness.

While we motivated these without looking at culture, many are common to cultural approaches (Appendix E). The considerable overlap encourages us in thinking parameters might usefully typologize dance purely by articulatory factors.

In Table 1 we explore these parameters in comparing six dance forms, labeled Cambodian, Modern/Contemporary (M/C), West African, Ballet, Release and Hip-Hop. These were selected to offer some distribution across the world and across traditional and newer western forms.

Table 1. Sampling of basic dance components as they relate to specific dance forms

	Cambodian	Modern/ Contemporary	West African	Ballet	Release	Hip-Hop
Alignment	Shoulders and hips aligned (highly arched back, hyper-extended lumbar spine, shoulders and elbows pulled back); Feet parallel	Often out of vertical and horizontal alignment; Feet variable	Often out of vertical alignment; Feet parallel	Highly constrained, hips and shoulders often in full alignment (with backward arches or with bowing of head); Feet turned out	Often out of vertical and horizontal alignment; Feet parallel	Often out of vertical and horizontal alignment; Feet parallel
Gravity	Upright posture, planted solidly on the earth, controlled (not dropped) weight	Often upright posture. Grounded in floorwork and sense of dropping weight. Light in lengthening and jumps	Yielding to gravity in pulsing downward actions	Upright posture, Illusion of weightlessness in jumps and pointe work wearing toe shoes, lifts and partnering, extending illusion of being free of gravity	Fully yielding to gravity and using momentum from letting weight down to find upswings	Using fine-tuned alignments for challenging balances and inversions
Inversion	Not used	Used	Not used	Not used	Used	Used freely, including actions balanced on head
Space	Limited locomotion – primarily walking, symmetrical arrangement, mostly standing, few jumps or low-to-the ground actions	Action on the ground and in the air. Spatial patterns of any kind can be used Organized patterns, asymmetrical arrangements, seemingly chaotic or random directions and placements, using whole space	Groups moving in circles and lines. High jumps, deep folds of joints to move toward earth	Travelling, highly patterned large movements, symmetrical arrangement, airborne and with lifts. Torso rarely close to ground	Full use of floor including supine, prone and outstretched, use of mid-levels – on all fours, standing and jumping actions. Spatial patterns of any kind can be used.	often on one spot
Sequencing	Lots of overlap and simultaneity	Frequent use of isolations; Lots of overlap and simultaneity	Isolations particularly of pelvis; Lots of	Isolations limited mostly to extremities; Transitions rather	Frequent use of isolations; particularly refined movements of the spine in small	Refined isolations in every part of the spine; Lots of overlap and

			simultaneity	than overlaps	segments; Lots of overlap and simultaneity	simultaneity
Rhythm	Well-defined	Variable	Undulations and beats in every direc- tion, highly rhythmic, isolations	Well-defined	Variable	highly rhythmic
Initiator	Feet, torso, hands, head; Intrabody: actions flow from center to periphery and reverse, subtly	Any part of the body; Intrabody: legs and arms move clearly and directly into distinct shapes or can flow more fluidly or jaggedly from one placement to another	Pelvis, ribcage, head, feet; Intrabody: responsive fluidity of body parts one to another makes strong percussive movements echo through whole body	Feet, hands, head; Intrabody: Legs and arms move clearly and directly into distinct shapes, with subtle fluidity	Any part of the body; Intrabody: interconnectedness of body parts is a focus, dancer feels flow of movement from one area to another in shorter and longer time frames	Any part of the body; Intrabody: Movement travels through the body in fluid or jagged increments
Quality of Movement	Constrained, regal	Highly variable	Pulsing, percussive	Graceful	Fluid	Fluid as well as percussive
Tenseness	Feet: on floor with toes raised	Feet: all settings. Contracting pelvis forward and releasing;	Feet: whole foot relaxed, used as a rhythm instrument	Feet: pointed	Feet: whole foot relaxed. Fully extended torso, spine lengthened	Feet: whole foot relaxed

Evaluating the usefulness of this approach to distinguishing between dance traditions

requires us to both take a close look at details and to step back for overview.

Let's consider just one detail: use of torso. This is largely the interaction of several parameters: V/H Alignment, Initiator, Quality, Rhythm, Sequencing and Tenseness. In Cambodian, shoulders and hips align, while torso front and elbows can both lead, and in different directions. In ballet, the spine is fully extended and used in a refined way, with backward arches and head bowing. In the other four dance types, the spine is fluid, with motion initiating within it. In M/C, we find contractions in pelvic and other areas and alignment freedom. In West African, we find rhythmic undulations, with isolations of

subparts and an active pelvis. In Release and Hip-Hop, we find refined articulations of spine within small sections, with Hip-Hop showing percussive rhythm.

Now taking a step away for overview, we see Cambodian is the outlier in the table, although it has similarities to Ballet. M/C shares characteristics with all but Cambodian. Ballet differs dramatically from all others with the strong exception of M/C. West African is similar to M/C, but also shares characteristics with Release and Hip-Hop.

Future work is needed to refine these and add new parameters. As they presently stand, they raise sticky issues regarding discreteness. V/H Alignment affects the ways in which we can respond to gravity, and gravity (and physiology) affects the alignments we can achieve. The use of space is affected by sequencing, which affects the extent to which gravity becomes relevant, and so on. Further exploration should winnow away unenlightening distinctions.

With respect to addition/replacement, the parameters here should not limit discussion. Our parameters thus far do not mention partnering, for example. All but Release dance makes use of unison choral action. Cambodian partnering is mostly without contact, while M/C, Release, and Hip-Hop make extensive use of contact. In M/C and Release, women support men and vice-versa, whereas in Ballet, partnering is mostly handholding or support for lifts and balances. In West African, individuals create personal variations and duets show mock battles and courtships, and in Hip-Hop, dancers take turns being soloists, often having interactive gymnastic-like routines. Partnering may be a major factor in distinguishing

traditions. Likewise, our parameters do not give attention to upper limbs or head. The use of hands could offer contrasts between some traditions and new connections between others.

6. Conclusion.

Dance parameters of a purely physical nature exist and offer new ways of grouping dance traditions. While we have suggested a handful, precisely which exist and how they interact should be established by rigorous research. Still, we hope to have shown that one of the more insightful ways of typologizing languages may fruitfully be applied to typologizing dance forms.

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Bibliographical Information

Donna Jo Napoli is professor of linguistics at Swarthmore College. She got her Ph.D. in 1973 from Harvard University and did a postdoctoral year at MIT. She publishes widely in multiple areas of theoretical linguistics, including syntax (the area most pertinent to this article). She has been taking dance classes since 1996 (and had been a dancer when she was

young, before having children). She offers a course called “Movement and Cognition,” which is cross-listed by the three departments of Linguistics, Dance and Mathematics. She and Sally Hess published a paper comparing syllable structure in spoken language to asana structure in Yoga, which appeared in *Leonardo* in 2008.

Lisa Kraus is a dancer and dance educator. She writes for *The Dance Insider*, *The Philadelphia Inquirer* and *Dance Magazine*, among others. Her choreographic work has premiered in the Philadelphia Fringe Festival. Lisa has created dozens of performance works, many with her former company featuring John Jasperse, Sasha Waltz and Meg Stuart. She has received Choreographers’ Fellowships from the National Endowment for the Arts and the New York Foundation for the Arts and her work has been presented throughout the US, Europe and Australia. She received a 2004 Rocky, Philadelphia’s Dance and Performance Award, for her teaching in the Philadelphia dance community (Swarthmore, Bryn Mawr, Dickinson, Franklin and Marshall). She was on the faculty of the European Dance Development Center in Arnhem, the Netherlands, for a decade and has taught at New York University and the Naropa University.