Digital dance: (dis)entangling human and technology

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4.0 Introduction

In the previous chapter I have shown a persistent human-centeredness and theoretical simplifications in the literature of digital dance that results in a constant refrain in theory to apply the notion of performance to technology. As a result, conceptual approaches to digital dance in the existing discourse seem extremely limited in their capacity to take an account of the actual role of technology as a performing element alongside the human dancer. This chapter aims to fill the gap on technological performance by drawing upon work that offers an alternative analytical approach to the dominant phenomenological tradition, and which are extremely useful to evaluate the role and contribution of technology to staged digital dance. What seems also required is a framework that is able to bracket the persistently human-centered investments of dancer-theorists writing in this field. I argue that despite the fact that most scholarly work of digital dance have perpetuated this investment in phenomenology in order to often (not always) simplify and reduce complexity, tension and difference in the relationship between dancing bodies and technological components, this need not be the case. If we can see such acts of incorporation, projection, and celebrative human-centeredness as signs of digital dance’s challenge to dance conventions, it is also possible to theorize from other view points. If we do not take the human body as the starting point or centrally installed “value” of digital dance we open up the possibility of acknowledging the technology and its aesthetic effects as a performing element. It is for this reason that I am cultivating in this chapter theoretical tools from outside of dance research - in order to develop an analytical framework that can account for the actions of the technology as performance.

Jon McKenzie is one theorist already doing this. McKenzie’s reading of performance in *Perform or Else. From Discipline to Performance* (2001) stands out in the discourse of performance studies in its efforts to provide a productive model for the evaluation of the actions executed by non-human interactive systems that make up contemporary choreographed works.¹ The starting point of *Perform or Else* is McKenzie’s highly productive re-framing of the concept of performance itself in a much more comparative view beyond the arts; “performance” as a term in fact refers to many different things within many different contexts. For McKenzie, performance emerges as a key term of research in the contemporary period across three quite different and specific domains: performance studies, performance management, and techno-performance research (for

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the latter, he gives the examples of rocket science, computer science). By posing the question of what the meaning of performance infers or achieves across contexts, and how it operates within each domain, McKenzie concludes that each field has developed a particular definition and “evaluative” criteria of performance. This emphasis on evaluation within the very definition of performance - wherever the concept appears - is actually quite important to register, and a key insight that grounds the work of this chapter: evaluation is inherent to (technological) performance. Furthermore, because the meaning and the evaluative criteria of performance differ greatly within each field, McKenzie considers each field as a different paradigm of performance, each tied to quite different concepts of value.² Performance studies uses the notion of performance to study “cultural performance,” that is, the symbolic structures of human bodies, activities, and behavior within embodied practices as well as the transformation of these structures through discourses and practices of resistance and mutation. Performance management uses the notion of performance to study “organizational performance”, incorporating strategies that aim to maximize the organization’s output while minimizing its input. Finally, “techno-performance” research utilizes concepts of performance that attend to the behaviors and properties that technologies demonstrate during the execution of a given task in a specific context. For the purposes of this chapter, it is useful to spend some time with this third trajectory of technological performance and its methods. To consider technological performance through this framing allows for the injection of productively counter-intuitive, technologically attuned thinking in to digital dance’s theory.

In McKenzie’s outline, the evaluation of technological performance takes place via a two-step process, which requires examining the quantitative (measurable) and qualitative (having perceivable impact within a certain context) dimensions of technological performance. These two criteria are related on a continuum, because the operation of the technical aspects of technological performance has an influence on outcomes at the qualitative level or dimension. Interestingly, McKenzie points out that the criteria used to evaluate technological performance within the domain of techno-performance research are not fixed. There is no “set” of criteria to refer to theoretically, in advance of specific studies. Rather, criteria need to be re-designed on the basis of the conditions of the context at stake. Hence, the evaluation of technological performance depends on how effectively a technology carries out its given task within a given context.

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² McKenzie, 2001: p.53
With this flexibility to re-arrange the evaluative criteria of technological performance according to different contexts comes the possibility of applying the concept - as understood in techno-performance research - to the domain of staged digital dance. I suggest with the work of this chapter that it is possible to create a certain framework of performance evaluation, based on the quantitative and qualitative dimension of technological performance, according to criteria that suit the art form. In this respect, the translation of technological performance to the domain of digital dance seems to offer a beneficial framework to explain the role of technology as a performing element and to help further destabilize the hierarchy of perceptual importance. Such a framework therefore also makes it possible to fill the gap where existing studies on digital dance fall short, offering an innovative perspective to explain the actions of technology as performance. Compared to the phenomenological investment in technology as prosthesis, techno performance theory conceptualizes technological performativity in the interactive system's responsive creation of projected visual images, which are productive part of the choreography itself. This means that the choreography goes beyond being limited to just human physical movements, and includes the movements and impacts of the projected images provided by the interactive system, upon the choreography. I go in to more detail about this relationship in the next chapter. This chapter deals with this new emergent recognition of technological components.

Section 4.1 offers a detailed description of technological performance and its evaluation within techno-performance research as presented by McKenzie. Section 4.2 translates the theory and understanding of technological performance within techno-performance research to the context of digital dance. By doing so, this section creates a possible theoretical framework tailored to the evaluation of technological performance in staged digital dance. To ensure its suitability, I use this developed theory of technological performance in a close reading of the case study Glow in two parts in section 4.3. The first part elaborates on the quantitative dimension of technological performance, focusing in particular on the operations of the interactive software in Glow. The second part evaluates technological performance from a qualitative dimension, which takes the projected visual images created by the system as its starting point. Section 4.4 discusses the added value of the created framework of technological performance for the domain of digital dance.
4.1 From quantity to quality: The effectiveness of technological performance

To consider the concept of performance in the field of techno-performance research, McKenzie argues, is to recognize a paradox. On the one hand, it seems that definitions and meanings of performance show the most changeability within this domain. On the other hand, despite numerous utilizations of the concept, any explicit definition of technological performance is lacking within this field. In order to demonstrate this paradox, McKenzie gives a close reading of sections from an article about the “beauty” of the “performance” of water-soluble polymers, published by the American Chemical Society.³ He first pinpoints the various uses of performance to refer to different things in this text, such as: ‘performance of polymeric flocculent in wastewater systems’, ‘performance of primary clarifier’ and ‘secondary sedimentation basin performance’.⁴ Next, he shows that, despite the various applications of the concept or notion of performance, the meaning of performance remains undefined throughout the entire article. This leads him to ask, “What is meant by technological performance in techno-performance research, and why is it so rarely defined?”⁵ By examining numerous other examples regarding the various applications of performance as a term, McKenzie concludes that perhaps the definition of performance in techno-performance research has no underlying meaning unless it is used in a very specific context, such as in the example of the performance of polymeric flocculent in wastewater systems.

McKenzie finds further support for these observations, regarding the non-fixity of the meaning of performance, in the work of two computer science researchers, Borovits and Neumann. These authors claim that, in computer sciences, performance “has no existence per se.”⁶ Similarly to McKenzie, they stress the importance of the context for the understanding and attribution of meaning to concepts of technological performance. They too emphasize that the definition of performance “must refer to a specific application. (…) Computer performance cannot be discussed but in the context of a defined application or


⁶ Borovits and Neumann quoted in McKenzie, 2001: p. 97
group of applications." In addition, these authors conclude that although technological performance is closely associated with quantitative aspects of technology such as, ‘efficiency,’ ‘capacity,’ or ‘volume of a system,’ within computer studies, what is meant by technological performance is the computer’s “effectiveness in a given task.” This opens technological performance up to qualitative as well as quantitative analysis.

But what does this “effectiveness” of technological performance refer to exactly? And according to which criteria should technological performance be evaluated? McKenzie explains that in techno-performance research, the effectiveness of technological performance refers to the evaluation of two dimensions. The first is the quantitative dimension, which is evaluated during a particular phase called ‘performance measurement’. The second is the qualitative dimension, which is assessed during a phase called ‘performance analysis’. In performance measurement, engineers begin with a certain hypothesis on the basis of which they set up the quantifiable capacities of a technology, such as the speed at which a computer calculates data. The results of this type of measurement are those commonly found in owner’s manuals of consumer items. In this respect, performance measurement can perhaps be considered as the measurement of technical features or capacities that lie ‘within’ the machine. Next, the engineers’ specific hypothesis is tested in the lab during a developmental stage. At this stage, it is possible to adjust, develop, and reprogram certain aspects of the technology that do not seem to offer up its maximum efficiency. Finally, following on from these first two stages in the process of measuring a technology’s performance, the technology is then assessed in an artificial surrounding, such as the lab, where testing is carried out in a ‘real field’ most like the environment and set of tasks for which the technology is designed to perform.

McKenzie explains that the evaluation of technological performance in the real field marks a shift to performance analysis. Performance analysis differs from performance measurement in one aspect: “while performance measurement determines whether a technology is currently performing to criteria, performance evaluation interprets this measurement within a wider context of interests and actions.”

Recognizing that the production, distribution, and consumption of technology entails socio-cultural, financial,
and political interests, the evaluation of technological performance cannot be determined based on its quantitative features alone. Rather, in performance analysis, technological performance is evaluated on the basis of qualitative factors, which includes “determining whether the infrastructure is meeting the community’s objectives.”  

This does not imply that the quantitative dimension is irrelevant for the analysis of technological performance. On the contrary, the two dimensions are wholly linked; the quantitative (measurable) dimension of technological performance is what makes the qualitative (perceivable/broader interpretable) dimension possible.  

From this we can recognize that in the field of techno-performance research, the assessment of the effectiveness of technological performance implies a shift from quantity to quality. In terms of its effectiveness the performance of a technology, when taken as the sum of quantitative and qualitative conditions, is not a pre-given feature that lies ‘in’ the machine. Rather, technological performance is evaluated on the basis of what a particular technology does (quantitative dimension) within the conditions of a certain context in which technology operates (qualitative dimension). In turn, the actions of technology—when assessed as successful according to the criteria of a certain context—are perceived as effective. Compared to the phenomenological perspective on technology as a prosthesis for the expansion of the human body in to external spaces, this approach to techno-performance allows us to focus on the performativity of technology; in digital dance, that the visual imagery provided by the technology becomes part of the choreography ‘proper’ and contributes to its development. This means that the understanding of choreography goes beyond being limited to just human physical movements, but also includes the organization of human and technological movements in energy, time, and space. I go in to more detail about the interrelationship between human and technological movements in chapter five where I will deal with the newly emerging recognition of the difference of digital dance from dance’s own art form conventions.  

Drawing from this argument, and the insights it generates, it is possible to propose that the establishment of a framework to evaluate technological performance must take the context in which a certain technology performs as its starting point. An especially illuminating (albeit seemingly lateral) comparison of the utilization of interactive technology

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12 However, the quantitative dimension of technological performance in most cases is not directly exposed to the perception of users. For example, when we work with a computer, we are not exposed to the technical operations that take place inside the computer. Rather, we perceive the operations of the computer through a certain interface.
within the context of home safety versus the use of the same technology in staged digital dance helps to underline the importance of contextual factors as far as the establishment of criteria for the assessment of technological performance is concerned.

Let us take a simple and fairly common application of an interactive system used for domestic safety purposes: motion-sensing lights that operate with ultrasonic sound waves or infrared light. These kinds of indoor and outdoor motion-sensing lights are of course consumer products that are very easily and cheaply available on the market. And they are installed inside and outside the house differently, for different purposes. In the situations where motion-sensing lights are placed inside a house, when a person walks into a dark room the light detects a change in movement and automatically turns on the light. The aim of this type of indoor motion-sensing lights is to prevent domestic accidents, which can be caused by one’s entry into a dark room. In terms of technicality, outdoor motion sensing lights operate in the same manner as indoor motion-sensing lights; however, they primarily function as a burglar alarm. The light—when it is triggered by the presence of a person—warns the property owner of an external presence within their territory. Hence, within the context of outdoor safety, the meaning of the light provided by the interactive system designates potential danger within the surroundings of one’s house. In other words, it makes a difference to our sense of this technological performance whether it is staged inside or outside the house. This difference effects our sense of the effect of the technology’s performance, even if the light itself is exactly the same, with the same quantitative technological capacities, such as luminance and reactivity.

Of course the qualitative experience in digital dance – the coming together of bodies and interactive systems- is of a different kind again to these two technological “performances” in the context of house safety. But what can we learn from the comparison? In the examples of staged digital dance examined in this thesis, most often, the choreography integrates interactive technology with the aim to portray a quite similar sense of a responsive exchange between the physical movements of the dancer and the activity of the interactive system. What is often framed as this “duet”, I argue, is based on the making visible of a parallel, or differentiating correlation, between human and technological performance, based on certain guiding principles of dance composition, such as energy, time, and space. Looking back to the different instances of the meaning and perception of an accident (or accident avoidance) inside the home, and the perception of a burglary (or the avoidance of break-ins) outside the home, we can also understand that

13 For instance motion-sensing lights can be purchased at Amazon.com. See: http://www.amazon.com/Sylvania-72178-Activated-Battery-Powered/dp/B001LJNS8U
the technological performance in both instances - the effectiveness of the technology that is at stake - is actually in both instances to do with timely and appropriate degrees of illumination. Timely illumination/reaction in the form of light becomes the (quite simple) evaluative criteria of technological performances in these inartistic performances of interactive technology. But the meaning and qualitative experience of the interactive technology within other contexts might be capable of being something quite different. In digital dance, for technological performance to be effectively in line with what is qualitatively intended by the choreographer (and media designer), signs and images created by the interactive system and the capacity of that system for instantaneous illumination will be a point of question, explored in the creation phase of the work. Once we transfer the same motion-tracking interactive system to digital dance, the instantaneity and luminance is still relevant – but the aesthetics can become much more complicated and sophisticated through experimentation precisely because of the qualitative dimensions of quantifiable capacities. In this sense, there is a blur: basic quantifiable attributes of the technology turn into qualitative visual aesthetics. In other words, what are considered impactful or effective or affecting correlations and correspondences between the technology and the physical movements of a human performer are actually cultivated from capacities that are inherent to or inbuilt within the quantitative dimension of the technology.

Of course, further complicating matters, the qualitative experience of technological performance is negotiated at two different moments or levels for staged digital dance, in the sense that both the creative team (choreographer and media designer) and then later the audience, will each be invested in evaluating the technological performance. Regardless of this doubling, what we can say at this point is that the evaluation of the effectiveness of technological performance in staged digital dance requires finding and cultivating appropriate and explicit, context-specific evaluative criteria. By context, I mean that of the individual dance work, both within and outside of its choreographed components (everything that gives a dance meaning - which includes what is on stage, but also historical references, performance traditions, frames, and so on). In relation to staged digital dance, taking the inter-related artistic aims of the examined case studies into account establishes a good starting point for the evaluation of technological performance, from its quantitative to its qualitative dimensions. The following section translates the quantitative and qualitative dimensions of technological performance as understood in techno-performance research to the domain of staged digital dance in order to create a framework to analyze technological performance within this artistic practice. To remind ourselves, the quantitative and qualitative dimension of technological performance quite
often overlap. Nevertheless, a distinction between the two dimensions is useful for the sake of analysis and in clarifying how technological performance differs at the technical and perceptual level of staged digital dance choreographies.
4.2 Establishing evaluative criteria of technological performance for digital dance

The common artistic inquiry of the digital dance practices examined in this thesis is most often described as the staging of a relationship between the human body and technology in the form of a partner-work and to portray technology in the role of dance partner. My entire thesis in fact unpacks what this notion of “partnership” actually implies, symptomatizes, and tries to come to terms with. I suggest that it is useful to see these digital dance practices as capturing a moment in dance when the (dominant) phenomenological tradition of dance theory and practice is coming to terms with thinking through to its own technological outside, at least in this very specific strand or trend of digital dance works that stage a human-technology duet. Looking back to the case study that I first introduced in the introduction, Glow, you will recall is described as a “spectacular 27-minute duet for body and technology, an essay on the relationship of dance and cutting-edge software technology.”\footnote{http://www.frieder-weiss.de/works/all/Glow.php Accessed on 12.01.2010} The website of Apparition refers to the aim of this specific art work as the creation of a type of choreography in which “your partner is software, (…) when virtual and real images share the same space, (…) [and] when everything moving on stage is independent and interactive at the same time.”\footnote{http://www.exile.at/Apparition/ Accessed on 10.08.2010} Troika Ranch’s website transubstantiates the emphasis on technology in a phenomenological way, when describing 16 [R]evolutions as the portrayal of a struggle between our animal and intellectual selves.\footnote{http://www.troikaranch.org/vid-16rev.html. Accessed on 22.10.2022} “Intellectual”, here I suggest could be considered to refer to the rationalizing impetus of the technological. Accordingly, the scenes that address the struggle with our intellectual selves are portrayed via the responses of the interactive system to the movements of the human dancers. Or in other words, these scenes stage a correspondence between the physical dancers and the output of the technology (perceived in the form of projected images) in terms of a partner-work.

In dance, ‘duet’, partner-work, or partnering\footnote{Duet, partner-work, and partnering are terms that are used interchangeably within the context of dance; they refer to a certain relationship between at least two dancers, which often includes shared energy, time, and space.} is a general term used to describe the assistance and support (usually) given to one dancer by another. It should be noted that
“duet” most often involves physical contact between the dancer but it may also be non-physical. \(^{18}\) A detailed account of partner-work can be found in the work of Robert Greskovic, who describes partner-work in dance as an organic and smooth interaction between two different bodies. Partnering, according to Greskovic, requires “double work” because it necessitates training the coordination of one dancer with another through various means of support and manipulation that are quite besides training the coordination of one’s own body.\(^{19}\) Hence, the staging of a duet between two human performers entails specific additional skills from the human performers and the presentation of these skills themselves, which are non-reducible to the perception of the audience, through the choreography itself. This comprehension of partnerwork is in staged digital dance able to be transposed on to the human-interactive system relation. Staged digital dance implies making visible the “partner-work” (non-anthropomorphically speaking) between the actions taken by the human (i.e., physical movements created by the performer) and technology (i.e., the movements, transactions, responses and output of the interactive system, which in these works take the form of projections on a screen) for the perception of the audience.

Furthermore, expanding our literacy for this dynamic, it is important to note that there are several types of partner-work in dance, which require different skills from the human performer. In classical ballet, partnering is mainly known as ‘pas-de-deux’. An example of skills required from this type of partner-work is for instance, the physical coordination of the female dancer for multiple pirouette turns and the coordination of the male dancer in supporting the female dancer during the demonstration of the pirouettes. In postmodern dance technique, partnering is often associated with contact improvisation. In contrast to the vertical and gravity-defying positions in classical ballet, partner-work in modern dance can be characterized by techniques of support within a horizontal axis, that is, movements that are not vertical and take place close to the ground or on the ground. Support can also take place during ‘off-center’ movements, meaning movements that require letting go of one’s center of balance, such as falling and catching. In modern dance, partner-work can take place between two dancers of the same gender. Most importantly, in modern dance, a strict distinction between the supporting dancer (male) and

\(^{18}\) It should be noted that this is a rather narrow definition of duet and partnerwork that is serving the purpose in this chapter of showing how Glow's choreography makes visible the relationship between dancer and the visual images created by the technology, thereby challenging the hierarchy of perceptual importance. Much more elaborate attention to duet and partner work can be found in Blom, Lynn Ann and Chaplin, L. Tarin The Intimate Act of Choreography (1982), however such attention is beyond the concerns of this thesis.

the supported dancer (female) disappears: a performative engagement occurs between both dancers, which decrease clear distinctions of supporting/supported roles. Both dancers are expected to give and take support in various ways and in various moments, which result in a dialogue onstage. I locate the engagement in the duet between human and technology in staged digital dance within the latter example, that is, as a continuous shift of roles of leading and following between two performatively engaged entities.

Despite the differences in the skills and the created artistic effects, all of these different partnering techniques share criteria for the determination of what counts as successful partner-work. According to Tobi Tobias, in ballet “what characterizes a successful partnership is perhaps what marks any fortunate partnership: mutual sympathy and a good sense of timing.” The website of Contact Quarterly describes the two most important conditions to achieve a smooth partnering in modern dance as trust and communication between partners and shared timing and dynamics between them. Since physical bodies are positioned in space, to be able to dance, spatial navigation is also a necessary skill and artistic element. Following the logic of the definitions above, the composition of a duet between two physical dancers can be described as the specific organization of energy, time, and space in a parallel, or reciprocal relationship. Partner-work thus implies the portrayal of a correlation between the movements of two (or more) dancers in terms of shared energy, timing, and space. Indeed, in A Primer for Choreographers: An Introduction to Modern Dance Composition (1967, 1974), choreographer and scholar Lois Elfeldt describes energy, time, and space as the three major elements with which a choreographer engages during the composition of the


22 It should be noted that the definition of choreography as the organization of human movement in energy, time, and space has been challenged within the field of dance. I have explained this in footnote 25 in chapter one.
choreography. Stating that “the very word ‘dance’ denotes motion”, Ellfeldt explains that like other movements, dance— whatever purpose it fulfills— exists simultaneously in time and space and it involves the use of energy.

Ellfeldt breaks down the composition of movement in to three different categories, which she labels: intensity (gradations in the execution of movement), accent (movements that require greater or lesser force), and quality (the way the energy is used, i.e., swinging, percussive, sustained, vibratory, suspension) of movement. According to Ellfeldt, different energy categories arouse different feelings in the dancer and in the spectator. Ellfeldt describes the use of space within the choreography in terms of the potential of dimension (the size of the dancer’s movements) and potential of position (level and direction of movement) of movement. Moreover, the dancer’s actions affect the space, either visually (i.e., the body’s position and movement in space can create lines or circles for the perception of the audience) or connotationally (i.e., if the dancer’s body is in a curve, then, the dancer creates a hollow space in front of the body). In the same way, the dancer’s movements in time create tempo (speed of movement) and rhythm (the pattern of regular or irregular pulses, measured as movement in time).

Ellfeldt’s guide to choreographic composition addresses choreographers working with human performers. But what happens when technology replaces one of the two physical dancers in this concept of the duet, such as in the staged digital dance works at issue in this thesis? How can we translate a physical duet into a duet between physical

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23 It should be noted that there are more recent, elaborate studies on dance analysis than Ellfeldt’s that address dance composition within modern and postmodern dance such as, Blom, Lynn Ann and Chaplin, L. Tarin. The Intimate Act of Choreography University of Pittsburgh Press, 1982 and Smith-Autard, Jacqueline. Dance Composition. A practical guide to creative success in dance making. 5th ed. London: A&C Black publishers, 2004. Moreover, Ellfeldt’s companion of dance composition resembles Laban Movement Analysis, which is a language for interpreting, describing, visualizing and notating all ways of human movement, developed by Rudolf von Laban at the beginning of the 20th century. At present, Labanotation is a standardized system for analyzing and notating human motion. Yet, for the purposes of this chapter, Ellfeldt’s study of dance composition via the components of energy, time, and space form sufficiently does the work of showing the destabilization of a hierarchy of perceptual importance via correlations between the movements of the human dancer and the visual images created by technical system in these terms (energy, space, and time).

24 Ellfeldt, Lois. A Primer for Choreographers: an Introduction to Modern Dance Composition. London: Dance Books Ltd, 1974: p. 2. It should be noted that here, I chose to concentrate on the correlation between the movements of the human dancer and the output of the technological system in terms of the deconstruction of a hierarchy of perceptual importance, which shifts the focus from close readings and analysis of the work’s execution. In future work where I will transform parts of this thesis into publications, I intend to deepen the analysis of the case studies by means of engaging closer with elements of dance composition.

25 Ellfeldt rightly notes that the exact meanings associated with change in movement intensity are impossible to identify.

26 Ellfeldt, 1974: pp. 8-9
and non-human, virtual movements in terms of energy, time, and space? And how can the correlation between the movements of the human performer and the responsive, aesthetic effects created by the technology be evaluated more critically, and explicitly, in terms of the quantitative and qualitative dimension of technological performance?

Concerning the quantitative level of technological performance, I suggest that it is possible first to locate the correlation between technological and human performance in the translation of external physical stimuli into quantifiable numerical data primarily by means of the interactive software. During this translation, the software establishes specific correlations between the physical input and digital output. Hence, on a quantitative level, technological performance requires an examination of the operations of the interactive software, even if the software cannot function without the rest of the interactive system. In other words, from a quantitative aspect, technological performance asks us to come to terms with how interactive technology works on the level of the design of the interactive software, made possible through its interface.

As I have observed in previous chapters, this evaluation of the quantitative dimension of technological performance has not yet been “staged” in studies on digital dance. In chapter two, I argued that an understanding of quantitative performance is necessary for the choreographer and the dancer because they need to understand the logic and operation of the interactive system to be able to perform as effectively as possible within the choreography. They rely in fact primarily upon a new figure, the media designer, who takes on much of the responsibility for this quantitative aspect of technological performance. While it is the media designer who has the most knowledge on the interactive software and it is s/he who designs it, quantitative performance managed by the labor, perspective, and unique knowledge of the media designer always feeds back, in a translated loop, to be incorporated in to the perspective of the choreographer and also the dancer. During the exhibition of the choreography to the audience, only the media designer has access to the quantitative performance of technology; they keep the technical performance of the interactive software in check and inspect whether it operates according to plan. At the same time the impact and achievements of this quantitative performance work has strong correlations to qualitative intentions and effects.

Again we deal with a doubling, or even tripling of the question of evaluation here, in the qualitative comprehension of technological performance, when we consider that the audience neither has access to the interactive software nor is exposed to its technical quantitative operations. The exclusion of the audience from the operations of the quantitative features of the interactive system has drawn the attention of Scott deLahunta,
writer and researcher in the field of digital dance. In year 2000, DeLahunta was wondering whether the calculative dimension of technology should be made “visible” to the audience as part of the aesthetics of the choreography. For instance, this could be done by projecting the contents of the actual technical interface (seen by the media designer) onstage, instead of or alongside abstract and figurative “aesthetic” visual imagery generated through its workings. However, such an approach has not yet been taken by a choreographer to the knowledge of this researcher. Transparent exhibitions of the technical performance of technology do not seem to be a desired aesthetic choice of the choreographers working in digital dance. Moreover, most audience members do not have (equal amount of) such specific technical knowledge of motion-tracking based interactive systems to understand how exactly each different interface of this kind is being modified and aesthetically adapted in and for staged digital dance works before their eyes. Therefore, it is doubtful whether the audience would appreciate the aesthetics of the quantitative dimension of the interactive software as seen on the interface of the software.

Nevertheless, in terms of analysis, it is necessary to develop methods to examine the quantitative dimension as an essential component of technological performance as I have defined this. This is because, as I have explained, the quantitative dimension contributes significantly to the shaping of the qualitative dimension of technological performance both within the domain of techno-performance research, and at the moment of the qualitative reception of “live” works. Acknowledging this to some extent, authors writing about digital dance in the field have produced much work outlining the importance of the technical developments of interactive software for the creation of a “mutual dialogue between dancer and technology.” I differently interpret and reframe this emphasis on motion-tracking based human-computer “dialogue” in this chapter mostly to come to terms with what are in fact quite complex relationships between the quantitative (technical) and qualitative (perceptual) aspect of technological performance.

Dixon (2007), for example, claims that the advanced and sophisticated media hardware and software now available and exploited within digital dance performances has dramatically shifted the perception of digital dance. As I have detailed in the previous


chapter, according to Dixon, in the early years of digital dance practice (by which he means the beginning of the 1990s), the communication between human performer and technology was rather ‘rough’, because the technology then used did not have the capacity to enable a fluid conversation.\footnote{Sarah Rubidge makes a similar claim in the article ‘Action, Reaction, Interaction’ (2001), which I have explained in the previous chapter.} For Dixon, in those early experiments in digital dance, the dialogue between performer and technology resembled a conversation between two people who could understand each other’s language to some extent, but were forced to artificially slow down to compensate for gaps in understanding. Over the years, however, in his words, “a genuinely sensitive and sophisticated interactive paradigm has gradually replaced a previously rough and reactive one.”\footnote{Dixon, 2007: p. 205} I take from Dixon a sense that the quantitative dimension shapes the qualitative dimension of technological performance to a degree that has not been well theorized or understood inside of dance theory itself.

So what would an analysis of the qualitative dimension of technological performance imply within the context of staged digital dance? I suggest that on a qualitative level, technological performances compel us to analyze the correlation between the processes and outputs of the interactive system, and the physical movements of the human performer at a qualitative level that is informed by and non-bracketable from the quantitative, all of this coalescing at the level of audience perception. I also approach the qualitative dimension of technological performance (especially including the aesthetics of the projected images of the staged digital dance works covered here) as part of an ‘aesthetic of correlation’, that is being staged in staged digital dance, through two choreographic strategies in particular.

As I have already stressed, evaluation of the qualitative dimension of technological performance takes place at two different moments in the context of staged digital dance. During the creation of the choreography it is primarily the choreographer, media designer, and to a lesser degree the dancer who decide upon the aesthetics of correlation between the human and technological performance. During the reception the evaluation of the effectiveness of technological performance is made by the audience, a somewhat more informed version of the judgments of which I have drawn from the perspective of dance reviewers in this thesis. In conclusion, it is possible to translate the quantitative and qualitative dimension of technological performance as understood within the domain of techno-performance research to staged digital dance, in order to create a framework for
the analysis of technological performance inside of dance theory. In the following section, I develop this framework in detail and go on to apply it to an evaluation of the quantitative and qualitative dimensions of technological performance in *Glow.*
4.3 Analyzing technological performance in digital dance

A. Quantification of technological performance

Quantified aspects of technological performance occur in the behavior and functioning of the interactive software, which translates the qualitative movements of the dancer into quantifiable data. Robb Lovell, software designer working in the field of digital dance, explains the translation of qualitative input to quantitative output via an eight-step process. These eight steps are: action, sensing, processing, translation, control, generation, manipulation, and rendering, which together capture the process by which the software establishes a correlation between input and output. The parameters that guide the correlation between input and output are designed via the interface of the interactive software. In computer science parameter refers to “a reference or value that is passed to a function, procedure, subroutine, command, or program.” Parameters consist of values that can be programmed in different ways within the possibilities of the software. They determine the behavior of the output, such as the size of a pattern, the shade of a color, and the speed with which projected images move.

Quite a number of different interactive software programs are being used in the making of digital dance. Custom-designed applications include Isadora (designed by Mark Coniglio) and Eyecon (designed by Frieder Weiss), which stand alongside existing software programs not originally designed for dance-related purposes, such as Max/MSP. Because Eyecon and Isadora have been utilized in the case studies examined in this thesis and have been uniquely designed for staged digital dance, I elaborate in this section on how these two interactive software packages in particular actually work. Both software programs establish a correlation between body and technology by means of different


32 Lovell explains that in certain cases some of the eight steps can be left out for the execution of a certain operation.


34 As a matter of fact, in Glow, Weiss used the interactive software Kalypso, which is a version of Eyecon

35 Isadora is a commercial product designed by Mark Coniglio, which can be purchased at the website of Troika Ranch.
interfaces. The implied user of such software are most often media designers working in the field of dance, music, or animation, visual art, vj’ing, and theatre.

Eyecon is primarily used to facilitate the creation of interactive performances and installations in which the motion of human bodies triggers or controls various other media, such as music, sounds, photos, films, and lighting. It operates on the basis of a video feed from the performance or installation area. The rendering of the video signal by the computer results in an image in the main window of the program. From this point on, it is possible to draw ‘lines,’ ‘fields’ or other elements over the video picture. In this way, Eyecon can turn any qualitative input into quantifiable measures and outputs. As designer and media artist Weiss explains:

If you have drawn a field, Eyecon can measure the amount of motion that occurs within it. Additional features let you track the position of persons within the performance area, measure their height, width, overall size or the degree of left-right symmetry in their shape.

Figure 4.1 (see below) is an example of an open window, showing Eyecon in action. This window shows how the programming of the interactive software establishes correlations between the input, such as physical movements of various kinds and qualities, and the output, for example, of visual imagery or sounds, of various patterns and speed.

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37 [http://frieder-weiss.de/eyecon/index.html](http://frieder-weiss.de/eyecon/index.html), Accessed on 14-12-2010

38 [http://frieder-weiss.de/eyecon/index.html](http://frieder-weiss.de/eyecon/index.html), Accessed on 14-12-2010
At the same time, this illustration points to a significant difference between what is perceived by the audience (which includes both the physical movements of the dancer and the outputted visual imagery of different kinds projected mainly on a screen) and the performance of the parameters on the computer screen manipulated and observed by the media designer. During *Glow*, it is of course only the media designer (Weiss) that has view of this technical window into the interactive system, on his computer.

Isadora operates similarly to Eyecon. It utilizes a graphic programming language that “provides interactive control over digital media, with special emphasis on the real-time manipulation of digital video.” Isadora gathers movement information from various sensory devices, and uses that information to control and manipulate digital video, music

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synthesizers, sound modulation devices, and theatrical lighting.\textsuperscript{40} Hence, during the performance, Isadora functions as “the engine that drives the visual manipulation components” of the art works by means of:

(...)graphically represented building blocks, each of which performs a specific function (such as: playing or manipulating digital video, capturing live video, controlling a DV camera, etc.), the modules allow information to travel from one source to another inside the computer, and from the computer to outside interfaces.\textsuperscript{41}

The developer’s commercial website that advertises Isadora’s suitability for artistic work places limited emphasis on aesthetic effect and instead upon the fact that Isadora is easy to use, powerful, flexible, and reliable, emphasizing the importance - among artistic consumers of the system - of the quantitative dimension in shaping the qualitative aspects of technological performance. The software offers “over one hundred building blocks that can be connected in an almost unlimited number of ways,” allowing the artist “to tailor how the media is presented or manipulated to (...) specific needs.”\textsuperscript{42} In turn, such a range and degree of artistic options in the relation between inputs and outputs allows expanded possibilities for integrating technology in to the artwork.

The interface of an Isadora file has three main areas: the Toolbox located on the left, the Scene List located on the bottom, and the Scene Editor which fills the remainder of the window.\textsuperscript{43} Figure 4.2 illustrates a screen capture of the start screen for Isadora:

\textsuperscript{40} http://www.troikatronix.com/isadora.html, Accessed on 14.12.2010
In addition to its easy-to-use interface, Farley (2002) describes that Isadora offers the following features:
Live Video Input: to mix or manipulate live video with your prerecorded digital video.
Snapshot Feature: to create, store and instantly recall the settings within a scene.
Record Output: to record Isadora's output to QuickTime movie.
Sound Input: to modulate sound volume.
DV Camera Transport Control: to instruct up to 8 cameras to play, stop, start, record.


It is important to emphasize that Isadora’s technical features are very complex and demand a much detailed elaboration than the one presented here. Due to the limited space and scope of this chapter, I have had to bracket this. I intend to more closely articulate links between the elaborated quantitative features of Isadora and the performances it creates in much more in detail in future work, including when I transform this PhD thesis into a publication. Meanwhile, the interested reader can visit Troikatronix’s website for a detailed account of Isadora’s technical fetaures in the Isadora 1.3. manual available on http://troikatronix.com/download/isadora-download/

What is interesting about this thesis, is the fact that many of the terms used in Isadora’s modules derive from the performing arts. The modules seen on the left part of the toolbox are ‘actors’. ‘Actors’ are the most basic building blocks in Isadora; each has a specific role, and they interact with one another through virtual connections, illustrated in figure 4.3. To be more precise, Isadora offers over seventy basic building blocks, some actors “perform simple functions like watching for a signal from a MidiDancer sensor, while others allow more complicated functions such as warping video imagery.”44 The organization of actors via virtual connections leads further to the creation of ‘patches.’ In Isadora, each scene contains its own patch. Figure 4.3 is an example of a patch with linked modules, consisting of the following (technological) ‘actors’ Media Player, Projector, Luminance Key, Feedbacker, and Control Watcher:

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The features of the correlation designed on an Isadora patch can be programmed in numerous ways, depending on the aesthetic choices of the artists. In digital dance, the correlation between physical and visual movements is to a great extent inspired or desired by the aesthetic choices of the choreographer, which are then developed and realized by the media designer or engineer. As I have explained earlier, this collaboration is quite a central and relatively new aspect of digital dance due to the fact that most choreographers have not been experts in media design and programming in their own right. Furthermore the combination of these roles involves a great amount of labor time spent in testing and cultivating configurations in which, most often, the media designer informs the choreographer on the technical and aesthetic possibilities of the software. It is possible to speculate that this collaboration between the choreographer and media designer can be thought of as a kind of back-end feature of the partner-work of staged digital dance, occurring instead in the earliest designing stage. Such dynamics only further reinforce the argument I am making about the dual character of the choreography in staged digital dance as a composite of human and technological performance.

Similar to the creation of a duet between two physical dancers, also in digital dance, most often, the choreographer is concerned with creating a relationship of a certain kind
between the human dancer and the technological ‘actors’ - in the case studies, these actors always include visual projections, extrapolated from the human actors and modulated by the interactive system. The choreographer (with the collaboration of the media designer/artist) needs to create three different kinds of movement for the establishment of the correlation between human dancer and technology, which includes the determination of the physical movements of the dancer, the virtual “movements” (correlations, and modulations) of the technology, and the relationship between these. For example, if the dancer goes left, should the visuals projected on the screen also move to the left, following the dancer or should they move in another direction? To the same degree, or in an amplified way? Or, if the dancer increases the speed of his or her movements, then, should the projected visuals also move faster, or should they move in the opposite direction of the dancer, or should they not react at all? By finding artistic answers to such questions, the choreographer together with the media designer and dancers search for the most effective integration of the visuals provided by the technology into the choreography, with the aim to portray the visual images created by technology as dance “partner” and to create a dialogue between human and technological performances. Let me describe an example in order to further clarify the difference in the quantitative and qualitative aspect of technological performance via Isadora.

Let us say that the aim of one particular scene of a digital dance choreography is to create a correlation between the dancer’s forward or backward movements in space and the degree of brightness of the stage lights. The aesthetic decision made is to portray an increase in the amount of light when the dancer moves to the front of the stage and a decrease in the amount of light when the dancer moves to the back of the stage. For this, the parameters of the actor, ‘Brightness’, are programmed accordingly, to move within a range of zero (total darkness) and one hundred (maximum light). Next, the actor ‘Eyesweb’ (the function which enables to track motion in real-time) is activated for the tracking of the motions of the dancer. In addition, the actors Projector, Brightness, and Eyesweb are connected on the patch of this particular Scene.

Once the correlation is designed on the Isadora patch, the process that takes place from this point in the realization of the performance occurs both on the quantitative level (visible to the media designer’s perspective) and qualitative levels (visible to the audience’s perspective). From the media designer’s perspective, Eyesweb detects a change in data as the dancer changes her location in space and it sends this information to Brightness. Brightness reacts by raising (or lowering) the value of its parameters. From the audience’s perspective, an increase in the brightness of the lights is perceived as the
dancer moves towards the front part of the stage. When the dancer moves backwards, the audience perceives a decrease in the degree of brightness of the light. In this way, the audience becomes acquainted with the logic of a correlation between the dancer’s change of spatiality and the aesthetic effects created by the technology. Hence, in terms of performance measurement, the quantitative performance of Isadora in this specific example is effective because its execution of certain calculative acts evolves according to the technical aspects of a larger choreographic plan. But we can also note that an aesthetic logic is also being cultivated through this efficacy.

As I have already outlined in chapter two, in digital dance, the choreographic aim is to achieve an artistic outcome that goes beyond attaining a quantitatively successful correlation between physical movement and interactive software. But how do we talk about this technical-aesthetic correlation between the input of the physical performer and the output of technology for the perception of the audience? And how are these works of staged digital dance judged according to the ability of the visuals provided by the interactive technology to capture technology as a non-human dance partner? In other words, how does the evaluation of technological performance shift from quantity to quality in digital dance? Although it plays an important role in the realization of the aesthetic in digital dance, the answers to such questions cannot be found through more refined approaches to quantitative performance alone. We need to look as well at how quantitative and qualitative dimensions of technological performance combine to qualitative effect. This entails analyzing the aesthetics of correlation within digital dances’ cultivated choreographic strategies.

B. Qualitative dimensions of technological performance

In digital dance, the exposure of the aesthetic of correlation entails the deployment of two different choreographic strategies, which involve what I term either ‘differential correlative operations’ or the ‘gradual amplifications of correlation’. The first strategy refers to the exploitation of the aesthetic of correlation by means of four operative modes. These modes derive from principles of dance composition earlier described and are labeled as: direction in space, synchronization of movement, change in movement size, and intensity of movement. The second strategy refers to the way in which the choreography gradually exposes the correlative relationship between human and technology, from more simple to more complex encounters.
In order to pinpoint the different modalities of the aesthetic of correlation, let us revisit the opening scene of *Glow*, described in the introduction of this thesis:

The performance begins with the appearance of three straight, short white lines projected on to the black dance floor. The lines move horizontally from the left to the right of the stage during which they extend in length. On the right of the stage the three white lines create a diagonal and disappear. [Fig. 4.4 and 4.5]

![Fig. 4.4 and 4.5 — Glow (2006)](image)

A moment later, a bright, white light takes over the entire stage space, illuminating it uniformly. The dancer appears on the left of the stage. She is sitting in a curled over position. Similar to the movement of the lines before her, she too walks horizontally from the left to the right of the dance floor while maintaining her curled over position. In the meantime, a white line traverses her body vertically and moves together with the dancer to the other side of the stage. During this passage, the line moves forward and back simultaneously with the dancer as she shifts her body weight forward and back. [Fig. 4.6 and 4.7]

![Fig. 4.6 and 4.7 — Glow (2006)](image)

Gradually, a second light appears onstage. This time the light forms a
silhouette around the dancer’s body and contracts and expands in line with the dancer’s movements. In addition, the silhouette intensifies its amount of light as the dancer intensifies the force of her movements, in particular the movements of her arms and legs by extending them upwards or sideward.

[Fig. 4.8 and 4.9]

In this scene, we can observe four modes of an aesthetic of correlation in operation. The first mode (direction in space) takes place between the movement of the line of light and the dancer’s walk across the stage. Here, the correlation is based on the change of the location of the dancer and the light’s movement along with her. The aesthetics in this section portray shared direction in space between the movements of the dancer and the visual movements of the technology. Moreover, this section illustrates a well-established synchronization of timing, the second mode of an aesthetic of correlation, between their movements. The precise synchronization of the movements of the technologically realized projection and the physical dancer eliminates the possibility of an external intervention (for example, by a lighting technician who might otherwise manually project light on the stage).

The third mode of correlation (change in movement size) occurs between the reduction and enlargement of the size of the light and the expansion and contraction of the movements of the dancer. Here, the correlation is based on changes in the size of the dancer’s body and the degree of the light’s luminance. In addition, this scene portrays an aesthetic correlation of intensity (which is the fourth mode), as the increase in the degree of light correlates with the dancer increasing the force of movement that she sets in motion. Here, the correlation is one of shared dynamics between the visuals provided by the interactive software and the physical movements of the dancer.

Taken as a staged performance, these shared aesthetic modes of correlation between physical dancer and projected visual images recall two physical dancers who
adjust their movement in terms of quality, timing, or direction in order to be able to dance together. In the analyzed scene the visual effects created by the interactive system are portrayed in a dynamic engagement with the human dancer on the basis of shared qualities of energy, time, and space. For example, the way the projected light changes in size and degree of illumination in accordance with the movements of the dancer is an illustration of this active and dynamic engagement. At the same time, as I have explained in chapter two, during the rehearsal, the dancer needed to adjust her movements according to the limitations and potentials of the interactive system. As explained in section 4.2, mutual assistance is (usually) a feature of partner-work in modern dance. If the support of one dancer given to another and vice versa is an aspect of partner-work, then, in Glow, technological elements appear to function as this dance partner.

In this respect, Glow destabilizes the generally accepted role of technology as merely supportive devices for the human performer within a hierarchy of perceptual importance. Whereas a staging based on a hierarchy of perceptual importance reduces the effects of technological performance to a minimum level, Glow maximizes such perceptual effects by laying bare the presence of the effects of technological performance to the audience as a continuous and apparently autonomous performing element onstage. The visual abstract images provided by the interactive system co-respond in various ways to the physical movements of the dancer in Glow, and are staged as a performing element that correlate with the human performer. As a result, Glow, in its dual attention to technological and human performance, counter-balances the commonly accepted peripheral status attributed to technologies in dance described in the first chapter.

In order to facilitate the audience’s appreciation - both technical and aesthetic - of the correlation between human and technology, in Glow the interaction between human and technological performance is exposed via several gradations to the audience, which constitutes the second choreographic strategy. These different phases, which expose the collaboration between human and technology, evolve from simple to more complex interactions. Put differently, Glow stages a gradual build-up of correlative exchange between human and technological movement, which starts with scenes that portray simple interactivity, moving on to scenes that show a higher degree of complexity in their aesthetics. Glow’s structure for example consists of four parts, which are organized so that the correlation between dancer and technology is slower and more clearly articulated in the first two parts, and more complex in the last two parts. The aim of the second choreographic strategy is to aid the comprehensibility of the real-time correlation between the human performer’s input and the technology’s activity and output for the audience.
Once set, the choreography complicates the established correlation according to the needs of its dramaturgy.

Saltz (2001) argues that the exposure of the adaptative processes between the human performer and technology (see chapter 2) is itself a general principle and the most important novelty of performances that incorporate interactive technologies. He describes this principle as a strategy that shapes the audience’s understanding of the correlation between human dancer and the output of the technology, and further reinforces my own argument that this correlation needs to be purposively staged in certain steps. Calling this staging principle the “paradox of the interactor”, Saltz explains that in theatre:

The more thoroughly the performer explores the technology, the more clearly the audience will recognize the ability of the environment to respond dynamically and spontaneously to the performer’s actions.46

In other words, the paradox of the interactor is a paradox because it shows in fact the activity of all of the elements that are not that actor’s “work” or doing. This pedagogical unfolding of digital interactive performance helps the audience to understand, follow, and appreciate the conventions and dynamics of the encounter between human and technology precisely as an encounter, one that has been rehearsed indeed but that is also before their eyes being experienced as cultivated. For Saltz, during this process the performer - their movements - especially takes on a certain pedagogic responsibility concerning the audience’s comprehension and appreciation of the principles of correlation between him or herself and the output of the interactive system. Saltz maintains that in such performance created with interactive technology:

The performer must teach the audience to understand the conventions that define the interactions by starting slowly with the simplest interactions (e.g., “the sound plays only while I am rocking this chair”) before moving on to more complex interactions.47

Frieder Weiss, media designer in Glow, refers to examples, which portray fairly obvious trigger-response connections, such as Saltz’s description of the interaction between the performer’s manipulation of the chair and the creation of sound, as tight connections. For Weiss, this staging of a “tight connection” between the input of the human performer and the output of the interactive system is necessary in order to make the audience understand the conventions of the interaction portrayed within the

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46 Saltz, 2001: p. 117

47 Saltz, 2001: p. 118
choreography. In his experience, “loose” (meaning less obvious, or less direct) correlations between the human performer and technology are most often not understood by the audience.\textsuperscript{48}

Interestingly, for his earlier works with choreographer Robert Wechsler (during 1995-2000), Weiss and Wechsler would actually demonstrate how the system works to the audience before the actual performance had commenced. They would literally go on stage and explain the audience the technical process that takes place, starting from the dancer’s physical movements and the images created by the interactive system. Weiss argues that this preparatory, didactic demonstration was necessary for those early emerging performances because the audience did not believe in the possibility of a wireless connection between dancer and technology and therefore they could not appreciate its conventions, meaning how the visual images provided by the interactive system are generated as a result of a certain technical relationship between human and the projected images. At present, Weiss no longer sees the necessity for pre-performance demonstrations. According to Weiss, audiences of digital dance now are fairly acquainted with interactive technologies and do not experience them as deceiving or confusing.\textsuperscript{49} Nevertheless, for Weiss, an element of adjustment, built in to the choreography itself, is still necessary as far as the audience’s perception of the interaction between human and technology within the choreography is concerned.

The logic of the paradox of the interactor can also be demonstrated also by close readings of \textit{Glow}. The contrast between \textit{Glow}’s first and last two parts reveals strategic developments and variations in the exposure of correlation. For example, the aesthetics deployed in the third scene presents a break in the established correlation of shared qualities and direction between the human dancer and technology, established previously in the opening scene of \textit{Glow}. This section introduces instead a correlation of non-simultaneity and oppositionality. The non-simultaneous aesthetics in the third section are illustrated through a multitude of dark, strangely formed patterns on the white dance floor, which appear as the dancer moves across the stage. In this particular scene, some of the dark patterns continue to move towards the dancer as she stands still. The movements of the dark patterns repeat the movements of the physical dancer, but with temporal delay. Now, when the dancer starts moving again, so do the remaining dark patterns, but in the opposite direction of the dancer. This means that if the dancer goes left, the patterns move

\textsuperscript{48} Notes made during lecture of Weiss at the Cinedans festival 2010, Amsterdam, 12.12.2010.

\textsuperscript{49} Notes made during lecture of Weiss at the Cinedans festival 2010, Amsterdam, 12.12.2010.
right and if the dancer moves forwards, the patterns moves backwards and so forth. [Fig. 4.10 and 4.11]

That Glow's aesthetics become more complex towards the end of the performance does not mean however that the communication established between dancer and the projected real-time visuals is less perceptible for the spectator. Because the first two scenes took time to establish a “tight” correlation (to use Weiss’s term) between human performer and technology, it is clear for the audience that the correlation between dancer and technology exists even in the non-simultaneous and oppositional correlations that are presented in, and transform, the last two parts of Glow. Hence, the implementation of the paradox of the interactor facilitates the audience’s understanding of complex, ongoing, cultivated relation of the performances of human and technology together.

In this way, staged digital dance offers a new understanding of the notion of partner-work in terms of this parallel performativity of human and technological elements in dance works that are no longer entirely human-centered. In staged digital dance, choreography (here, as a kind of “partner”-work that exists beyond the human) expands from the organization of a correlation of physical movements in energy, time, and space to the organization of a correlation of human and non-human movements in energy, time, and space. This leads to the perception of the sometimes confronting role of technology as a dance “partner”, and an understanding of the encounter between the human and the non-human as communication of some kind. From this perspective, the integration of interactive technology in Glow underlines the fact that the choreography is not simply a showcase for the demonstration of the quantitative capacities of the interactive system. Instead what is discovered is the productive technical-aesthetic tension of staged digital dance.
When such a communication of correlation is perceived as aesthetically affecting, both human and technological elements contribute to the development of Glow’s dramaturgy. For the choreographer Obarzanek, Glow’s dramaturgy enacts an encounter between a dancer and a digital world, or in other words, the virtual\(^{50}\), and it explores the “desire to discard or escape elements from within ourselves.”\(^{51}\) For him, Glow can be read as a visual metaphor that represents “our own constant struggle with our primitive state of duality.”\(^{52}\) In the words of Obarzanek, in Glow:

The performer appears to evolve from a huddled form into human shape, creating a world of astonishing shapes and colors around her, one, which eventually takes on a threatening life of its own. It’s an intense experience and, [dark as its theme appears to be], an exhilarating one.\(^{53}\)

Obarzanek describes his desire to present the encounter between the dancer and the digital world through the themes of ‘fusion’ and ‘separation.’ Fusion is explored in the first two parts of the performance:

As the work develops so does the initial responsive relationship of light and graphics to the moving body. At one point the dancer’s effect on a graphic pattern gives us the impression that all particles are related and that the body has merged into a single entity with the system.\(^{54}\)

‘Separation’ is staged in the last two parts of the performance. Obarzanek describes the dramaturgical ideas behind separation in this way:

Later, projected shadow figures expelled by the performer take on a dramatic form of their own and influence the behavior response of the dancer. Approaching a climactic end, there is an intense physical process that ultimately leads to the separation between the body of the performer and its projected image. The seamless joint venture forged in Glow between a moving body and tracking light and images ultimately reveals itself as flawed and in the end irreconcilable.\(^{55}\)

Obarzanek’s explanation of Glow’s dramaturgy aids an understanding of how and why the two choreographic strategies are utilized in Glow. The simultaneous correlation portrayed in the first two parts of the choreography facilitates the staging of a fusion between the dancer and the ‘digital world’. The exploitation of shared timing and dynamics

\(^{50}\) I have explained the notion of the virtual in the previous chapter.


of movement help establish a fluid engagement between physical and virtual movements. For example, the increase in the amount of light in relation to the increase of the dynamics of physical movement creates a harmonious connection between physical input and visual output. In turn, the exploration of separation in the later sections of the performance signals a change in the quality of the relationship established between dancer and technology, explained via the aesthetics of non-simultaneity and oppositionality.

_Glow_ brings together through both human and technological capacities to destabilize the hierarchy of perceptual importance, especially by showing that the physical and technological elements and movements are productively relational to each other. Staged digital dance generates this understanding that the movements of the inhuman elements and forms generated by technology are as important as the movements of the human dancer for the realization of _Glow_’s aesthetics. In turn, the collaboration between human and technological performances paves the way to the perception of an aesthetically impactful quantitative and qualitative tension perceived between the human and technology, staged in various ways throughout the progress of _Glow_’s dramaturgy. From this it is possible to conclude that key concepts of ‘technological performance’ adapted from the discipline of techno-performance research and especially from the work of McKenzie, can be applied to evaluate technological performance within the context of staged digital dance.
4.4 Discussion of the framework of technological performance

A major advantage of the application of technological performance as understood in the domain of techno-performance is that it helps to acknowledge the actions of the technology in the choreography of Glow as performance in its own right. Moreover, the framework of technological performance grants technology the capacity to be deemed a performing element, without anthropomorphizing the technology, which I explained to be a tendency in the literature of digital dance in the previous chapter. In this respect, the analysis of technological performance conducted in this chapter helps to enhance the main argument of this thesis by showing how staged digital dance challenges the hierarchy of perceptual importance in dance.

In addition, the framework of technological performance is particularly productive for working beyond or to the side of the phenomenological heritages of dance theory; technological performance does not take the human body as its starting point. As I have explained in chapter three, first generation digital dance scholars’ continued investment in humanist or human-centered dance conventions, their tendency to “incorporate” and absorb emerging technologies in to those durable conventions, and their major use of phenomenological theory which they considered most suited to this task of incorporation, has had the impact of largely neglecting and downplaying the role of technology in digital dance discourse. They (to a large degree) have not recognized or theorized the capacities of technological elements for performance. In light of this, the framework of technological performance created in this chapter contributes to existing studies on digital dance.

Finally, this analysis of technological performance - which recognizes the human and technological in a double or parallel view - raises interesting further questions about the nature and comparison of human and technological performance. Firstly, by granting technology the possibility to perform, it is also possible to demonstrate that the actions taken by technology have an impact on the progression of the choreography. This leads to the recognition that the actions executed by the technology may have a certain agential or generative power when it comes to the creation and realization of the choreography. Second, by showing that the actions of human and technology both contribute to the creation of the choreography, the analysis raises questions on whether the notion of skills
can be applied to technological performance within the staging of the partner-work in staged digital dance.

At the same time, the analysis demonstrates that the framework of technological performance is limited, in a similar but inverse way, to the human-centered model. Due to its exclusion of human performance, the established framework is insufficient to analyze the relationship between human and technological performance within the choreography. Such a framework cannot account for the dual character of staged digital dance as a composite or tension, with quantitative and qualitative dimensions, emerging from the relationship between human and technological performance.

Therefore it is important to build further upon this new contribution that I am making to dance studies by this transposed framework of technological performance. In the next chapter, to deal with the problem of reading human and technological performance together, in line with the relationality of staged digital dance, I propose to read the choreography in staged digital dance through the notion of interperformance. Interperformance is a useful way to examine staged digital dance as that which emerges from the engagements between the two ontologically different performing elements. Moreover, interperformance helps further deconstruct the hierarchical ordering between human and technology in dance by addressing abstracted similarities and differences between the capacities of human and technological performance, especially, as I consider, the notion of agency and skills.
4.5 Conclusion

This chapter has set out to develop a much-needed framework to account for the actions of technology incorporated in staged digital dance as a kind of performance. To do this, I have taken the understanding of performance within the domain of techno-performance research as a point of departure. Because the field of study of techno-performance research differs greatly from that of staged digital dance, I have productively adjusted the evaluative criteria associated with this concept to the context of staged digital dance, and applied the concept of technological performance that this makes possible to the case study of *Glow*.

The analysis conducted in this chapter demonstrated that the framework of technological performance is a productive way to understand the role of technology as a performing element and as dance “partner” in the choreography of the selected case study. The framework of technological performance also helped show how technology contributes to the creation of the choreography both from a technical (quantitative) and perceptual (qualitative) dimension. In this respect, an analysis of technological performance helps to unsettle the hierarchy of perceptual importance by portraying a change in the center-periphery ordering between human and technology within the choreography.

Nevertheless, the framework of technological performance remains insufficient to account for the choreography as an amalgam emerging from the relationship between human and technological performance in staged digital dance. For this reason, in the next chapter, I propose to approach staged digital dance through a specific notion, which I label as interperformance. Interperformance is a way to read choreography as that which emerges on the basis of the intersections of two different performance types within the context of staged digital dance. Moreover, interperformance addresses the issues of agency and skills, which presents new ways to destabilize the hierarchical ordering between human and technology.