CHAPTER 42

AN AGILE MIND IN AN AGILE BODY

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Introduction

Dancers and choreographers have developed numerous improvisation techniques to facilitate the real-time composition of movement sequences, from simple behavioural tasks, such as drawing imaginary figures with different parts of the body, to problem-solving tasks that require the dancer to translate a word or a phrase into movement, such as 'separate the wheat from the chaff', 'make angels out of devils', 'spicy', and 'water'. A key difference between these techniques and other approaches to dance improvisation is that these techniques involve the exercise of one's *cognitive* capacities. In contact improvisation, for example, the impetus for a movement is physical and may originate in the pull of another dancer or the removal of support. Another key difference is that the dancers typically need to know and be able to explain what they do. Ideally, different observers should be able to agree on whether a task has been accomplished, and different dancers should arrive at comparable results; otherwise, the connection between task and result would be lost. There should be a difference between 'water' and 'frozen'.

I am aware that following rules and employing techniques is anathema to many dance improvisation practitioners. Doesn't this take the spontaneity out of improvisation? Isn't improvisation about freedom? However, improvisation is not as free and spontaneous as it may seem. Habits, mannerisms, and behavioural dispositions may lead one to unconsciously make the same choices repeatedly and lapse into stereotypical movements. As the French author Raymond Queneau once wrote: 'the sort of inspiration that consists in blindly obeying every impulse is in reality a kind of slavery. The classic writer who composes his tragedy by observing a certain number of rules that he knows is freer than the poet who writes whatever comes into his head, and who is a slave to other rules that he doesn't see' (2007: 36).

The 'other rules' to which Queneau refers in this passage are the hidden laws and unconscious inclinations that guide our behaviour and the aesthetic preferences and cultural biases which have become embedded in our mind.

There is, however, no need to revert to the classical rules of composition to achieve the artistic freedom to which Queneau aspires. Any odd rule will do, as Queneau himself demonstrated in his *Exercises in Style* (1947), which is both a catalogue of literary genres and style figures and a display of the freedom one attains when one masters them all. In improvisation, too, familiarity with different styles and genres leads to increased freedom of mind. One reason Keith Jarrett is such a phenomenal performer is his intimate knowledge of various musical traditions, from the entire canon of Western classical music to jazz, blues, and pop.

I would like to argue that, in improvisation at least, freedom cannot only be achieved through knowledge and experience, but also through understanding. For if we could gain a better understanding of the workings of the mind and brain and make the implicit rules that guide our behaviour explicit, we could transcend our behavioural dispositions and attain a new degree of freedom: what was unconscious has now become a conscious choice.

In the following sections, I will show how some familiar dance improvisation techniques have their roots in properties of the motor system. I will also show how experimental findings from cognitive neuroscience and psychology may inspire improvisation techniques that may be new to some readers.[1] I will not dwell here on the question of what happens where in the brain, as this is of little direct relevance to the practice of dance improvisation.[2] I will also forgo an analysis of why dancers may get stuck when improvising.[3] The emphasis is on practical techniques that can be easily performed by dancers and nondancers alike.

From Theoretical Concepts to Experimental Techniques

Let's start with a simple experiment. Take a piece of paper and a pen, draw a square and a triangle, and sign it by writing your name underneath. Next, hold the pen in your nondominant hand and repeat the exercise. Now place a piece of paper on the floor, hold the pen between your toes, and do it again. You have just demonstrated a classic finding in neuroscience known as motor equivalence. From an anatomical point of view, there are a number of differences between the movements involved in writing with one's hand and one's foot and writing on a piece of paper and a blackboard. Drawing a small circle on a piece of paper requires fine control of the thumb and index finger, while drawing a giant circle on a blackboard requires control of the arm and shoulder. Despite these differences, the result looks more or less the same. This suggests that the central nervous system encodes movements in terms that are more abstract than instructions to specific

muscles. It also suggests that circles, squares, letters, and more complex shapes, such as Chinese characters and one's signature, are encoded as abstract memory structures, which are translated into an action sequence once the limb or end effector, to use a technical term, is selected.

Motor equivalence forms the basis for a well-known improvisation technique whereby the goal is to draw imaginary figures with different parts of the body. This technique goes by various names and has been reinvented by many dance practitioners. For example, in *Improvisation Technologies* (1999) William Forsythe refers to it as 'writing'. As Forsythe emphasizes, when practising this technique you should take care not to stop at using the hand, finger, foot, and elbow but also experiment with the shoulder, head, hip, and so on. This technique can easily be extended to circumscribing two- and three-dimensional shapes and figures. For example, you can outline the shape of a ball or a vase with your hands and arms. In my own work, I use architectural drawings and data visualizations, which the dancers then translate into movement. I should add that the goal is not for the audience to be able to guess the figure the dancers are drawing: the goal is to generate movements. You can stop at any moment and continue with doing something else.

Let's do another experiment. This time it involves reaching for an object, say a glass of water. Depending on the distance between the glass and your body, you can do so by extending only the arm or by bending forward and rotating around the waist. By carefully examining video recordings of just this task, researchers found that when one reaches for an object, the fingers already begin to shape as the arm extends towards the object's location (Jeannerod 1981). It was also found that the preshaping of the fingers depends on the shape of the object one is reaching for. This may sound obvious, but it isn't. After all, you could also first extend the arm and then open the hand, or the other way around, the way one might program a robot to grasp something. Now suppose that it is a glass that has a stem and is upside down on the table. When grasping the glass in order to fill it, most people will turn the hand during reaching; otherwise, the hand would end up in an awkward position upon turning the glass upside down. This shows that one's grasp is shaped not only by the object but also by what one intends to do with it (Rosenbaum et al. 2012).

As I'm sure many readers will have recognized, these experimental findings are easily put to creative use: find as many ways of reaching for an object by varying the form and dynamics of the movement, the starting position, the distance to the object, its location, and so on. As a matter of fact, this could be the basis for a dance performance, *Glass on the Table* (2017). All we need to do is select the costumes, determine the lighting, add a soundtrack, and we are done.[4]

Suppose that you want to drink from the glass in the previous experiment. You could, of course, just grasp it and bring it to your mouth. However, if the glass is too full it would be wise to bend forward and sip from it in order to prevent spilling its contents, as indeed many people do. In the first instance, the head stays in the same position and the glass is transported towards the head; in the second instance the glass stays in the same position and the head is transported towards the glass. This observation provided the

inspiration for an improvisation technique, which I have termed 'fixed point technique' in a playful homage to the Dutch mathematician L. E. J. Brouwer (1881–1966), who is best known for his fixed point theorem, a basic result in the mathematical field of topology (Hagendoorn 2003). The technique draws on the observation that the position of an object (and a part of the body) can be defined both in an *intrinsic* frame of reference, which is relative to the body—to one's left, at hip level—and in an *extrinsic* frame of reference, which is relative to other objects, on the desk, next to the dictionary, or as coordinates in an abstract space.

With this distinction in mind, the first thing to observe is that one can establish an intrinsic relationship between two or more parts of the body and maintain that relationship while moving through extrinsic space. For example, one can stretch an arm and lie down while keeping the arm stretched, that is, while maintaining the intrinsic relationship between arm and chest. Obviously, there are always some intrinsic relationships between different body parts that remain constant as one moves. For example, when walking, the arms remain in more or less the same position next to the torso. But remember that we are trying to raise these unconscious patterns to a conscious level in order to make them a conscious choice. Once you are aware of the position of your arms while you are walking, you can decide to change the way you hold your arms.

The next thing to observe is that there are essentially two ways by which one can reestablish an intrinsic relation between two body parts. For example, extending one's hand from one's chest to a point in extrinsic space changes the intrinsic relation between one's arm and the rest of one's body. To reestablish the starting position (between the hand and the chest) one could either reverse the movement by bringing the hand back to the chest *or* move the chest towards the hand. If one were standing, one would do so by stepping forward. In the first case, the chest is fixed in extrinsic space; in the second, the hand. I probably make it sound more complicated than it is, but once you get the idea you will notice that this way of varying the parts of the body that are held fixed in intrinsic and extrinsic space gives rise to a great multiplicity of movements. Breakdancers will instantly recognize this technique as one of the fundamental components of popping. To give another, practical, example, you can scratch your left arm by moving the fingers of your right hand across your left arm, holding the left arm fixed in extrinsic space, and by keeping your right hand fixed in extrinsic space and running your left arm underneath.

Let's return to the glass on the table one more time. Suppose that you are standing in front of the table and are about to reach for the glass. As you extend your arm, the muscles in your legs and feet contract to maintain the body's centre of mass within its base of support. If you stand further away from the table, you may have to bend forward and stretch your arm to reach the glass. This in turn may force you to extend your other arm backwards and possibly even a leg so as to keep yourself from tipping over.

Let's call the arm that is extended towards the glass the primary, acting, or leading limb or movement, and let's call the movements of the leg and arm that are engaged to maintain balance the residual movement. The primary purpose of this distinction is to draw attention to the parts of the body that are not directly engaged in an action.

Instead of just leaving your left arm dangling as you extend your right arm, you can hold it behind your back, and when the hands are not engaged, you can ball your hand into a fist or shape your fingers in the form of a *hasta*, one of the single hand gestures from Bharatanatyam. This distinction can also be turned into a technique for generating movements, for example by changing the leading movement, left arm, right leg, left shoulder, and so on or by alternating the leading movement. Possibly the best real-world example of this technique is the triple jump in athletics, which consists of a hop, a step, and a jump (in that order), whereby the athlete lands first on the same foot as that from which she has taken off and then makes a step landing on the other foot before making the final jump.

As the foregoing examples show, one can analyse the fundamental properties of the motor system so as to develop an improvisation technique. I used drawing imaginary figures as an example of a technique based on motor equivalence, but with this principle in mind one could also design a different technique.

The key to developing an improvisation technique is to find some discernible regularity and to formulate the concept or the rule that best describes it. The advantage of knowing a rule is that you don't have to memorize the individual cases: once you understand the rule for adding and subtracting fractions, you can add any fractions (without having to grab a calculator). Similarly, once you grasp the idea behind what I termed fixed point technique, you can apply it at all times, and once you are aware of which limbs are acting and which are residual, you can decide to change the leading movement (or not).

To give one more example, a technique I find very useful draws on a distinction between global and local movements. Local movements are movements that span a small region in space, such as flexing a finger or rolling a shoulder. They are what in Cunningham technique are referred to as 'isolations'. Global movements span a large region in space and typically involve stretched arms and legs. However, what counts as global or local is in part determined by the previous and subsequent movements. Keep this at the back of your mind when you are improvising, so that you can alternate between global and local movements or consciously decide to keep your movements local for an extended period of time.

Motor Schemas

A central concept in the cognitive neuroscience of action is that of motor primitives (Wolpert et al. 2011) or motor schemas (Arbib et al. 1998).[5] A motor schema is an abstract representation of a movement such as a tennis stroke or an arabesque and only represents the structure of a movement. A forehand, a backhand, and a serve look quite different, but they are all variations on a tennis stroke. An arabesque remains an arabesque whether it is performed slowly or quickly, clumsily or gracefully. Motor schemas can be thought of as neural control modules that can be modulated and combined to

generate an extensive repertoire of movements. They are recursive, in that they can be combined with other schemas to form a new, higher-order schema or, alternatively, can be taken apart into smaller schemas. Together the collection of all motor schemas constitutes one's motor vocabulary. Ballet, breakdance, and Bharatanatyam can thus be thought of as particular sets of motor schemas. The module that gets uploaded to Neo's brain in *The Matrix* (1999) presumably consists of the schemas for a collection of martial arts moves. If only the mind would work that way. It would save considerable rehearsal time!

Many everyday actions involve a tool or an object. Since the schemas for each of these movements are part of one's motor vocabulary, one can easily mimic any of these movements in the absence of the actual object. You could imagine picking up a large ball, carrying it over to another location, squeezing it, dropping it, and kicking it away. As a way of generating novel motor schemas, during rehearsals you can use an actual object and explore different ways of engaging with it. You can then take out the object and keep the movement, although you may have to repeat it several times before the temporary schema assemblage is fixed into a schema of its own. You will find that even an object as simple as a broomstick can give rise to a wide range of movements.

While the concept of a motor schema is thought to underpin motor behaviour in general, it can be used as a framework for generating movements. One could start with a collection of simple movements and explore the different ways in which they can be combined into a larger assemblage. As a matter of fact, starting from a collection of movements or poses, one could simply concatenate the movements and poses to create a performance. In the late eighteenth century, Emma Hamilton (1765–1815) made a name for herself with her 'Attitudes', a series of mimes and poses representing figures from antiquity, classical literature, and history. Her repertoire consisted of around two hundred poses and included such characters as Medea slaying her child and reinterpretations of scenes depicted on the antique Greek vases from the collection of her husband, Sir William Hamilton. As she moved from one pose to another, audiences would try and guess the names of the characters and scenes she portrayed. Her act became a big success and drew audiences from across Europe to her home in Naples.

Instead of starting with a collection of simple movements, one could also start with a choreographed, composite movement sequence, take it apart into its constitutive elements, and recombine them into a new configuration. One need not stop here, for instead of merely concatenating a series of movements, one could create variations on each building block or movement segment. One could reverse left and right or transpose a movement from the leg to the arm or vice versa, so that extending an arm becomes extending a leg. If the original movement is small (think writing on a piece of paper) one could enlarge it (think writing on a wall) and vice versa. A transformation can be applied to the primary movement and the next operation to the resulting residual movement, turning what was residual in the previous movement into the primary or leading movement.

In principle, any dance style or genre can be recreated by varying the vocabulary and the rules and restrictions that describe how the individual motor schemas can be

recombined. This method for engendering movement lends itself particularly well to minimal dance, with its shifts and variations on a basic movement repertoire. In my own work I use a combination of choreographed phrases, which change for each performance, and an ever-growing collection of everyday movements. At any moment during a performance a dancer can isolate a particular sequence of movements and use that as a composite motor schema to be taken apart and recombined. As dancers become more familiar with this concept, they will also notice that applying transformation X to movement A results in the same movement as applying transformation Y and Z to movement B.

For *Self Meant to Govern* (1994) and *Eidos: Telos* (1995), of which *Self Meant to Govern* is the first section, William Forsythe, in collaboration with the dancers, created a collection of about 130 movements. Each movement was given a name, such as 'brick', 'pizza', 'bottle', 'oyster', or 'rabbit'. During the performance, the dancers could perform the movement connected with the word 'pizza' and subsequently perform 'atlas', which begins with the last letter of the previous word, or they could perform 'honey', because it is also food. The dancers could also notice that, while performing one movement, say 'oyster', the elbow and knee might be in the same configuration as in another movement, and then continue with this movement. In this case the overlapping body positions create an anatomical bridge between two movements. In addition, the dancers could transform a movement using any of the dance improvisation techniques Forsythe had developed over the years (Forsythe 1999). During the actual performance, clocks, with letters instead of digits, were dispersed across the stage and served as word/movement cues; in addition, invisible to the audience, banners with the names of the various improvisation techniques were displayed on both sides of the stage.

Metaphors and Analogies

When working on a new production, Pina Bausch famously handed the dancers a list of keywords, questions, themes, and instructions, which the dancers then interpreted in the form of movements. But how do you dance a wing, bay leaves, the moon, dead feet, expectations, or like a king? How do you console an object or resist temptation, in dance, that is? And what does it mean to pull your bones in or to alternately dance like you push the earth and like the earth pushes you, to cite some instructions from a class in Gaga, the dance improvisation technique developed by Ohad Naharin?

When asked to dance like a king, one would first imagine what it is like to be a king, what a king does, and how one might recognize a king. One might imagine the demeanour of a king to be grand and stately if not pompous, so one might move accordingly. To dance water, one might examine the properties of water, for instance that it flows, and create flowing movements. In each of these examples, an analogy is sought that could be rendered in movement. Of course, water is wet, but that doesn't readily translate into movement.

According to the cognitive scientists Fauconnier and Turner (2002) the ability to create analogies relies on a core human cognitive capacity which they refer to as 'conceptual integration' or 'blending'. Conceptual integration is a mental process that combines the elements from two different mental spaces into a new configuration or blend. Mental spaces can be thought of as some kind of temporary thought assemblies that are constructed as one thinks and speaks. For example, when you think of a circus, a mental space is activated which includes clowns, acrobats, a marquee, and whatever your personal memories of a circus encompass.

Conceptual integration is best understood when the process is visualized. In figure 42.1, mental spaces are represented as circles, their respective elements as points, and the connections between elements in different spaces as lines. A partial cross-space mapping connects the elements in the two input spaces, represented by the solid lines. The elements that both input spaces have in common are contained in the generic space. The blended space, or blend for short, contains a projection of *selected* elements from the two input spaces and may also contain some elements not found in either of the input spaces, represented by the small circles. The blended space has a structure of its own and is not contained in any of the input spaces, as is represented by the solid square in the diagram.

When two mental spaces are combined or integrated, the resulting blend can take over the structure of the input spaces or acquire a structure of its own. For example, Picasso's cubist portraits combine features from a profile and a full-face perspective, but the organizing frame is that of a face. In its most complex form, which Fauconnier and Turner (2002) call double-scope blending, the two input spaces have different and possibly clashing organizing frames. The blended frame is a projection of elements of both

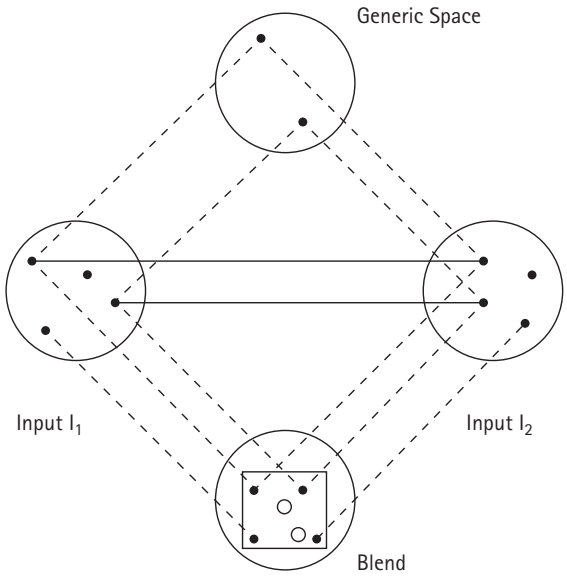

FIG. 42.1 Conceptual integration. *Source*: adapted from Fauconnier and Turner (2002: 46).

input frames but also has a structure of its own. The trashcan on your desktop is an example of such a double-scope blend. It combines elements from the frame of everyday life (throwing trash away) and from the frame of computer commands (delete).

One of the most famous classical ballets, *Swan Lake*, offers an excellent example of conceptual integration in the form of Odette. Odette's movements do not aim to imitate those of a swan but try to capture a swan's grace and essence transposed onto a human body, thus creating a blended figure with a structure of its own. Gregory Bateson perfectly captures Odette's dual nature in his 'Metalogue: Why a Swan?' As the father explains to the daughter: 'I get confused when I speak of the "swan" and the dancer as two different things. I would rather say that the thing I see on the stage—the swan figure—is both "sort of" human and "sort of" swan' (2000: 33).

Conceptual integration is governed by several principles that describe the various conceptual relations that can obtain between different mental spaces, such as change, identity, time, space, cause-effect, part-whole, role, property, category, and intentionality. For example, when one says of a sweater that it is warm, the fact that it keeps one warm is translated into a property of the object. Obviously, the sweater is not warm the way a cup of tea or a fire is, unless, of course, it has just been removed from a tumble dryer.

It is an open question whether the mind operates according to the principles identified by Fauconnier and Turner (2002), but it is a useful paradigm for analysing what dancers do when they translate a metaphor into dance. When consoling an object or separating the wheat from the chaff, the dancers of Pina Bausch Tanztheater Wuppertal unconsciously looked for the conceptual relations that might obtain between the instruction and their postures and movements. *Oblique Strategies,* developed by Brian Eno and Peter Schmidt, which I sometimes use in my own work, relies on the same principle. Originally designed in 1975 as a deck of cards, *Oblique Strategies* consists of a set of cards/phrases which offer cues for generating new ideas. How would your best friend do it? What went wrong the last time? Give way to your worst impulse. Decorate. Don't be afraid of clichés. Make it big/small. Lighten up.

Pina Bausch used her lists of questions and keywords only during rehearsals for a new production, but one can imagine employing the same concept in a live session. One could, for example, place monitors on stage displaying a random slide show of phrases, pictures, and film sequences, to serve as cues for the dancers. Some improvisation purists might consider this cheating, but the dance would still be improvised, and besides, who cares if it makes for an interesting performance?

Spatial and Temporal Organization

Dance improvisation and dance in general do not consist in twisting the body in every conceivable way. One of the things I noticed when I first attended a dance improvisation session was that the dancers tended to stay in the same place and kept on moving at

more or less the same pace. There is nothing wrong with this if it is a conscious choice, but to make it a conscious choice one needs to be aware of the existence of alternatives. In much the same way as one can formulate rules and techniques for generating movements, one can design rules for their spatial and temporal organization.

In general, patterns emerge from the arrangement of repeated or corresponding parts, so to create a spatiotemporal pattern, all one has to do is repeat a movement. Repeating the same movement creates a temporal pattern; repeating the same movement at a different location creates a spatiotemporal pattern. Repetitions need not be identical; mirroring a previous movement also creates a pattern; they don't need to be evenly spaced either; what matters is that there is a discernable regularity within the stream of movements.

A simple rule for breaking a constant stream of movement is to freeze and remain within the same position for X seconds. If you are performing for an audience, this will also give the viewers a moment of respite to catch up with the ongoing stream of sensory stimuli. I know that this isn't exactly rocket science and that these ideas will be familiar to anyone with a passing knowledge of dance improvisation, but having these four concepts—freeze, repeat, slow down, accelerate—at the top of your mind when you are improvising will make it easier to vary not only the form but also the dynamics of your movements.

In a choreography, the dancers follow the directions of the choreographer. In the absence of a choreographer who designs the spatial organization, the dancers will have to determine their own itineraries. Without a destination, deciding on a trajectory can be a challenge. A concept from mathematics that is also employed in psychogeography as a strategy for exploring a city can be of use in this respect.[6]

Imagine randomly selecting one of four cards after every step: clubs you step forward, diamonds you step backward, hearts you turn left, and spades you turn right. These instructions result in what in mathematics is referred to as a *random walk*, a path that consists of a succession of random steps. It is used, among other things, to model the movements of bacteria, foraging animals, and stock prices. As a computer simulation might show, if you were to strictly adhere to the above rule, you might end up moving around in the same area. It is, however, fairly straightforward to extend this concept to more choices. Imagine throwing a die and moving one step forward at one, one step backward at two, five steps forward at three, and so on. In practice you can just move around and remember to turn into a different direction every now and then, to vary the number of steps and to alternate moving forward, backwards, and sideways. There is no need to confine your movements to a lattice either, and should you bump into a wall or leave the stage, you can turn around and continue in any direction.

Another strategy for organizing movements in space is to divide the stage into different sections: two halves, a grid, and so on. This concept, too, will be familiar to most readers, and I only mention it for the sake of completeness. One section of *Communications from the Lab* (2004), a production I created for the Ballett Frankfurt, consisted of multiple lanes and the rule that no two dancers could occupy the same lane. Since there were more dancers than lanes, this simple rule forced the dancers to jump lanes. Another

section was set on a grid. The dancers had to imagine they were moving through narrow corridors, and their movements were constrained accordingly. I had listed the events that could happen when two or more dancers would meet, and together with the dancers, I worked out some schematic solutions. Thus, if two dancers met in the same lane or corridor, they could either block each other's way or figure out a way to get past each other while maintaining the idea of the narrow corridor. If two, three, or four dancers met at a crossing of two lanes, they could get past each other using a combination of choreographed movements, which formed the basis for an impromptu duet, trio, or quartet.

Conclusion: Learning to Improvise

Anyone can improvise. There is nothing to it. Just do whatever comes to your mind. But sometimes the mind goes blank. Overwhelmed by the infinite number of possibilities, the mind may even shut down altogether. With practice, one can improve one's improvisation skills. Keith Jarrett did not become a virtuoso overnight either. But which type of practice is going to make you a better improviser? And how do you know whether you are making progress?

Motor learning in general can be defined as a process which leads to long-term changes in the capacity to perform certain motor tasks as a result of training and exercise. When learning to play baseball, one's sensorimotor control improves to the point where one can hit the ball deliberately and repeatedly and not just by chance. When learning an existing choreography, the dancers rehearse the movements until they closely resemble the choreographed movements. But what does learning mean in the context of dance improvisation? And how does one assess whether a dancer fully grasps and masters the present or any other improvisation techniques?

Psychologists commonly measure creativity by asking participants to list as many interesting and unusual uses of, for example, empty cardboard boxes or tin cans within a given timespan. Participants are then evaluated by fluency (number of responses), flexibility (variety of responses), and originality (unusual responses). In much the same way, one could rehearse the aforementioned improvisation technique and evaluate the progress one is making. One could list the number of different instances of a particular technique a dancer can generate or measure the number and variety of different phrases a dancer can construct from a few motor schemas.

The goal in dance improvisation is not to produce a random sequence of movements, although it might make for an interesting performance. Dance improvisation, like choreography, involves structure as much as variation. The difference between an improvised and a choreographed performance is that in the latter the movements are designed in advance, whereas in the former they are designed in real time. This difference is becoming increasingly blurred, as choreographers such as William Forsythe, Ohad Naharin, and Emmanuel Gat incorporate different forms of improvisation in their work, and dance improvisation practitioners employ games as a structuring principle.

The dance improvisation techniques considered in this chapter serve the dual purpose of creating variation in structure and structure in variation. They can be applied in dance but also in skating, snow boarding, synchronized swimming, and so on. They can be used to generate movements, which can subsequently be laid down in a choreographed sequence. They can be a means to an end and used to realize the artistic vision of a particular individual, and they can be used to break out of established patterns and challenge one's implicit aesthetic preferences. They are conceptual tools as well as physical exercises. As such, they are a way to enhance one's physical and mental agility. For dance improvisation requires not only an agile body but, first and foremost, an agile mind.

Epilogue: Beyond the Human Body

The past few years have seen a dramatic increase in computer capacity. At the turn of the century, self-driving cars were the stuff of science fiction; now they are driving the streets of Silicon Valley. Humanoid robots, too, are becoming increasingly sophisticated, and one can only imagine what they will be capable of twenty years from now. Although myriad technological challenges would still need to be surmounted, in principle most of the ideas described in this chapter could be implemented in robotics or using a three-dimensional avatar. But what does this mean for how we look at dance improvisation? Most people would consider improvisation a creative act. But if a robot were to improvise, would that mean the robot is creative? And if one doesn't consider the robot itself creative, but for example its developers, why would one consider a human dancer creative? Only because he or she is human? It won't be long before these questions become pertinent. One thing is certain, though: the advent of improvising robots and avatars will alter the choreographic landscape and enrich our aesthetic experience.

Notes

1. Disclaimer: this is a systematic, not a historical, overview. I first outlined some of the techniques described here in Hagendoorn (2003), but I do not claim to have invented any of them. Evidently, the work of William Forsythe has been an invaluable source of inspiration for my research. I had the great fortune of being able to witness rehearsals and join in the discussions at the time when *Eidos: Telos* (1995) was created and *Improvisation Technologies* (Forsythe 1999) was produced.
2. A number of neuroimaging studies have investigated the neural correlates of improvisation in music (e.g., Bengtsson et al. 2007; Limb and Braun 2008). Depending on the experimental paradigm, these studies report increased activity in some brain regions and decreased activity in other regions. While these findings may be of interest to neuroscientists, for example because they shed light on the similarities in neural processing between music and language production, it is unclear how musicians might benefit from this knowledge.

3. The reason dancers (and musicians) get stuck when improvising is not much different from creative block in general. The difference is that a writer, composer, or choreographer can spend hours contemplating the next phrase. When improvising, one does not have this luxury: one has to decide in real time what one is going to do next. And whereas a writer or a composer can review what he or she has done and even gain a helicopter view of the entire project, when improvising one has to rely on one's memory, which is both limited and faulty.
4. And find funding, of course.
5. The term 'motor primitive' suggests that it is the most basic unit of movement, which is why I prefer the term 'motor schema'.
6. Throughout this chapter I have silently assumed that we are moving in an empty studio or on an empty stage. In parkour, which can also be considered a form of dance improvisation, the entire city becomes a stage.

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