

# **SPONTANEITY: EMERGENCE THEORY IN RELATION TO DANCE IMPROVISATION**

**A THESIS**

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**In Partial Fulfillment**

**of the Requirements for the**

**University Honors Program Certificate**

**Yasmine N. Lindskog**

**Spring 2016**


**I, THE UNDERSIGNED MEMBER OF THE COMMITTEE,**

**HAVE APPROVED THIS THESIS**

**SPONTANEITY: EMERGENCE THEORY IN RELATION  
TO DANCE IMPROVISATION**

**BY**

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**California State University, Long Beach**

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## ABSTRACT

# **SPONTANEITY: EMERGENCE THEORY IN RELATION TO DANCE IMPROVISATION**

By

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May 2016

In fulfillment of the requirements for the University Honors Program, I engaged in extensive research on the application of emergence theory to dance, focusing on its relation to structured improvisation and choreographic process. Having conducted a review of previous research into emergence and complexity theory across a range of disciplines, I conducted practical research in choreography. My investigation of emergence resulted in the creation of a dance, entitled *The Last Light*, which premiered at the Martha B. Knoebel Theater October 15 – 17, 2015. My findings have led me to conclude that emergence as a conceptual model leaves room for complex choreography to develop out of relatively simple structures. Additionally, this research reveals the range of levels emergence can potentially operate on.

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# CHAPTER 1

## INTRODUCTION

My research project centers on the application of emergence theory to dance, focusing on its relation to structured improvisation and choreographic process. Having conducted a review of previous research into emergence and complexity theory across a range of disciplines, I conducted practical research in choreography. My investigation of emergence resulted in the creation of a dance, entitled *The Last Light*, which premiered at the Martha B. Knoebel Theater October 15 – 17, 2015. My findings have led me to conclude that emergence as a conceptual model leaves room for complex choreography to develop out of relatively simple structures. Additionally, this research has allowed me to further develop my approach to choreography.

The research question I began with was: How can a choreographer develop a work that retains the appearance of spontaneity and involves both dance improvisation and set choreography? I hypothesized that through applying concepts of emergence to dance improvisation and choreography, one would be able to see emergent patterns similar to those found in nature arise. What I hoped to discover was that by developing enhanced cognitive awareness in the dancers and training them in principles of structured improvisation, choreographers can utilize emergence to create the appearance of spontaneity in performance, even in set choreography.

While I maintain a cybernetic/connectionist approach (focusing on communication, control, and feedback loops between self-organizing agents) in the analysis of the interactions between social systems, I explore the emergence of novel dance aesthetics through applying Dynamic Systems theories in dance improvisation. G. H. Lewes introduced ‘emergence’ in 1875 as a “creation of new global properties, structure, organization, and behavior (a transformation

process driven by self-organization) by interacting agents due to some local rules, although the exact patterns that emerge cannot be predicted in advance.”<sup>1</sup> The analysis of spontaneity arising from dynamic pattern formations within complex systems is largely explained through Dynamical System Theory (Complex Systems). Paul V. Fusella characterizes dynamic systems as non-linear, complex, self-organizing, and emergent, all of which help explain the fluctuations occurring over time within these systems.<sup>2</sup> Self-organization and emergence theories are used to explain dynamic patterns in complex systems. Riley, Shockley, and Van Orden define self-organization as the driving force of the continual changes in dynamic systems and imply that no one agent is directing the system.<sup>3</sup> Scott Kelso defines emergence as the spontaneous and unpredictable outcomes or patterns produced from the self-organization of agents in complex systems.<sup>4</sup> Complexity Theory’s concepts of self-organization and emergence can be applied to complex organizations in a variety of fields and on many different levels.

Self-organization and emergence have been studied in several different scientific fields such as physics, chemistry, biology, robotics, and the cognitive and social sciences.<sup>5</sup>

Additionally, these concepts have been applied in philosophy, systems theories, and art.<sup>6</sup>

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<sup>1</sup> Thow Yick Liang, “Edge of emergence, relativistic complexity and the new leadership.” *Human Systems Management* 32, no. 1 (2013): 3-15.

<sup>2</sup> Paul V. Fusella, “Dynamic Systems Theory in Cognitive Science: Major Elements, Applications, and Debates Surrounding a Revolutionary Meta- Theory.” *Dynamical Psychology* (2012-13): 1-14.

<sup>3</sup> M.A. Riley, K. Shockley, G. Van Orden, “Learning from the Body about the Mind.” *Topics in Cognitive Science* 4, no. 1 (2012).

<sup>4</sup> Kelso, *Dynamic Patterns*, 16.

<sup>5</sup> Linda Smith, “Cognition as a Dynamic System: Principles from Embodiment.” *Developmental Review* 25, no. 3-4 (2006): 1-21.; J.A. Scott Kelso, *Dynamic Patterns: The Self-Organization of Brain and Behavior*. (Cambridge, MA: MIT press, 1997), 1-15.; Paul V. Fusella, “Dynamic Systems Theory in Cognitive Science: Major Elements, Applications, and Debates Surrounding a Revolutionary Meta- Theory.” *Dynamical Psychology* (2012-13): 1-14.

<sup>6</sup> Keith R. Sawyer, *Social Emergence: Societies as Complex Systems*. (Cambridge, New York: Cambridge University Press, 2005), 1-9.



Theories of emergence can be applied to something as microscopic as cellular organization and as macroscopic as the universe. Self-organization and emergence have been used to explain the patterns of traffic flow, patterns of convection from oil heated in a pan, molecular patterns, stock markets, the landscaping of cities, and the patterns of snowflakes.<sup>7</sup> The applicability of this theory allows room for exploration of this concept in an infinite number of ways. The exploration of these concepts in an art discipline (such as dance) provides clarity with the components of complexity theory and provides further explanation of the creation of spontaneity or emergence.

In 2003, dance choreographer Susan Sgorbati began discussing complex systems and emergence theory with Dr. Bruce Weber, Dr. Gerald Edelman, and Dr. Stuart Kauffman.<sup>8</sup> Sgorbati was intrigued with this concept and began to experiment with the emergence of new aesthetic forms through dance improvisation.<sup>9</sup> Sgorbati coined the term “Emergent Improvisation” to describe dance improvisation that operates based on principles found in Dynamic Systems.<sup>10</sup> Sgorbati’s improvisation scores consist of simple guidelines for the dancers that allow room for individual agents (dancers) to self-organize and form complex systems, demonstrating emergence at the level of human interactions through movement.<sup>11</sup> In my research, I explore how emergence theory can produce a choreographic work that embodies spontaneity, both through emergence in performance and emergence in the process of the creation of the work. While the incorporation of structured improvisations in the choreography

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<sup>7</sup> J.A. Scott Kelso, *Dynamic Patterns: The Self-Organization of Brain and Behavior*. (Cambridge, MA: MIT press, 1997), 1-15.

<sup>8</sup> Susan Sgorbati, “Emergent Improvisation: where dance meets science on the nature of spontaneous composition.” *Contact Quarterly*, 38, no. 2 (Summer/Fall 2013): 6.

<sup>9</sup> Sgorbati, “Emergent Improvisation”, 6.

<sup>10</sup> Sgorbati, “Emergent Improvisation”, 6.

<sup>11</sup> Sgorbati, “Emergent Improvisation”, 6.

allows for emergence to occur in performance, using improvisation scores throughout the creative process allows for the discovery of spontaneity in choreographic form and experiments with emergence as a fundamental part of the choreographer-dancer collaboration. Thus, set choreography is discovered through emergence as form and content arise out of improvisation scores and the resulting material is then set in a way that creates a spontaneous effect.

Susan Sgorbati's 'Emergent Improvisation' also builds upon a history of improvisation. Dance Improvisation typically assigns dancers with a simple task for them to explore and find authentic, novel ways of moving while still embodying the task given.<sup>12</sup> Numerous scholars have explored novel movement arising from dance and choreographic improvisation. Concepts of emergence and self-organization have been inherent in dance improvisation all along. This fact is evident in the work of Nina Martin and Richard Bull. Martin creates improvisation scores with simple constraints and encourages quick, impulsive responses in reaction to the other agents moving.<sup>13</sup> Bull created his own technique to train dancers to successfully allow for new movement to arise unexpectedly.<sup>14</sup> The intent of each of these choreographers' works is essentially to produce novel choreography that is intriguing to watch and in which the audience can engage. My research reflects a similar intent in that I sought to create novel choreography out of improvisation. Dance choreographer Wayne McGregor also applies these ideas to his choreographic process, and like Susan Sgorbati, he is also collaborating with researchers.

Choreographer, Wayne McGregor, and researcher, David Kirsch, extensively researched multi-modal instruction, distributed creativity, and human cognition. McGregor implemented a variety of ways to instruct his dancers during the choreographic process—ranging from

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<sup>12</sup> Melinda Buckwalter, *Composing While Dancing: An Improviser's Companion*. (Madison, WI, USA: University of Wisconsin Press, 2010).

<sup>13</sup> Buckwalter, *Composing While Dancing*, 20.

<sup>14</sup> Buckwalter, *Composing While Dancing*, 23.

visualizations, rhythms, sounds or tactile stimulation.<sup>15</sup> McGregor referred to choreographic problems as assigning problems for the dancers that required the dancers to create some type of mental imagery. The mental imagery the dancers created led to the creation of virtual structures that the dancers then tried to relate to choreographically.<sup>16</sup> McGregor recognized that when the dancers were part of solving a problem then they had greater intentionality and feeling toward the movement.<sup>17</sup> Another interesting element of McGregor's process is that he would keep his dance unstructured until the last few weeks before a show.<sup>18</sup> Initially, I set off to create a dance performance with an approach similar to Sgorbati's—using strictly structured improvisations—but as my research progressed, my process and the resulting dance ended up paralleling the work and approach of choreographer Wayne McGregor. I took a similar approach to McGregor in structuring the piece and in how I gave the dancers 'choreographic problems' to solve. Through the implementation of a variety of tasks and ability to embody these varying instructions, the dancers' development throughout the choreographic process paralleled well with concepts of embodied cognition.

Embodied cognition suggests that bodily experiences shape our cognitive perceptions.<sup>19</sup> These physical experiences help provide an understanding shared by the body, brain, and the world.<sup>20</sup> In 1980, Lakoff and Johnson explored how humans employ metaphors as a mean to conceptualize the world. We depend heavily on physical properties of our bodies to develop

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<sup>15</sup> Dafne Muntanyola. "How Multimodality Shapes Creative Choice in Dance." *Revista Internacional de Sociología* 72, no. 3 (September-December 2014): 563-582.

<sup>16</sup> David Kirsh, "Choreographic Methods for Creating Novel, High Quality Dance." *International workshop on Design and Semantics of Form and Movement*, (2009): 191.

<sup>17</sup> Kirsh, "Choreographic Methods", 191.

<sup>18</sup> Muntanyola, "How Multimodality Shapes", 563-582.

<sup>19</sup> Glenna Batson, "Integrating somatics and science." *Journal of Dance & Somatic Practices* 3, no. ½ (2012): 183-193.

<sup>20</sup> Batson, "Integrating somatics and science", 183-193.

metaphorical reasoning, which ultimately helps illustrate our understanding of concepts of the world.<sup>21</sup> We develop understandings of the world through our bodies using multi-modal sensory-motor systems that expand our perceptions. Additionally, studies in Phenomenology explain how we experience things in our environment and extract meaning from these experiences through consciousness. Warburton suggests that phenomenology is “essentially a philosophical argument for the foundational role the perception plays in understanding and engaging with the world.”<sup>22</sup> These key ideas pertaining to embodied cognition are prominent in many dance practices. Dance improvisation provides dancers with a means of exploring their bodies and environments in order to obtain more understanding of themselves and the world that surrounds them. The use of these concepts in my research provided a more effective analysis of how emergence arises out of dance improvisation. Several dance choreographers have gone on to utilize these concepts within their own choreographic processes.

Previous choreographers such as Ivar Hagendoorn and William Forsythe have developed improvisation scores emphasizing motor skills and awareness to produce movement. These individuals suggest that we can consciously control our motor systems and we can easily produce alternative body configurations.<sup>23</sup> Additionally, maintaining kinesthetic awareness of one’s body can create infinite opportunities of movement and creation. The intertwining of bodily movements, tasks, and environment support the adaptation of cognitive processes and broadening perceptions.<sup>24</sup> I explore these concepts in my research in order to develop the relationship of complexity theory to dance, choreography, and dance improvisation. It becomes

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<sup>21</sup> G. Lakoff, M. Johnson, *Metaphors We Live by* (Chicago, IL: University of Chicago P, 1980).

<sup>22</sup> Edward C. Warburton, “Of Meanings and Movements: Re-Languaging Embodiment in Dance Phenomenology and Cognition.” *Dance Research Journal* 43, no. 2 (2011): 65.

<sup>23</sup> Ivar Hagendoorn, “Cognitive Dance Improvisation: How Study of the Motor System can Inspire Dance (and Vice Versa).” *Leonardo* 36, no. 3 (2003): 221-227.

<sup>24</sup> Batson, “Integrating somatics and science”, 183-193.

evident how large the potential for research on the relationship between dance and concepts of emergence and self-organization is. Given my interest in spontaneity in both choreography and improvisation, how I chose to structure my process was rather specific and influenced by the different concepts I extensively researched.

My practice-as-research consisted of 3 months of rehearsals that culminated in 4 performances of the final dance piece. The choreographic process consisted of creating structured improvisations that were designed to recreate the essence of four photographs that I was inspired by. Structured improvisations use scores to provide a set of rules given to the dancers that constrain their choices while improvising. These structures rely upon the principles of self-organization as the individuals make choices in relation to the group. My methodology included researching dynamic systems, emergence, self-organization, dance improvisation, choreographic processes, and embodied cognition. The dance piece I created resulted in a 12-minute piece that consisted of a combination of improvisation and set choreography. Each section applied a combination of the different topics researched in order to best capture the essence of the images and evoke four different worlds within the piece. My research reveals how the relationship between dynamic systems and dance hold an immense amount of information that can continue to be explored.

Theories of emergence and self-organization demonstrate how science and dance hold the potential of collaboratively working together to create a work of art. The effectiveness of intertwining these two fields is revealed in my research through its application of emergence (dynamical systems theory) to the creation of a choreographic work that embodies spontaneity through set choreography and structured improvisation. The ability to embody movement through dance practices provides a more profound experience to individuals engaged in the

practice. Maintaining a consistent awareness of one's body, mind, and surroundings can foster the key concepts of complexity into a hybrid exploration of scientific concepts and dance aesthetics. The application of these concepts in art further develop the emergence theory and exemplify the applicability of this theory to a broad range of studies. My choreographic work uses kinesthetic awareness, motor skills, and dance improvisation to explore the key concepts of emergence and self-organization drawn from Complexity Theory. I employ improvisational and choreographic structures to generate continually arising and dissolving moments of emergence. As a result, engaging this example of choreography-as-research displays how scientific concepts are applied to produce unique aesthetics within an artistic setting. The significance in this theory being applied to a dance setting creates a broad spectrum of possibility for future exploration. It reveals the implications that the study of dance can potentially be applied to additional scientific theories, extend individual perception's from embodying movement that can be derived through dance practices, and expand on the artistic possibilities intrinsic in scientific theories.

## CHAPTER 2

### KEY VOCABULARY TERMS

Dance Improvisation: is giving dancers the freedom to compose and create in the present moment based on a set of constraints; there is no individual directing the ensemble of dancers

Improvisation Score: in dance, it is the set of constraints you assign the dancers to help guide the dancer(s) while composing in the moment; it refers to structures or a set of rules given to dancers that constrains their choices while improvising.

Dynamic systems: are characterized as non-linear, complex, self-organizing, and emergent, which help explain the fluctuations occurring over time within these systems.<sup>25</sup>

Self-organization: is the driving force of the continual changes in dynamic systems and imply that no one agent is directing the system.<sup>26</sup>

Emergence: is spontaneous and unpredictable outcomes or patterns produced from the self-organization of agents in a complex system.<sup>27</sup>

Complexity: is structuring at the edge of chaos, finding what constraints allow for continuous transformation and for patterns to be unrecognizable.<sup>28</sup>

Embodied Cognition: is how bodily experiences shape our cognitive perceptions.<sup>29</sup>

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<sup>25</sup> Fusella, "Dynamic Systems Theory", 1-14.

<sup>26</sup> M.A. Riley, K. Shockley, G. Van Orden, "Learning from the Body about the Mind." *Topics in Cognitive Science* 4, no. 1 (2012).

<sup>27</sup> Kelso, *Dynamic Patterns*, 1-15.

<sup>28</sup> Kelso, *Dynamic Patterns*, 1-15.

<sup>29</sup> Batson, "Integrating somatics and science", 183-193.

## CHAPTER 3

### METHODOLOGY

#### Choreographic Process

My choreographic process consisted of using four images as a scaffold to create improvisation scores for each section of the piece. I was inspired by Susan Sgorbati's use of landscapes as a source for scores, and it led me to choosing several drastically different landscapes. Sgorbati extracted details from landscapes to create more abstract ideas for a dance.<sup>30</sup> The goal I had for myself was slightly different as it was to best capture the essence of these four images. Applying concepts of embodied cognition, I was able to vividly capture these four images through an array of senses. McGregor explains in his processes that, "imaginary structures or feelings can serve as scaffolds for a dancer... On an empty stage, structures are absent, at such moments imagination, when guided, can fill the void."<sup>31</sup> Through my directorial stance as the choreographer, I was able to guide individuals in a way that allowed them to apply their own imaginations to the images and bring them to life in their own unique way. This use of imagery allowed the dancers to vividly paint the empty proscenium stage with movement during the live performances.

The scores I gave the dancers evolved throughout the rehearsals. Each section became layered with more constraints that helped guide the dancers in producing the essence of the images. I was able to create choreographic forms that functioned as metaphors for the images that inspired me. Although the four images differed quite dramatically, I noticed a connection in the ways isolation played a role in each image and the ways concepts of emergence resonated with the image content. The first image was of vines growing on a wall, the second image was a

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<sup>30</sup> Sgorbati, "Emergent Improvisation", 48.

<sup>31</sup> Kirsh, "Choreographic Methods", 192.



deep, empty hallway, the third image was a busy train station filled with blurred lines of people and then isolated clear images of an individual, and then the last image was of an abandoned building with an opening in the ceiling where a beam of light was shining down and a light rain fell.

Each image embodied concepts of emergence and isolation in a different sense. The first image of vines, mirrors concepts of emergence in the ways the vines self-organize to create these unique emergent patterns of intertwining vines. I felt this image also embodied isolation as it instantly made me think of how abandoned buildings are sometimes enveloped in vines. The second image of the hallway did not actually embody concepts of emergence, but the choreographic process incorporated these concepts in it. Isolation was apparent in this image, as it was a deep, eerie hallway that was completely empty. The third image of a train station incorporated concepts of emergence in the ways crowds of people self-organize to create new emergent forms. Isolation was apparent in the way some individuals were clearly alone, while others were in large crowds. The final image also did not embody concepts of emergence, but it inspired the idea of using actual water in the fourth section, which led to emergent forms. This final image evoked feelings of isolation, as it was an empty, abandoned building.

In terms of the overarching structure of the piece, I drew inspiration from Richard Bull and Italo Calvino. I used Richard Bull's improvisation score, 'Studying Form', which employs literature as a structure.<sup>32</sup> Bull developed dance composition counterparts to common literary devices such as allusion, interpolation, and interior monologue.<sup>33</sup> As Bull used literature to inspire his structured improvisation, I used it to inspire the structure of my choreography. I was inspired by Italo Calvino's, *If on a winter's night a traveler*, I wanted to continue Calvino's style

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<sup>32</sup> Buckwalter, *Composing While Dancing*, 43.

<sup>33</sup> Buckwalter, *Composing While Dancing*, 43.

of starting something new without resolving a certain chapter, yet ultimately maintaining a connection between all the chapters. In each chapter Calvino develops entirely different short stories that then abruptly stop. It is not until the end of the book that the reader discovers that the title of the chapters is a series of words that make up a cohesive sentence and thus connect each chapter.<sup>34</sup> I combined Bull's idea of using literature along with Sgorbati's idea of constructing improvisation scores from landscapes to set up my own structured improvisation. I created four improvisation scores that were extracted from the four distinct images. Each section was dramatically different from the next; the randomness and differences of each section were held together by the central idea of isolation. I created short, simple transitions between each section that included isolating an individual before the next section began. The use of literature and visual images ultimately influenced the entire dance and created a choreographic process that I had never experimented with before.

A final aspect of my piece was the consistency of movement performed by the dancers. I paralleled my approach to McGregor's in that I kept my piece unstructured until the last few weeks of performance.<sup>35</sup> The majority of my piece was structured improvisation but in the rehearsals prior to the actual performance I began to set more choreography. If I noticed something interesting performed by the dancers, I told them to try to keep a certain movement or develop an idea they introduced in their improvisation. Additionally, if I saw a movement a dancer did that I was drawn to, I added another layer to my score that incorporated this movement or idea they introduced.

My literary and practical research led me to create this specific choreographic approach involving numerous concepts. The influences of McGregor, Sgorbati, and Bull guided me in

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<sup>34</sup> Italo Calvino, *If on a winter's night a traveler*. (New York, NY: Harcourt, Inc., 1981).

<sup>35</sup> Muntanyola, "How Multimodality Shapes", 563-582.

defining my own choreographic process for my research project. The extensive research of the concepts I previously discussed has significantly influenced the growth of my research project as well. I will further discuss my discoveries before, during, and after creating each section of my piece. For the purpose of clarity in discussing my piece, I will refer to section 1 as “vines”, section 2 as “hallway”, section 3 as “train station”, and section 4 as “rain”.

### **Scores and Photographs**

In my piece I had six main dancers and four extra people in the cast who I will refer to as the chorus. Below is a list of each section in chronological order including the image and improvisational score created for that section.

#### Vine Section

Main dancers score:

1. Find the most indirect way to stand up by intertwining with other bodies and using both tactility and negative space
2. You must intertwine through your distal ends
3. If there are no opportunities to intertwine with other bodies, then find opportunities on your own body.



McGregor, S. “Vines on Wall, NC.” Digital image. Art Space. 2011. Accessed May 30, 2015. Artspacenh.org.

Set Cue for all dancers:

1. When you hear the bell in the music, push the dancer who is the closest to center stage out of the cluster and observe the dancer pushed out of the group.

#### Hallway Section

Main dancers score:

1. You are either a soloist in the center of the ‘hallway’ or you are a ‘wall’ enclosing the soloist
2. If you are a ‘wall’ you have the options to run across the hallway, pull a soloist out of the center space, push a soloist into the center space, or play with the negative space of the soloist



Haker, Matthias. "The Blue Mile." Digital image. 500px. March 13, 2013. Accessed May 30, 2015. 500px.com.

3. 'Wall' dancers have the option to make different noises throughout the score, paying particular attention to not overlapping noises
4. If you are a soloist, you are playing with the extremes of moving quickly or slowly while traveling down the 'hallway'
5. If you are a soloist, you are simultaneously responding to the noises of the 'walls'

Chorus dancers score:

1. Travel along the edge of the hallway while traveling down the 'hallway'

Set Cue for all dancers:

1. When the last dancer is at the end of the hallway, this soloist then continues to move quickly and the remaining dancers reach their arms in to eventually completely encompass the soloist and fall to the ground, leaving the soloist standing.

*"In the second section, I am going to a space where I feel this live connection with the energy around me, with the people, with different relationships, with the 'walls'—I've never had walls breath on me like that, I've never had that type of sensory experience on stage live, improvising. Trying to work through peoples sounds, understanding that their sounds are kind of like actions that we are reacting to. All of these different things were new and felt so real to me."*

—Katie Istvan, dancer from *The Last Light*

## Train Section

Main dancers score:

1. You are allowed to enter and exit off the stage through running or walking
2. There must be at least 2 but no more than 3 dancers improvising a solo at any one time
3. You must follow the individual task I give you while improvising your solo (for example, one task

was to interact with the negative space of the surrounding dancers)



Maher, James. "Waiting in Grand Central." Digital image. James Maher Photography. 2003. Accessed May 30, 2015. [www.jamesmaherphotography.com](http://www.jamesmaherphotography.com).

### Chorus Score:

1. Walk slowly through the space

### Set Cue for all dancers:

1. When the male dancer walks backwards across the stage, the main dancers begin soloing together and the chorus dancers pause in place
2. After the main dancers finish their solos they come to a stillness and then run off stage, once they begin to run off stage the chorus dancers continue walking and eventually find their way off stage

### Rain Section

#### Main dancers score:



Baker, Dave. "The Ruins." Digital image. Flickr. March 19, 2010. Accessed May 30, 2015. [www.flickr.com](http://www.flickr.com).

1. You are either a soloist or a 'framer',
2. If you are a soloist, you are playing with generating movement from the 27 points of a cube while simultaneously playing with the sensations produced by rain.
3. If you are a framer, stay at a low level and keep your focus on the soloist
4. If you are a framer you are echoing the movement of the soloist, creating rhythmical percussive sounds with your body or observing the soloist

#### Set cue for all dancers:

1. Towards the beginning, when the male dancer pushes the soloist to the ground, everyone try to be the only one in the center of the lit square. If everyone is in the square, then jump out and begin to start this section.
2. The final sequence of unison movement is a set phrase.

*"I am very aware in the fourth section, especially with the water, you add another element. Our bodies are so hot in that moment and when the water drops its like instant coldness that comes to you. You become so aware of your breath because the music isn't there anymore. A lot of elements are eliminated and so that's how sensation really becomes heightened in that final moment."*  
-Alvaro Nuñez, Dancer from *The Last Light*

## **Susan Sgorbati's Research**

A significant amount of my research was influenced by the research conducted by Susan Sgorbati and several scientists on the relationship between dance improvisation and emergence. Initially, I had set out to use dance improvisation to observe the emergent phenomenon in a manner similar to Sgorbati's approach. Due to my time restriction, I ended up producing a different choreographic approach and way of recognizing emergent properties. Nonetheless, a significant amount of Sgorbati's work contributed to producing my own choreographic process, approach to improvisation, and way of recognizing emergent characteristics.

In both Sgorbati's work and in characteristics of emergence, adaptation is a fundamental component. Dynamic systems continuously need to adapt in order to produce emergent properties. Sgorbati uses ideas of adaptation when she discusses creating improvisation scores out of landscapes. Sgorbati explains how adaptation entails that the dancers enter a process of selection through repeated practice. The dancers adapt and renegotiate the structuring principles to best capture or embody the nature of a landscape.<sup>36</sup> Similarly, I implemented these ideas of adaptation throughout my choreographic process. The exception being that I did not leave the improvisation scores completely open-ended for the dancers. My dancers and I created a more concrete structure through continual conversations on how particular guidelines and details could further enhance the image from a given section. Every rehearsal was a chance to adapt the initial improvisation scores in order to better capture the essence of the images the scores were derived from. This repetition in the rehearsal process consisted of practicing the same improvisation scores, renegotiating what constraints best captured the essence of the images, and determining

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<sup>36</sup> Sgorbati, "Emergent Improvisation", 48.

what constraints left room for the occurrence of emergent properties. Adaptation became an essential component to my choreographic process.

Sgorbati provides several methods for practicing ensemble improvisation. This practice is extremely difficult, as you must consider that each dancer is simultaneously tracking an awareness of themselves, an awareness of the entire system, and the constraints of the score. Improvisation in itself is complicated, but when placed in ensemble work, it enters an entirely different level of complexity. One method Sgorbati suggests for entering into an ensemble practice is a compositional exercise she coined, ‘Initiator, responder, and framer’.<sup>37</sup> The initiator was the soloist, the responder responded to the soloist, and the framer framed the duet.<sup>38</sup> This practice ended up becoming the backbone to many of the improvisation scores I created. The “Improvisation Scores” discussed on page 13 reveal how this idea is paralleled in the scores I built. I created the structures of each section using this ‘initiator, responder, and framer’ idea. In every section of the dance, except for the first section, there was typically some type of solo work or ‘initiator’ that the other dancers would either respond to or frame. This type of approach was very efficient for my research as I had a limited amount of time. The solo and framer approach in the scores allowed the entire group to still work as an ensemble but with fewer complications. The dancers were still engaging in challenging practices, but this approach made it much more feasible to create coherency in this improvisation work regardless of the limits of improvisation skills or time.

### **Wayne McGregor’s Work**

David Kirsh has engaged in a significant amount of research with dance choreographer Wayne McGregor on the choreographic process and information that manifests within it. The

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<sup>37</sup> Sgorbati, “Emergent Improvisation”, 34.

<sup>38</sup> Sgorbati, “Emergent Improvisation”, 34.

different approaches McGregor has to choreography include making, showing, and tasking.<sup>39</sup> In my choreographic process, I used similar ideas to create or define structured improvisation scores.

The inclusion of McGregor's 'showing' allowed the opportunity to show movement vocabulary and qualities for the dancers to explore in a given section. McGregor's choreographic approach involving methods of tasking and showing paralleled my process as well.<sup>40</sup> I had dancer's interpret the task of 'playing with the extremes of speed, both fast and slow'. I included dramatic rap music in a rehearsal session to help inspire the dancer's movement quality. I was looking for a more tense movement quality that embodied extreme physicality in moving both fast and slow. I had the dancer's experiment with this idea in two groups. As the groups were going I pointed out which dancers were getting the quality I was looking for. I had certain dancer's 'show' when I felt like they were heading in the right direction in terms of movement quality. This approach was utilized throughout my choreographic process to provide dancers with an opportunity to engage in the work differently by visually seeing their peers perform a task.

In my choreographic process I employed 'making-on' as another tool for creating a dance piece. McGregor describes 'making-on' as "making a phrase on a target dancer and using the bodies of dancers to shape the form and dynamics of a phrase."<sup>41</sup> For the vine section, two of the dancers solved the task of intertwining in a way that reflected the image of vines the most vividly. I asked these two dancers to perform the task, and I continued to direct them towards the image of the vines. For instance, I told them to play with the idea of tactility and negative space

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<sup>39</sup>Kirsh, "Choreographic Methods", 188-195.

<sup>40</sup> Kirsh, "Choreographic Methods", 188-195.

<sup>41</sup> Kirsh, "Choreographic Methods", 191.



as they intertwined in order to reflect how vines literally interweave through each other in both of these ways. I had dancers solve tasks, and then I continuously guided them in the route that best reflected the image and generated the most unique movements. This process allowed for the continual discovery of new ideas and constraints that influenced how each section began to take shape.

Each improvisation score largely required ‘tasking’. The entirety of the piece was a compilation of tasks for the dancers. As McGregor suggests, ‘tasking’ creates choreography problems for the dancers.<sup>42</sup> McGregor assigns problems for the dancers that require each dancer to create their own mental imagery. He says that, “this requires dancers to use imagery in some way to create a virtual structure that they are then able to relate to in a choreographically interesting manner.”<sup>43</sup> I similarly did this with the vine score I created. Dancers had to envision themselves as vines and embody this image and way of weaving and intertwining. This expanded the dancers repertoire of movement, as many of them had not previously discovered this way of moving in space.

McGregor kept his pieces unstructured until the last few weeks of performance. If he saw a movement that excited him or was unique, he would make the decision to either keep or take away a movement. I similarly did this through the weeks prior to the performance. If I noticed something interesting performed by the dancers, I would tell them to try to keep a certain movement or develop an idea they introduced in their improvisations. Additionally, if I was drawn to a movement a dancer executed, I then added another layer to the score that incorporated this movement or idea. The set movement ended up emerging out of the structured improvisations. This approach created a more organic development of the piece as the actual set

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<sup>42</sup> Kirsh, “Choreographic Methods”, 191.

<sup>43</sup> Kirsh, “Choreographic Methods”, 191.

choreography arose from the final weeks before performance. The dancers had fine-tuned their understanding of the piece at this point; hence the inclusions of choreography came about naturally, yet unpredictably.

*“Intent is subjective to each individual, but overall there is a common or conventional sense of what a feeling means. Given the more detailed explanation of what sensation I should become aware of really shaped the way I moved and helped create a common ground within the whole cast. It becomes more of a diverse vocabulary within the structure.”*

- Alvaro Nuñez, Dancer from *The Last Light*

This project taught me that with improvisational scores, there is ways to engage individuals, whether it is to problem solve, to use imagery to embody a movement quality or to use sound to influence movement. The constant adaptation of the improvisation structures led to verbal discussions between myself and the dancers, referencing the images, and having other dancers serve as an example of what qualities were prevalent in a particular section. As Kirsh explains in his research, the most novel dances are created through different approaches in the process. Using multi-modalities to create pieces creates authenticity in choreography—authenticity meaning that the choreography is unique, original, and innovative. Incorporating tasks in the choreographic process breeds diversity.<sup>44</sup> I was able to find different structures and ways of using time, space, and energy through the differing tasks I employed in each section. The research on Wayne McGregor’s choreographic process significantly helped me develop my own methodology and choreographic work.

*“I can only tell novelty when I see it, or feel it, or experience it. I can only do it with the live matter present, I can’t do it drawing it, or I can’t really do it on a computer or anything like that. I really need to work through the siphon of a live experience.”*-Wayne McGregor<sup>45</sup>

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<sup>44</sup> Kirsh, “Choreographic Methods”, 188-195.

<sup>45</sup> Muntanyola, “How Multimodality Shapes”, 568.

## CHAPTER 4

### RESULTS AND ANALYSIS

#### Dance Improvisation Techniques

During the process of developing scores into an organized improvisational dance, I came across many absent skills. Towards the beginning of the choreographic process, a few deficient components included working as an ensemble versus a solo, finding relations, and varying time, space, and energy. These elements are sizeable components for trying to create a cohesive improvised dance. Many of my dancers are very strong improvisers when it comes to solos, but when put into an ensemble, the quality of improvisation decreases. Another significant aspect to this dance piece was the ability of dancers to communicate between each other nonverbally. There needed to be a clear exchange of meaning so that dancers could recognize patterns, negotiate roles in different scores, listen, recognize development, and balance individual and collective choices. If I were to try this process out again, I would begin with just practicing the basics of improvisation with an ensemble.

As Sgorbati suggests, several of the key components to produce emergent forms through improvisation are “maintaining an external awareness, being fully present in the moment, exploring one’s own movement through sensory awareness and memory, and exploring dimensions, scales, edges, range, depth, and scope through various dynamics.”<sup>46</sup> Sgorbati has a compilation of exercises to help practice these key components. One of them is experiencing embodiment and centering yourself in the present moment of your own physical and sensory reality.<sup>47</sup> It would have been beneficial to start rehearsals with a more meditative practice that got my dancers in tune with their own bodies and with the other dancers. Due to the time restriction

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<sup>46</sup> Sgorbati, “Emergent Improvisation”, 20-25.

<sup>47</sup> Sgorbati, “Emergent Improvisation”, 20-25.

we usually just jumped straight in to working on the dance piece. In the future, and given more time, I would begin each rehearsal with a practice to get the dancers in tune with their body and awaken their level of awareness.

In the structured improvisation I created, solos are emphasized, though the improvisation of the entire ensemble is equally important. The dancers had difficulties when they were seen as a soloist because they disregarded the rest of the group. This lack of awareness was a large issue at first, but the dancers practiced, and eventually, they were able to move more as an ensemble versus a soloist. The ability to move coherently with an ensemble is important when creating emergence because as Sgorbati's practices in emergent improvisation suggest, it is essential to be connected with the entire group and environment.<sup>48</sup> Moving individually without consideration of the entire ensemble limits the amount of emergent moments that can occur. It does not work as emergence involves interacting agents. If agents are merely interacting with themselves then there is no room for emergent properties to arise on a global level. Another big issue we dealt with was the spectrum of freedom dancers were given. When given less restrictions dancers were more hesitant about what to do and movement became more ambiguous.<sup>49</sup> The more clearly we defined each section and implemented rules, the more dancers adapted their movement in relation to the constraints and allowed a more vivid image to emerge.

Sgorbati's research with dance improvisation in relation to emergence has allowed her to develop "factors that contribute to Emergent Improvisation."<sup>50</sup> Factors include:

1. "Movement [energy force driving all self-organizing systems in a directional flow in time, vocabulary of action includes gesture, emotional expression, rhythmic timing, and exploration of space]

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<sup>48</sup> Sgorbati, "Emergent Improvisation", 33.

<sup>49</sup> Sgorbati, "Emergent Improvisation", 17.

<sup>50</sup> Sgorbati, "Emergent Improvisation", 9.

2. Dancers have agency—personal choice to move and interact with ensemble [essential aspects of agency are kinesthetic awareness (sensation of being embodied) and desire to interact by mimicking, exchanging, contrasting, or developing]
3. Self-organizing relationship of movement within a particular time and space within a particular context or composition—scientific terms, embeddedness—will create a variety of dynamic structures.
4. Memory essential factor, choose certain patterns over others in order to find more adaptable solutions
5. Three levels of interaction exist at one: local neighbor interaction, small group ensemble, global collective behavior.”<sup>51</sup>

It was a constant challenge to coach dancers in structured improvisation as it was my first time creating scores and guiding dancers through improvisations. There were some scores where I felt more confident in giving the dancers instructions, but there were others where I felt like it just wasn't working. An immense amount of improvisation practices require you to stick to one task for an extended amount of time until you can finally obtain a better understanding of the rules. The longer you stick to something the more clear it eventually becomes and the more opportunity for new forms to emerge arises. Additionally, I could have practiced basic ideas of improvisation with my cast by guiding them while they were in the midst of an improvisation score. I did not fully feel comfortable guiding dancers through the scores at first because I was still not as familiar with improvisation myself. Another aspect that hindered the structured improvisation from maintaining only improvisational elements was time. Though my cast and I had several weeks to work on this piece, we did not have enough time to really delve into a truly improvised piece because the focus was on the conceptual ideas, the general structure, and the production elements of the piece. We did not have the time to spend full rehearsals refining improvisation skills and tactics. Due to the time frame and my sparse experience in working with scores and structured improvisation, the dance took a much safer route. For the future, I want to

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<sup>51</sup> Sgorbati, “Emergent Improvisation”, 9.

return to this piece and create a much more risky piece by including more pure improvisation moments.

*“Intelligence comes from learning how to structure your own movement vocabulary in a dance to make sense for an audience to not notice that it is improvisation, for an audience to see a beginning, middle, end, when everything up to the performance is unknown, other than timing and structure, and even timing fluctuates within each section.”* -Alvaro Nuñez, Dancer from *The Last Light*

### **Emergence**

Emergence can be recognized on a number of levels in my research—globally, structurally, psychologically, and individually. The dance I choreographed reveals how emergence operates on a bodily level in relationship to motor skills or cognitions. Emergent forms and emergent patterning continue to arise and dissolve as the ensemble of dancers self-organize to fulfill the score of a given section. I will discuss the prominence of emergence throughout my practice-as-research portion of my research project.

In the vine section emergent patterning is apparent in the visual image and the moving bodies. The ways in which vines grow on a wall create unique, unpredictable patterning. Similarly, my dancers produced a continual intertwining quality with the other moving bodies that produced these random patterns in motion. On a global level, we can visually see these unique forms or patterns arise. On an individual level, the movement vocabulary of the dancers emerged from the score given in this section. There was no predetermined movement vocabulary for the dancers. While the dancers problem solved to fulfill the score in this section, the dancers developed their own movement vocabulary that was coherent in their own bodies and evolved over time as we continued to rehearse. These two components—coherency and evolution—are

common characteristics of emergence mentioned by Jeffrey Goldstein.<sup>52</sup>

Coherence and evolution are essential in producing emergence. Dynamic systems are constantly fluctuating and going through adaptation periods, coherence can be recognized once the system has evolved into a new emergent form or pattern. Hence, coherence and evolution are vital components to ensure a system holds emergent properties. The vine section ends with a dancer pushing another dancer into the center of the stage—the individual pushed in is randomly determined in each performance. It is dependent on the way in which the ensemble of dancer's self-organized to find their way to standing. The self-organization of the dancer's fluctuated every night as the dancers constantly adapted pathways, interactions, and ways to follow the score. The individual pushed into the center emerged based on the ways the ensemble of dancer's self-organized to fulfill the score and employed evolution and coherency in their interactions. These same ideas are recognized in the hallway section as well.

The hallway section captured emergence in several different ways. For instance, the order of the solos occurring was unpredictable and determined by the dancers on the sides. These dancers pushed an individual in who then became the soloist. Self-organization was employed as the ensemble of dancer's collectively chose the individual who was being pushed in. The randomness and spontaneity produced by the ensemble self-organizing required dancers to maintain a strong external awareness of the entire system—this is one technique Sgorbati mentions as capable of producing emergent forms.<sup>53</sup> Additionally, the pathways of the dancer's running across the 'hallway' created an unseen emergent pattern. I drew a sketch of all the pathways the dancers created, and it ended up illustrating a rather complex design of

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<sup>52</sup> Jeffrey Goldstein, "Emergence as a Construct: History and Issues." *Emergence* 1, no. 1 (March 1999): 49.

<sup>53</sup> Sgorbati, "Emergent Improvisation", 20.

crisscrossing pathways. In nature, it could almost be seen as a spider web. Thus, the rather simple task I gave the dancers culminated in a complex emergent pattern arising. This type of random pattern formation is precisely what is meant by self-organization: “the system organizes itself, but there is no “self”, no agent inside the system doing the organizing.”<sup>54</sup> Another instance emergence is recognized here is in the vocal task I gave the dancers. The dancers were asked to create different noises that the soloist tried to instantaneously respond to. The unpredictability of the noises produced created a sense of emergent patterning vocally. The pattern of the noises parallels the common patterns of crowd behavior. For example, in large crowds different forms emerge such as individuals clustered in a group, individuals in pairs, or an individual alone. This type of emergent form was apparent with the patterning of the sounds being produced. There were multiple sounds occurring simultaneously, or just one sound or two sounds back-to-back occurring. The patterning of the noises created reflected emergent forms similar to those found in crowds, but in an audible sense.

The train station section captures how patterns can emerge within social interactions. This section captures how when interacting with a crowd, clusters, solos, and relationships continue to arise and dissolve over time.<sup>55</sup> This dynamic within crowds (and this section of the dance) is representative of the way patterns emerge within dynamic systems. There is a moment in the train section where one individual walks backwards across the front of the stage. The decision to use his walk as a cue arose out of an improvisation session. Creating this set moment of choreography to cue the other dancers parallels Wayne McGregor’s choreographic approach—McGregor’s choreography typically emerges out of the improvisational work and

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<sup>54</sup> Kelso, *Dynamic Patterns*, 8.

<sup>55</sup> Mehdi et al Moussaïd, “Traffic Instabilities in Self-Organized Pedestrian Crowds.” *Plos Computational Biology* 8, no. 3 (March 2012): 1-10.



collaboration with the dancers in rehearsals.<sup>56</sup> At 6:29 in the dance piece, all of the dancers on the stage come to a pause. This moment is an example of an emergent form that arose from the self-organization of the dancers. While the dancers followed the constraints they were given and maintained an awareness of their movement in relation to the space and other bodies, new emergent forms arose from the shifting interacting agents every performance.<sup>57</sup> In this specific section there were two different scores going on simultaneously. Each of the dancer's was constantly tracking the constraints they were given, their own body's movements, and the other bodies' spatial relationships.

Something I have not yet had the opportunity to study closely but think would be exciting to do, is to track the pathways of the dancers in order to see what patterns emerge. In this section it is much more difficult to track the pathways on paper because there are ten dancers on stage. It would be interesting to use a computer program to track these pathways for me.

In the rain section emergence arose from the movement choices of the individuals, the improvisational score, and the self-organization of the bodies in relation to each other. This section uses the element of water. Using water as a prop allows it to appear to be raining on stage. The water created a small puddle that the dancers had to consider while improvising. Prior to dress rehearsal week, the dancers had never experimented with the rain element. The rain element completely altered the movement quality of the dancers for this section. The water created its own constraints and unspoken rules for the ensemble. There was a certain level of not knowing here. The dancers were unable to move how they were previously moving because they kept stumbling and falling due to the slipperiness of the water. The limitation in movement due to the water required the dancers to find alternative ways of moving. It led to the discovery of

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<sup>56</sup> Muntanyola, "How Multimodality Shapes", 563-582.

<sup>57</sup> Sgorbati, "Emergent Improvisation", 20.

sliding and gliding on the stage that produced this almost supernatural quality. The discovery of new ways of moving allowed the dancers to discover self-organization on a bodily level in relation to motor skills. It allowed the individual's to discover where there were new possibilities of moving through the space. The movement choices and quality of each dancer emerged due to the restriction of the rain.

Emergence can be recognized on a bodily level in relation to cognition. Linda Smith mentions in her research that, "cognition is just a complex set of internal processes bound to each other and to the world through perception and action in real time with no fixed and segregated representation of anything, that is, that cognition just is a complex dynamic system."<sup>58</sup> Similarly, improvising dancers are constantly engaging in a number of internal processes as they are making decisions instantaneously based off the ensemble, themselves, the space, and the environment. The number of elements the dancers must consider in the decision making process during improvisation allows their own cognition to make these rapid decisions that emerge every millisecond in performance. In my research project, the choices each dancer made within their own body went through a set of internal processes based on the score of a particular section. The prompt responses each dancer was engaged in allowed bodily movements to emerge based on cognitive processes occurring in real time. It did not allow the dancers to contemplate what movement they would produce. The dancers had to instantaneously respond to in-the-moment occurrences—they were thinking via the body. On a cognitive level, we can recognize how the individual choices of each dancer emerged.

On a psychological level, emergence can be seen in the way the meaning of the piece was interpreted. In Sgorbati's research, she discusses approaching Emergent Improvisation on a

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<sup>58</sup> Smith, "Cognition as a Dynamic System", 1-21.

psychological level; by viewing improvisation we can extract meaning or metaphor from the ensemble composition.<sup>59</sup> As I continued to watch my piece more, I would develop new understandings of meaning and metaphors through the patterns and adaptation of the piece created by the dancers. Feedback about the meaning of the piece would vary from person to person. The way the piece was constructed allowed for a not so straightforward intention but also a not completely ambiguous meaning. There was room for individuals to interpret the dance how they pleased, while still arriving at understandings that reflected my initial inspiration. For example, a few of the interpretations I received were that this piece was a journey through accepting Jesus Christ as your savior; it was a journey of death and the in-between, and it was a journey of isolation and solitude. The open-endedness of the structure of the piece left room for the viewer's to place their own experiences within the piece; they were able to interpret the piece based on this particular moment in their life. There was room for emergence to occur on this entirely different level. Hence, on a psychological level, emergence can be recognized in the way new meanings, metaphors, and interpretations arise from different individuals and their internal processes.

### **Embodied Cognition (EC)**

By employing ideas pertaining to embodied cognition, I was able to create a piece that encompassed an array of elements, qualities, and experiences. Embodied cognition suggests that bodily experiences shape our cognitive perceptions.<sup>60</sup> Using multi-sensory motor skills allowed my dancers to develop their own perceptions of the piece through the bodily experiences they engaged in. The use of imagery, sensations, textures, focus, vocals, and listening captured the essence of the four photographs utilized in this piece. The physical experiences the dancers

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<sup>59</sup> Sgorbati, "Emergent Improvisation", 33.

<sup>60</sup> Batson, "Integrating somatics and science", 183-193.

engaged in contributed to providing an understanding between the body, brain, and the world in relation to this dance performance.<sup>61</sup> Additionally, this method for approaching choreography allowed my dancers the opportunity to fully relish in the present during each performance. My choreographic process utilized multi-sensory skills and ended up paralleling with many of the ideas relating to embodied cognition.

Incorporating multi-sensory skills into the choreographic process enhanced the performance quality of the dancers. We depend heavily on physical properties of our bodies to develop metaphorical reasoning, which ultimately helps illustrate our understanding of concepts of the world.<sup>62</sup> The development of our understandings of the world can be recognized through our bodies using multi-modal sensory-motor systems to expand our perceptions. Each score had specific demands that employed imagery through a different sense requiring the dancers to utilize multiple senses throughout the piece. McGregor works from a similar place as he uses multi-sensory imagery to produce movement. He uses visualizations, rhythms, sounds, or tactile stimulation. The choreographic process of Wayne McGregor requires dancers to develop multi-modal skills and expand on their internal cognitive processes. Upon concluding the research of Wayne McGregor's work, researcher, David Kirsh, explains how "the domain of choreography is a rich arena for research on the nature of distributed creative cognition, on multi-modal instruction, and phenomena of group attention, mental imagery, and interactivity."<sup>63</sup> The immense potential of research that dance choreography contains is important to recognize and continue to explore. I incorporated a wide range of multi-sensory imagery to influence

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<sup>61</sup> Batson, "Integrating somatics and science", 183-193.

<sup>62</sup> G. Lakoff, M. Johnson, *Metaphors We Live by* (Chicago, IL: University of Chicago P, 1980).

<sup>63</sup> Kirsh, "Choreographic Methods", 195.

choreography, movement, and improvisations. This addition to my choreographic approach allowed me to further explore and recognize the significance of concepts of EC.

The application of EC within a dance setting allowed the dancers to develop their own understanding of the movement and dance piece through embodying multi-sensory imagery. Throughout my piece I used multi-modal sensory skills to support the creation of a more holistic experience and to capture the spirit of each image. Each section required the dancers to maintain a continuous awareness of themselves and the group as a whole. A few sections required the dancers to make noises and one section required the dancers to use the element of water. Batson mentions that the intertwining of bodily movements, tasks, and environment support the adaptation of cognitive processes and broadening perceptions.<sup>64</sup> My choreographic approach employed these ideas pertaining to EC. The process originated from a conversation between the dancers and myself about the feelings each photograph evoked, influencing how I chose to construct the improvisational scores. Each score contained a set of constraints or rules that served as tasks for the dancers. The tasks produced the parameters for self-organization to emerge within the ensemble as each dancer became engaged with the task at hand, their own bodily movements, and their relationship to the ensemble of dancers. The rehearsal process became repetitive and adaptive as we practiced the improvisation scores of each section continuously. Through this repetitive practice, innovative movements or concepts emerged from the dancers, which were then utilized in the piece as a revision to the improvisation score or as a moment of set choreography. From rehearsal to rehearsal, dancers constantly expanded their movement vocabulary, the sophistication of their choices in relation to space, and their ideas for a given section. The mixture of movements, tasks, and the ways in which the ensemble interacted

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<sup>64</sup> Batson, "Integrating somatics and science", 183-193.

with each other from rehearsal to rehearsal influenced the adaptation of each individual's cognitive processes and perceptions in relation to the culminating dance piece. The dancer's expanded their own artistic abilities through this supportive environment they were immersed in during the choreographic process.

The experiential approach to the improvisational scores allowed the dancers to portray genuine responses to the experiences they were undergoing. This approach facilitated the creation of an organic piece with authentic emotions radiating from each dancer. The emotions and intentionality of the dancers came naturally from their experiences throughout the dance. The images, props, and ideas further defined the sections in a way that gave each dancer a more full experience for each section.

The culminating dance choreography became a metaphor to the images. Lakoff and Johnson explore how humans employ metaphors as a means to conceptualize the world.<sup>65</sup> I was able to create choreographic forms that functioned as metaphors for the images that inspired me. Through these different visual images, I was able to further define all four of the sections by tapping into different senses simultaneously. These metaphors also served as a framework for the dancers when considering the concept of the dance piece. Each individual had a different interpretation of what the culminating piece meant to him or her.

This research project drew my attention to the different ways in which individuals learn. Approaching work with multi-sensory skills gives individuals the opportunity to experience similar ideas through different senses. It allows individuals to realize what sensory experience provides them with the most clarity of a concept. For example, in the vine section of my piece, my dancers initially started playing with this idea of capturing the essence of vines. Only two of

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<sup>65</sup> G. Lakoff, M. Johnson, *Metaphors We Live by* (Chicago, IL: University of Chicago P, 1980).

my dancers were able to capture this, but after I showed the entire ensemble of dancers the images a few more were able to better understand this section. Additionally, in the second section the soloist at first was asked to play with the extremes of moving quickly or slowly. In some individual's this task created a feeling of fear or spookiness that was evoked by the image of the hallway. We then added the task that the soloist needs to react in their body to the noises the dancers on the side created. This task produced a more real quality of fear or spookiness in some of the dancers who initially did not find this quality. My research illuminated the fact that every individual experiences and learns differently. It is interesting to take note of what sensory experiences were the most effective for each individual and how using multi-sensory skills can influence overall experiences.

*“This process has helped me with decision-making. It has helped me think fast, especially on stage. I don't always know what I am doing, but I am doing things, so it makes me make decisions. It is like your multi-tasking with your brain inside of your body. It is funny to look back on because there were so many times in the beginning where I felt stuck and I felt like I was doing the same move. Now I feel like I can be really extensive and breath through the piece and the different ideas.”*

*-Katie Istvan, Dancer from The Last Light*

## **CHAPTER 5**

### **CONCLUSION**

The relationship of dance improvisation to emergence allows for many different levels of understanding of the concepts of emergence and dynamic systems to occur. We are able to simultaneously recognize different levels of emergence. Given the requirements and demands of dance improvisation, we are able to recognize emergence on a global level, individual level, and bodily level in relation to motor skills, cognition, and psychology. This range of levels occurring through the singular discipline of dance improvisation allows room for researchers to further delve into studies in dance and continue to recognize other ways the concept of emergence can be understood.

Prior to this research, I had a limited knowledge in choreography, improvisation, and emergence. All three of these components require an extensive amount of knowledge in order to properly apply and practice these. I knew going into this research that I did not know a significant amount about these three things, nonetheless I wanted to give myself this challenge. I lacked experience in improvisation so I played it safe by creating these imaginary structures that restricted the dancers to a certain space, I ended up setting certain moments versus keeping it purely improvisational. My dancers lacked experience in improvisation. Improvisation is a skill that takes years to master, as it requires you to multi-task and constantly track different ideas, constraints, and techniques. For this research project I had a limited amount of time given the performance was in mid October and we began rehearsing in August. These restrictions coincidentally influenced my choreographic approach and significant findings.

In the future, I want to challenge myself to explore this same approach with pure improvisation. I want to practice this with an unlimited amount of time so that I can train my



dancers and build stronger improvisation skills. Also, I want to experiment more with what is the least amount of constraints I can give dancers that will produce the most emergent forms. This relationship between dance improvisation and studies in emergence theory is very limited.

Emergence theory is a means to push artists to think beyond what they already know and find an even more unthinkable approach to a task where they already have default approaches. I think this theory can be easily applied to any art form and can also be a useful tool for critical thinking. To be able to stretch the tasks or guidelines given to one so far that they are thinking beyond this known space is what allows for adaptation.

In conclusion, the dance ended up embodying numerous elements of spontaneity for both the audience and performers. Additionally, it is important to note that only a few scholars have engaged in this type of work, and I believe that there is a significant amount of information that lies in this relationship between dance improvisation and emergence theory. The application of emergence and complexity theory to dance holds the potential to reveal how emergence operates on a global level, individual level, and bodily level in relationship to motor skills, cognition, and psychology.

## **APPENDICES**

**APPENDIX A**  
**PROGRAM: *VARIANCE 2015***

California State University, Long Beach  
College of the Arts & Department of Dance

presenting  
choreography by  
BFA choreographers  
**Yasmine Lindskog**  
**Colleen Melhuish**  
**Mari Uyeda**  
**Taylor Worden**  
with guest artist  
**Sidra Bell**

**variance**  
2015

Martha B. Knoebel Dance Theater  
October 15 - 16 at 8pm  
October 17 at 2pm + 8pm  
2015

### **The Confinement Quandary** (premiere)

Choreography: Colleen Melhuish

Music: *Labyrinth*, Original composition by Kevin Capacia and Elizabeth Chavez  
Carpentry: Steve Hutchens

Dancers: Stephanie Britton, Emily Devine, Anniessa Glover, Gabriella Juarez, Natalie Petti, Luis Vazquez

### **Even Though** (premiere)

Choreography: Mari Uyeda, in collaboration with the dancers  
Music: Original composition by Elizabeth Chavez

Dancers: Juliana Canty, Sullivan Fross, Nathaniel Gonzaga, Rebecca Ramirez

### **The Last Light** (premiere)

Choreography and Direction: Yasmine Linskog

Music: Original composition by Zachary Kenefick and Samara Rice

Dancers: Katie Istvan, Alvaro Nuñez, Rosario López, Jack Taylor, Jenna Thormodsgaard, Natalie Wong  
Chorus: Megan AuYeung, Jamie Carr, Madison Clark, Colleen Hendricks

## **INTERMISSION**

### **of observation** (premiere)

Direction: Sidra Bell

Rehearsal Director: Rebecca Lemme

Music: Original score by Dennis Bell © 2015 Mark of Aries Music BMI

Dancers: Orlando Agawin, Alice Amano, Megan AuYeung, Caitlin Barfield, Francesca Butler, Jamie Carr, Bradford Chin, Madison Clark, Leanna Fletcher, Justin Gulu, Colleen Hendricks, Haley Richartz

### **In The Hole** (premiere)

Choreography: Taylor Worden

Music: Original composition by Alec Loshonkohl

Film: Gregory R.R. Crosby

Dancers: Ashley Allen, Ashlee Blosser, Regina Ferguson, Madeline Rickard, Sydney Wolford

Understudies: Elana Goodman, Grace Guevara

## **Choreographer Bios**

**SIDRA BELL** (Guest Artist) is a Master Lecturer at the University of the Arts (Philadelphia), and was an Adjunct Professor at Ball State University (Indiana) and Barnard College (NYC). She has a degree in History from Yale University and an MFA in Choreography from Purchase College. **SIDRA BELL DANCE NEW YORK** is rapidly gaining an international profile for work that reveals aspects of the human condition through a distinctly female lens. Bell's creations have been described as "brainy, exuberant, and audacious" (San Francisco Chronicle). Bell has won several awards, including a notable 1st Prize for Choreography at the International Solo-Tanz Festival in Stuttgart, Germany and a production award from New England Foundation for the Arts (2015). Her critically acclaimed work has been seen throughout the United States and in Denmark, France, Austria, Bulgaria, Turkey, Germany, China, Canada, Aruba, Korea, Brazil, and Greece. Bell has received many commissions from institutions internationally and has produced over 100 new works. Bell was commissioned as the choreographer for the feature film **TEST** set in San Francisco during the height of the AIDS crisis. The movie was nominated for a 2015 Independent Spirit Award. **TEST** was also awarded two grand jury prizes from the Los Angeles Outfest and was a New York Times Critic's Pick. The film has had many screenings at LGBT festivals worldwide and is enjoying an international theatrical run. She was recently named one of 50 outstanding artists living or working in Westchester County as part of ArtsWestchester's 50th Anniversary. **SBDNY** has an extensive educational and mentorship program and works with institutions for dance and theater internationally with a particular emphasis on young artist development.

**YASMINE LINDSKOG** (BFA Choreographer) is a performer, choreographer, and dance instructor. She has been trained in modern, contemporary, ballet, jazz, pointe, and tap. She came to California to pursue her career in dance at CSULB where she gained extensive training in modern, ballet, and choreography. Currently a BFA candidate, Linskog has been awarded the Department of Dance Scholarship and the Richard and Johanna Baker Scholarship. Additionally, she has trained at the San Francisco Conservatory of Dance, Broadway Dance Center's Professional Semester, and at BODYTRAFFIC's Summer Intensive. Throughout her training thus far, she has had the opportunity to perform works by Shannon Giffen, Sidra Bell, Adam Barruch, Anton Lachky, Rebecca Lemme, Rebecca Bryant, Delyer Anderson, and Cornelius Carter. Linskog has also assisted Liane Plane at Broadway Dance Center, interned at the Movement Talent Agency and interned at the Pulse on Tour in NYC.


**COLLEEN MELHUIH** (BFA Choreographer) began training at age nine at Riverside Ballet Arts under Glenda Carhart, Damien Diaz, and Larissa Nazarenko. Throughout her time there, she also performed various works with California Riverside Ballet and was inspired by attending workshops and dancing onstage with prestigious dancers from around the country. Choosing to diversify her training at Riverside City College, Colleen later became part of the Dance Touring Ensemble and was chosen as a student choreographer for the department's Celebrate Dance. Some highlights from her time there include participating in Riverside's first Trolley Dances and "Long Night of Arts and Innovation", as well as ACDAs Gala performance. After receiving her Associate's Degree, Colleen made her way to CSULB where she is now enjoying her last year in college and working toward her Piletes certification. She is ecstatic to be showing her working in Variance!

**MARI UYEDA** (BFA Choreographer) began her dance training at the age of three in Mountain View, California. In 2006, she began training at Teen Dance Company under the direction of Mark Foehninger. There she had the opportunity to work with renowned choreographers such as Jennifer Backhaus, Christian Burns, Heather Cooper, Gregory Dawson, Kara Davis, and many others. In 2011, she also had the opportunity to perform with sJDANCEco, under the direction of Gary Masters, in their production of "Missa Brevis". She is currently a senior at CSULB pursuing her BFA in dance.


**TAYLOR WORDEN** (BFA Choreographer) is from Temecula, CA and has danced since the age of three. She began with hip hop and branched out to all other genres of dance. Currently, she is a Martin Figoten scholarship recipient at CSULB where she is completing her Bachelor of Fine Arts degree. Taylor has had the privilege of performing faculty works by John Beasant III, Rebecca Lemme, Sophie Monatt, Andrew Vaca, and Rebecca Bryant, and student works by Stephanie Yonkovich and Jill Lindsey. She has modeled for Ubisoft Entertainment Campaigns and was a featured dancer for Bare Intensive, Teen Dance Inc., and documentaries on drunk driving, Every 15 Minutes, and teen suicide, Don't Change the Subject. This past summer, Taylor was honored to attend the River North Dance Chicago Summer Intensive where she trained alongside the RNDCC company members under the direction of Artistic Director Frank Chavez.


## **APPENDIX B**

### **PROGRAM: *FRONT & MAIN DANCE FESTIVAL***


 heartbeats of dance  
**DANCE**

**FRONT & MAIN**  
**DANCE FESTIVAL**  
**TEMECULA 2016**  
**MAR 14-20, 2016**



Master Class with Special Guest Artist: **Trey McIntyre**  
**March 17, 2016** | 9:30am, on stage  
 followed by a Q & A, "Lunch with Trey"
 

**SAT, MAR 19, 2016 @ 8pm**  
**SUN, MAR 20, 2016 @ 2pm**

For more details and the full schedule of events, visit [www.frontmainfest.com](http://www.frontmainfest.com)

TICKETS: \$25 Regular • \$20 Senior & Groups of 15+ • \$15 Student  
 42051 Main St. Temecula • 866.OLD.TOWN 866.653.8696 • [www.TemeculaTheater.org](http://www.TemeculaTheater.org)

Temecula  
 THEATRE

**Sunday, March 20 – 2:00PM**

## **FRONT & MAIN DANCE FESTIVAL**

**Competition Performance #2**

### **Avocado Dance Theatre**

**Title:** Raven  
**Choreography:** Aaron Shaw  
**Music:** René Aubry, "Passages"  
**Dancers:** Kristin Brown, Joseph Lister, Emeline Lotherington, Lana Rowe, Aaron Shaw, Amanda Rose Shind

**Avocado Dance Theatre** is a non-profit dance company developed by Dance Theatre Collective of Southern California, with the support of Temecula Presents. Under the artistic direction of Lori Craig Torok and Aaron Shaw, ADT is in residence at Old Town Temecula Theater and creates new and original dances, which speak to today's audiences—enriching the community through art, innovation, dialogue, and opportunity. Avocado has performed at Dance in the Desert (Las Vegas), So Cal Dance Invitational (OC), MixMatch Dance Festival (Santa Monica), San Diego ArtWalk/Dance on the Edge, among others.

### **Vicious Circle Dance Company**

**Title:** Perimeter  
**Choreography:** Valerie Cabag  
**Music:** Regina Spektor  
**Dancers:** Jestoni Dagdag, Jonathan Kim

**Vicious Circle Dance Company** was founded November 2012 by Artistic Director, Valerie Cabag. The company is comprised of 10 male dancers, all of whom are working towards a degree in dance. Vicious Circle strives to bring art back into the community, as well as, encourage young artists to continue their passion of dance through education. Southern California native, Valerie Cabag earned her MFA in Dance from the University of California, Irvine and her BA in Dance from the University of California, Riverside. She is currently an adjunct faculty member at Camillo College, El Camino College, and Fullerton College. For the last 5 years, Valerie has been the assistant coach for the National ranked team, Torrey High School 'Red Hots' dance team. In 2012 she founded the company, Vicious Circle, with hopes of spreading dance into the community.

### **Yasmine Lindskog**

**Title:** The Last Light  
**Choreography:** Yasmine Lindskog  
**Music:** Zachary Kenefick & Samara Rice  
**Dancers:** Katie Istvan, Jack Taylor, Alvaro Nunez, Jenna Thormodsgaard, Rosario Lopez, Natalie Wong, Colleen Hendricks, Madison Clark, Jamie Carr, Megan AuYeung

Yasmine Lindskog is a performer, choreographer, and dance instructor. She has been trained in modern, contemporary, ballet, jazz, pointe, and tap. She came to California to pursue her career in dance at CSULB where she gained extensive training in modern, ballet, and choreography. Currently a BFA candidate, Lindskog has been awarded a Department of Dance Scholarship and the Richard and Johanna Baker Scholarship. Additionally, she has trained at the San Francisco Conservatory of Dance, Broadway Dance Center's Professional Semester, and at BODYTRAFFIC's Summer Intensive. Throughout her training thus far, she has had the opportunity to perform works by Shannon Gillen, Sidra Bell, Adam Barnuch, Anton Lachky, Rebecca Lemme, Rebecca Bryant, Andy Vaca, Delyer Anderson, and Cornelius Carter. Lindskog has also assisted Liane Plane at Broadway Dance Center, interned at the Movement Talent Agency, and interned at the Pulse on Tour in NYC.



**APPENDIX C**  
**PHOTOGRAPHY**

All photography by Gregory R.R. Crosby:



Dancers from left to right: Jack Taylor, Jenna Thormodsgaard, Katie Istvan, Natalie Wong, Rosario López, and Alvaro Nuñez



Alvaro Nuñez (furthest front) and Jack Taylor (furthest back)



Katie Istvan



Alvaro Nuñez (furthest front)



## **BIBLIOGRAPHY**

## BIBLIOGRAPHY

- Baker, Dave. "The Ruins." Digital image. Flickr. March 19, 2010. Accessed May 30, 2015. [www.flickr.com](http://www.flickr.com).
- Batson, Glenna, and Wilson, Margaret. *Body and Mind in Motion*. Chicago, USA: Intellect Ltd, 2014.
- Batson, Glenna. "Integrating somatics and science." *Journal of Dance & Somatic Practices* 3, no. 1/2 (2012): 183-193. Accessed March 20, 2015. [http://dx.doi.org/10.1386/jdsp.3.1-2.183\\_1](http://dx.doi.org/10.1386/jdsp.3.1-2.183_1).
- Bar-Yam, Yaneer. *Dynamics of Complex Systems*. Boulder, CO: Westview Press, 2003.
- Blom, Anne L., and Chaplin, L. Tarin. *The Intimate Act of Choreography*. Pittsburgh, PA: University of Pittsburgh Press, 1982.
- Buckwalter, Melinda. *Composing While Dancing: An Improviser's Companion*. Madison, WI, USA: University of Wisconsin Press, 2010. Accessed February 21, 2015. ProQuest ebrary.
- Calvino, Italo. *If on a winter's night a traveler*. New York, NY: Harcourt, Inc., 1981.
- Dixon, J.A., Holden, J.G., Mirman, D. & Stephen, D.G. "Multifractal Dynamics in the Emergence of Cognitive Structure." *Topics in Cognitive Science*, 4, no. 1 (January 2012): 51-62. Accessed February 26, 2015. EBSCOhost.
- Driver, Senta. *Choreography and Dance*. New Fetter Lane, London: Harwood Academic Publishers, 2000.
- Dufallo, Cornelius. "The Aesthetic of Impermanence: A Performer's Perspective of Four Systems and Tracer." *Contemporary Music Review* 26, no. 3/4 (2007): 429-436. Accessed February 21, 2015. <http://dx.doi.org/10.1080/07494460701414439>.
- Fuentes, Miguel Angel. "Complexity and the Emergence of Physical Properties." *Entropy* 16, no. 8 (August 2014): 4489-4496. Accessed February 28, 2015. <http://dx.doi.org/10.3390/e16084489>.
- Fusella, Paul V. "Dynamic Systems Theory in Cognitive Science: Major Elements, Applications, and Debates Surrounding a Revolutionary Meta- Theory." *Dynamical Psychology* (2012-13): 1-14. Accessed February 26, 2015. EBSCOhost.
- Goldstein, Jeffrey. "Emergence as a Construct: History and Issues." *Emergence* 1, no. 1 (March 1999): 49. *Business Source Premier*, EBSCOhost (accessed March 5, 2016).

- Hagendoorn, Ivar. "Cognitive Dance Improvisation: How Study of the Motor System Can Inspire Dance (and Vice Versa)." *Leonardo* 36, no. 3 (2003): 221-227. Accessed March 1, 2015. EBSCOhost.
- Haker, Matthias. "The Blue Mile." Digital image. 500px. March 13, 2013. Accessed May 30, 2015. 500px.com.
- Hasson, U., Nusbaum, H. C., & Small, S. L. "Task-dependent organization of brain regions active during rest." *Proceedings from the National Academy of Sciences*, 106, no. 26 (June 2009): 10841–10846. Accessed February 26, 2015. EBSCOhost.
- Kelso, J.A. Scott. *Dynamic Patterns: The self-organization of brain and behavior*. Cambridge, MA: MIT press, 1997.
- Khong, Belinda Siew. "The Understanding of Mindfulness: Seeing the Tree and the Forest." *Humanistic Psychologist* 37, no. 2 (Apr-Jun 2009): 117-136. Accessed February 21, 2015. <http://dx.doi.org/10.1080/08873260902892006>.
- Kirsh, David. "Choreographic Methods for Creating Novel, High Quality Dance." 5<sup>th</sup> *International workshop on Design and Semantics of Form and Movement*, (2009). Accessed March 1, 2015. Google Scholar.
- Kirsh, David. "Creative Cognition in Choreography." *Proceedings of 2<sup>nd</sup> International Conference on Computational Creativity*, (2011). Accessed March 1, 2015. Google Scholar.
- Kirsh, David. "Embodied cognition and the magical future of interaction design." *ACM Transactions on Computer-Human Interaction*, 20, no.1 (March 2013): 1-30. Accessed March 1, 2015. EBSCOhost.
- Lakoff, G. and M. Johnson. *Metaphors We Live By*. Chicago, IL: U of Chicago P, 1980.
- Lakoff, G. and M. Johnson. *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*. New York, NY: Basic Books, 1999.
- Liang, Thow Yick. "Edge of emergence, relativistic complexity and the new leadership." *Human Systems Management* 32, no. 1 (2013): 3-15. Accessed February 21, 2015. <http://dx.doi.org/10.3233/HSM-130781>.
- Maher, James. "Waiting in Grand Central." Digital image. James Maher Photography. 2003. Accessed May 30, 2015. [www.jamesmaherphotography.com](http://www.jamesmaherphotography.com).
- McGregor, S. "Vines on Wall, NC." Digital image. Art Space. 2011. Accessed May 30, 2015. [Artspacenh.org](http://Artspacenh.org).

- Moussaïd, Mehdi, et al. "Traffic Instabilities in Self-Organized Pedestrian Crowds." *Plos Computational Biology* 8, no. 3 (March 2012): 1-10. *Academic Search Complete*, EBSCOhost (accessed February 29, 2016).
- Muntanyola, Dafne. "How Multimodality Shapes Creative Choice in Dance." *Revista Internacional de Sociología* 72, no. 3 (September-December 2014): 563-582. Accessed March 4, 2015. <http://dx.doi.org/10.3989/ris.2013.04.04>.
- Nikolic', D. "The brain is a context machine." *Review of Psychology*, 17, no. 1 (2010): 33-38. Accessed February 26, 2015. EBSCOhost.
- Riley, M.A., Shockley, K., & Van Orden, G. "Learning from the body about the mind." *Topics in Cognitive Science*, 4, no. 1 (January 2012): 21-34. Accessed February 26, 2015. EBSCOhost.
- Rivers, Ashley. "Movement in the Moment." *Dance Magazine*, February 2015, 60-61, accessed February 21, 2015. EBSCOhost.
- Sawyer, Keith. "Moving forward: Issues for future research in improvisation and education." *Psychology of music* 27, no. 2 (1999) 215-216. Accessed March 15, 2015. EBSCOhost.
- Sawyer, Keith R. *Social Emergence: Societies As Complex Systems*. Cambridge, New York: Cambridge University Press, 2005.
- Sgorbati, Susan. "The Emergent Improvisation Project: Embodying Complexity." *Contact Quarterly*, Winter/Spring 2007, 40-46, accessed February 21, 2015. EBSCOhost.
- Sgorbati, Susan. "Emergent Improvisation: where dance meets science on the nature of spontaneous composition." *Contact Quarterly*, 38, no. 2 (Summer/Fall 2013): 1-57.
- Shapiro, Larry. "The Embodied Cognition Research Programme." *Philosophy Compass* 2, no. 2 (2007): 338-346. Accessed February 26, 2015. <http://dx.doi.org/10.1111/j.1747-9991.2007.00064.x>
- Shapiro, Lawrence. "Dynamics and Cognition." *Minds and Machines: Journal For Artificial Intelligence, Philosophy, and Cognitive Science* 23, no. 3 (August 1, 2013): 353-375. Accessed March 30, 2015. EBSCOhost.
- Shapiro, Lawrence. *Embodied Cognition*. New York, NY: Routledge, 2011.
- Sheets-Johnstone, Maxine. "Thinking in Movement: Response to Erin Manning." *Body & Society* 20, no. 3/4 (2014): 198-207. Accessed March 17, 2015. <http://dx.doi.org/10.1177/1357034X14547395>
- Smith, Linda. "Cognition as a Dynamic System: Principles from Embodiment." *Developmental Review* 25, no. 3-4 (2006): 1-21. Accessed March 20, 2015. EBSCOhost.

Smith, Linda B.; Thelen, Esther. *A Dynamic Systems Approach to Development: Applications*. Cambridge, Massachusetts: The MIT Press, 1993.

Spier, Steven. *William Forsythe and the Practice of Choreography*. New York, NY: Routledge, 2011.

Stephen, D.G. & Van Orden, G. "Searching for General Principles in Cognitive Performance: Reply to Commentators." *Topics in Cognitive Science*, 4, no.1 (January 2012): 94-102. Accessed February 26, 2015. EBSCOhost.

Warburton, Edward C. "Of Meanings and Movements: Re-Languaging Embodiment in Dance Phenomenology and Cognition." *Dance Research Journal* 43, no. 2 (2011): 65-83. Accessed March 17, 2015. <http://dx.doi.org/10.1017/S0149767711000064>.

Welch, Graham F. "Education and musical improvisation: In response to Keith Sawyer." *Psychology of music* 27, no. 2 (1999): 211-214. Accessed March 15, 2015. EBSCOhost.