

Introduction

Performance as practice, method, and worldview is becoming one of the major paradigms of the twenty-first century, not only in the arts but also the sciences. As euphoria for the simulated and the virtual that marked the end of the twentieth century subsides, suddenly everyone from new media artists to architects, physicists, ethnographers, archaeologists, and interaction designers are speaking of embodiment, situatedness, presence, and materiality. In short, everything has become performative.¹

Theater, dance, music, and—increasingly—the visual arts have long been occupied with the embodied, material characteristics of performance, while emerging forms like digital media have emphasized technology and tools as their holy grail of innovative creative expression. Obsessed in the 1990s by the ocular and the inscribed, the screen and data, now even the new media arts are discovering (or recovering) felt experience, situated context and polysensory affect that cannot simply be reduced to text, code, or photons aimlessly floating on the screen.²

This move seems like a logical step as the new media embrace the dynamic, *real-time* event that has always differentiated performative practices from the static objecthood of the visual arts. Yet with the spurt of work in areas such as laptop computer music, sensor-augmented dance, responsive architecture, video-saturated *mise-en-scène*, network-controlled robots, and performative urban spaces, it sounds like new technologies have suddenly created a horizon of aesthetic experiences with no previous historical precedent. Even a cursory glance at the technological history of performance on and off the stage, however, reveals a story strangely similar to our present one. From the transfer of electric light into the theater, the introduction of optical apparatuses like the video camera that shattered the purity of the live event or wraparound, transmutating image and sound environments, this story is populated with the same utopian hopes as that of our forebears, namely, that technological invention could be harnessed to create unparalleled aesthetic,

perceptual, and ontological experiences. What these histories so fundamentally reveal is that the performing arts are really an unstable mixture amalgamating light, space, sound, image, bodies, architecture, materials, machines, code, and a perceiving public into unique spatiotemporal events.

"Technology," writes performance studies scholar Barbara Kirschenblatt-Gimblett, "is integral to the history of performance" (2002, 48). Undeniably, we see this integration materialized in the endless metaphors used to describe the stage itself: mechanism, clockwork, construction, system, apparatus, and even computer. Whether through the invention of perspective and its subsequent transfer to the stage, the assimilation of newsreel films into the theatrical *mise-en-scène* in the Russia of the 1920s or the deployment of sensing systems to turn dance and even architecture into a play between humans and electronics, the history of performance has always been caught up in our machine fascinations.

As a microcosm of the world, technology already revealed itself on the fifth century Athenian stage as *machinae* intimately bound up with the fate of human beings. Like an omniscient god, the cranelike *deus ex machina* emerged in the final moments of Greek tragedy to solve the moral quandaries created by human mistakes.³ Using the civic platform of the stage to showcase the sociopolitical world of Athenian society, the Hellenic theater already plays out dramas between human and machine—technology's transcendent embodiment as the gods and, simultaneously, its immanent⁴ demonstration of the constructed mechanisms of the human world.

Likewise, the origin of the word "theater," the Greek word *theatron*, which translates as the *place of seeing*, was both a physical and perceptual space ordered by technology: an architectural zone where the spectator sat to watch the drama unfold, and a perceptual one that mediated the visual and acoustic relationship between the worlds of stage and audience. In other words, technology in the performance arts reveals itself not only in the machines that descend from the heavens by their own will, but also in how—through craft, skill, construction, or making (what the Greeks called *techne*)—it orders the world (*logos*).

But technology is not rooted in just the Western stage. Although it does not explicitly feature discussions of *machinae*, the *Natyasastra* (the science of dramaturgy), the great poetics of Indian music, dance, and drama written somewhere between 200 BCE and 200 ACE, spans thirty-six detailed chapters in laying out the mechanics of Indian performance forms, much like a software manual.⁵ Making no distinction between the performing and visual arts, the *Natyasastra* articulates the vast systems that give life to Sanskrit performance traditions, from vocabularies of gesture (*mudras*) and the construction of stage architecture to the analysis of melodies (*raga*) and rhythmic cycles (*tala*) and the composition of the aesthetic theory of *rasa*: rules for the generation of affect between performer and spectator. Similar to the spatial *theatron*, the literary *Natyasastra* is also composed of ordering systems; technologies in the form of plans, schemas, descriptions, and rules for

the construction of performance events that bring the spiritual universe of the gods to life through the fragile *techne* of humans.

Our focus on the technological in performance does not demonstrate just how we order the world through artifice, however, but how such artifice orders us. As Kirschenblatt-Gimblett claims that technology is integral to the history of performance, she also states "performance is integral to the history of technology" (2002, 49). Devices, machines, and tools may perform in terms of their *efficiency* or benchmarks, but they also perform by expressing things through material transformations that do things to the world.⁶ It makes sense that we can put the artifice of technology on the stage to show the workings of the world and that humans can *act out* or *present* something in front of a spectator surrounded by that technology, but how can machines and substances, materials, and spaces perform, especially when they have no consciousness or intention? Why should we grant the human right of performance to inanimate things, especially ones that we have created? How can we confuse artistic performances with the performances of machines, not only in terms of their function or efficiency, but also through the attribution to them of embodied expression?⁷

If we are then to rigorously examine how technology transforms performative practices, we might start with the word "performance." To arrive at a cogent definition, however, is not going to be a trivial task, and it will be slow going. In fact, we are only following in the footsteps of countless others who have already created volumes dedicated to uncovering performance's fluctuating meaning.⁸ In his *Performative Science and Beyond: Involving the Process in Research*, the physicist Hans Diebner states quite correctly that "due to many different approaches and divergent developments, the terms 'performance' and 'performativity' lack conceptual clarity . . . deriving from various artistic fields and from linguistic, sociological and philosophical discourses, which are rooted in the second half of the twentieth century" (2005, 21).

Even if it may be conceptually unclear, as Diebner states, I want to argue that there are certain characteristics of performance that distinguish it from other forms of knowledge making, namely: (1) an interest in enaction or doing, (2) real-time, dynamic processes over static objects or representations, (3) engagement with the temporal moment of the present, (4) embodiment and materiality, (5) immanent experience, (6) the effect of both human and nonhuman presence, and (7) transmutation and reconstitution. To make sense of this story, therefore, it is first necessary to broaden our inquiry and examine a number of different theoretical and disciplinary registers in order to provide some lenses for understanding what takes place in the technological transformation of artistic performances.

Performance in the Arts and Beyond: Culture, Speech, Material

In its commonly understood artistic context, the label *performance* was a strategy used to describe actions, happenings, and time-based events emerging out of the visual arts during

the 1950s through the 1980s. Predominantly but not exclusively in North America, Europe, Japan, and Latin America, artists and movements as varied as Yves Klein, Fluxus, the Japanese Gutai (*Gutai Bijutsu Kyokai* or Collective for Concrete Art) group, and Laurie Anderson, among others, invaded or bypassed the white-walled gallery with temporal and body-based practices, "dematerializing" the art object.⁹ As described in critic Rose Lee Goldberg's 1976 landmark study *Performance Art: From Futurism to Present*, which located performance's origin in the early-twentieth-century Western European avant-garde of the Futurists, Constructivists, and Dadaists, performance art practices aimed above all to distance themselves both from the static objects of the visual arts and the dramatic, text-based theater of the stage (Goldberg [1976] 1988).

The contamination of the sanctified, self-sufficient art object by way of the flux of temporality, the artist's body, and the viewer's unstable perception, was not met with universal enthusiasm, however, particularly from art historical critics like Clement Greenberg and Michael Fried, who already claimed that static minimalist art and the encroaching world of performance represented a creeping "theatricality" that would destroy the essence of the individual arts. In what Fried saw as a movement away from the artwork as an independent unity and toward its eventual dissolution in the hands of viewers—or worse, participants—the survival of the visual arts would depend in part, as he notoriously wrote in his 1967 essay "Art and Objecthood," on their "ability to defeat theater" (1967, 21).

The concept of performance received a more radical reconceptualization in the 1970s. In what is now known as the *performative turn* in anthropology and sociology, scholars such as the cultural anthropologists Victor Turner and Clifford Geertz, theater director and theorist Richard Schechner, and later, performance studies scholar Dwight Conquergood and the sociologist Erving Goffman, attempted to wrestle performance away from its purely artistic-bound connotations. As early as 1973, Schechner already called for using the theories and methods of the social sciences to understand the nature of performance, and not only the kind occupying the traditional stage environment or the avant-garde of the art world. Schechner wrote:

I believe that the convergence of the social sciences and the performing arts and the creation of *performance theory* is an antecedent to an avant-garde movement just taking shape. This movement will be more iconographic than iconoclastic; more conservative than prodigal; and more based on sheer observation and analysis than intuition and feeling. The movement will be radical not in the political sense of the late sixties but in the manner in which it attempts to go to the roots. (1973, 4; emphasis added)

Turning its focus onto the kinds of events studied by ethnographers, anthropologists, and sociologists, such as rituals, festivals, games, play, sports, interaction rituals, and performances within quotidian life like social work or gang violence, performance theory

sought to "combine aspects of the scientific method with some of the traditionally intuitive methods of the arts," analyzing what Dwight Conquergood later described as "the fabricated, invented, imagined and constructed nature of human realities" (1989, 83). Harnessing Victor Turner's work in social drama (Turner 1974), Johan Huizinga's (Huizinga 1950) and Roger Caillois's notions of play (Caillois 1961), Goffman's studies of framing and co-present interaction (Goffman 1959, 1963), and Ray Birdwhistell's theories of kinesics and gestural communication (Birdwhistell 1970) among others, the performative turn not only took performance as the subject of research but also, more radically, the *method* by which research would be conducted. Performance as method thus aimed to challenge traditional understanding that saw the transmission of knowledge strictly through textual form and described with a critical, objective distance "from above," instead focusing on the tacit, nonverbal, embodied, and immanent act of *doing* research; particularly, ethnographic research—what Conquergood eloquently described as the difference between "knowing that" or "knowing about" versus "knowing how" (2002, 312).

The emphasis on performance as an act or doing also finds its roots in linguistics, and in particular the speech act theories of the British linguist John L. Austin. In his 1955 Harvard lecture entitled "How to Do Things With Words," Austin defined what he called a *performative* or *performatory* as an expression or *utterance* that does not just describe or represent an action in language but actually performs or activates something. Whereas normal statements in speech or what Austin labeled "constatives" are considered to be either true or false, *performative utterances*, such as saying "I do" in a marriage ceremony or "I christen thee" when inaugurating the maiden voyage of a ship, are words that "are doing something . . . rather than reporting something" ([1955] 1975, 12–13). "The issuing of the utterance," Austin wrote, "is the performing of an action" (6). Austin's "questioning [of] an age-old assumption in philosophy—the assumption that to say something . . . is always and simply to *state* something," suggests that language does not just represent statements but is an inherently *material practice* in the way it can change the course of an event in the world or create a new one (12).

After Austin's student John R. Searle broadened the discussion to include all speech acts as performatives, the label performativity reemerged with a vengeance in cultural studies, most notably in the work of philosopher and cultural theorist Judith Butler. Butler's 1990 work *Gender Trouble* interpolates multiple meanings of performativity, coalescing them into a critical exploration of how the gendered female/male subject comes to be. In suggesting that "gender is in no way a stable identity or locus of agency from which various acts proceed; rather, it is an identity tenuously constituted in time," Butler's concept is critical of the notion that one has a fixed gendered *identity* (1988, 519). Gender is performative not through the metaphor of playing an imaginary *role* as Goffman used the term, but as an *act*, a temporal constitution of identity or event that is not yet given in the world. Although at times the theatrical and linguistic meanings blur, Butler's use

of Austin's word "performativity" over "performance" advocates the active creation of a reality "that is, in some sense new, a modality of gender that cannot readily be assimilated into the pre-existing categories that regulate gender reality" (527). Through Butler, the notion that the materiality of the human body and its gendering is not ontologically pre-given as a fixed essence in a fixed human subject, but instead performatively produced in and over time, has had strong repercussions for the productive understanding of power relations and human subject formation than goes beyond Austin's use of the word as a linguistic turn of phrase.

Spanning a wide range of seemingly disconnected disciplines, what is at stake in all of these accounts is how performance as a mode of being in the world radically differs from *representational* forms of knowledge. In general, representation assumes a split between the representation, whether an image on the canvas or in the brain, a description in text or a line of code, and a thing or world to be represented—a referent. Various translations as "imitation" or "mimicry," Aristotle's use of the term *mimesis* in the *Poetics* already suggests that the thing or act on the theatrical stage stands in for or represents someone that is not present but that we nevertheless should identify with through an act of empathy (1967, 17–18).

Within a stage context, representation is hotly contested. The French actor and theater theorist Antonin Artaud railed against the concept that the stage was a place of stand-ins and imitators. By harnessing the means of spectacle, of light, space, sound, gesture, and forsaking the dominance of text, the theater would no longer *copy* life but instead, through the vibratory effect of its media, emerge as life itself, in all of its unstable, shifting materiality.¹⁰

But there is another more fine-grained notion of representation that goes beyond imitation and yet still manages to address the same problematic. In the context of the cognitive and computational sciences, the word "representation" denotes a *correspondence* between a mental image or symbol (a representation) in the brain or machine and an object or world that the symbol corresponds to. What this definition assumes first of all is that the object outside the brain is fixed and that the role of cognition is to *recover* the representation, as it exists *a priori*, that is, before experience. In other words, what representationalist forms of knowledge suggest is that a stable reality exists independent of the knower's actions, and that this reality can be captured and described purely through the representation, whether a set of abstract symbols manipulated by the brain, descriptions in text or code, or more generally, culture itself.

In contrast, what performance as method/worldview suggests is that there is not a reality pre-given before one's experience but rather that the world is enacted or actively performed anew. The word "enaction" here has a specific meaning, derived from psychologist Jerome Bruner and later, the work of Francisco Varela, Eleanor Rosch, and Evan Thompson.¹¹ Enaction, in Varela's sense, describes the performance or action of "bringing forth of a world" based on the fact that we are a sensorimotor-based embodied agent in

which meaning emerges through a continually historical process of "active living." We bring about this world through a history of *structural coupling* between us and the dynamical environment, "not as a representation system, but as constrained imagination (which the name enaction evokes)" (Cohen and Varela 2000).

Although Varela's theory of enaction focuses on the embodied and dynamic interactions between the neural-cognitive system of an organism and its environment, there is nevertheless a curious resonance to the connotations of performance found in cultural theory. If representational accounts privilege a demarcation between subject and object or self and world, performative ones imply a world in which subjects and objects have not yet come into being and, even if materialized, are always in a constant state of flux and transformation that is unstable and difficult to repeat.¹² "The move towards performative alternatives to representationalism," as Karen Barad writes, "shifts the focus from questions of correspondence between descriptions and reality (e.g., do they mirror nature or culture) to matters of practices/doings/actions" (2003, 802). Like Butler's use of the word, which proposes an active practice, a doing that constructs gender, "performative" implies that the world emerges over time, continually transformed through our history of interactions with it.

Performative Science: The Battle of Agencies

Given its important contributions, performance studies has largely been a human-centered affair, remaining, with a few exceptions, conspicuously silent on issues of machines, technologies, objects, and matter, and increasingly proving inadequate for wrestling with the complex human-machine relationships that mark not only contemporary artistic practices but also scientific ones within technoculture.¹³ In fact, in an ironic twist of fate to Schechner's original declaration that the arts should integrate more social science methods, the arena of STS (Science and Technology Studies or Science Technology and Society) has taken up his call in an inverse way, appropriating performance for the sciences while leaving the arts behind.

The areas researched by STS are certainly not new. For the past twenty-five years, its adherents have been trying to understand the complex entanglements among natural, social, technological, and corporeal forces that help shape the world. A mixture between the naturally given and the culturally constructed, scientific knowledge has become an object of study by those seeking to understand, as sociologist Karin Knorr-Cetina argues, "the strategies and policies of knowing that are not codified in textbooks but do inform expert practice" (1999, 2).

Proliferating a language focused on laboratories as the site where science is created and practiced while examining the bizarre *imbroglios*, as the French anthropologist Bruno Latour anoints them, of "human and nonhuman collectives," those working in STS have effectively displaced humans as the sole producers of knowledge, the expressers of agency,

or the only performers worthy of study in scientific dramas.¹⁴ Instead, STS explores the ways the *nonhuman*, things like bacteria, yeasts, scallops, bubble chambers, rarified technological instruments, and cultural artifacts, *act* and how competing materialities of humans and things or matter itself might be reconciled.

What is more revealing in the STS landscape is how often the word "performance" appears, used to describe the actions of such entities like lactic acids, failed utopian transportation systems, or piezoelectric crystals that transcend the neat social/natural binaries that we are wont to divide them up into.¹⁵ Part of this new performative turn is an attempt to understand the role that material practice plays in scientific creation: how things are done rather than how they are described, once again marking out the territory between representational versus performative knowledge. For example, in numerous articles, sociologist of science Michel Callon discusses the performative properties of economics, arguing that economics, like any social scientific discipline, partially engages in the constitution of the *reality* that it attempts to describe; that any discourse *acts* or performs on the object of its discourse and changes it.¹⁶

Performance is even more explicit in the work of Bruno Latour. In his anthropologically oriented ethnographies of laboratory practices, Latour seeks a symmetrical relationship between humans and nonhumans in a move away from the earlier school of the Sociology of Scientific Knowledge (SSK) that emerged in the 1970s at the University of Edinburgh.¹⁷ Unlike SSK's human-centered focus on scientific construction, Latour seeks to give an equally important performative role to the nonhuman.

In Latour, Woolgar, and Salk's 1986 milestone study of the Salk Institute *Laboratory Life*, for example, the authors assert that the practice of science is not to provide facts or representations about nature but rather to perform it. "Interpretations do not *inform* as much as they *perform*" (Latour, Woolgar and Salk 1986, 285). Arguing that the animism of nonhuman systems has been patently ignored by social theories of knowledge that conveniently attempt to separate nature and culture, Latour's notion of performance stems from his development along with fellow sociologists Callon and John Law of what has been termed the *sociology of translation* but more commonly, and perhaps erroneously, as Actor-Network Theory (ANT).

In order to cope with the monsters produced by contemporary technoscientific society, the weird jumbling of disciplines, ideas, instruments, and formations ranging from genetically modified foods to ozone holes, digital expert systems, and *RFID*-tagged animals that are simultaneously social, technical, cultural, and natural, Latour, Law, and Callon invent what they label *actor-networks*. In this network model, the *agency* of *actants* (rather than just human actors) is spread out among multiple associations (the *network*), connected to each other in a skein of relations and transforming each other through such relations (Latour 2007).

Studying "how a given element becomes strategic through the number of connections it commands and how does it lose its importance when losing its connections," ANT as

a method examines the co-constitutive processes by which actants come to perform in relationship with each other within technoscientific practices—"the attribution of human, unhuman, nonhuman, inhuman, characteristics; the distribution of properties among these entities; the connections established between them; the circulation entailed by these attributions, distributions, and connections; the transformation of those attributions, distributions, and connections, of the many elements that circulate and of the few ways through which they are sent" (Latour 2005).¹⁸

In another vein, sociologist of science Andrew Pickering also engages with the performative modes of science. For Pickering, performance is a method that breaks with the representational modes of sciences—the concept that knowledge can be encoded only in the minds of scientists or in the documents, theories, papers, texts, or other forms of inscription they produce to disseminate knowledge. Rather, the "performative image" of science is of "a field of powers, capacities and performances, situated in machinic captures of material *agency*" (Pickering 1995, 7).

As demonstrated by the invention and deployment of instruments, devices and machines, the material aspects of scientific practice come to the fore; practices arising from the intertwining of human and nonhuman forces (like the weather) or what Pickering calls the *dance of agency*. Pickering's dance of agency, however, is not fixed in time but depends on what he calls "temporal emergence." Particular performances of agency arise only in the process of "doing science": the processes of building instruments, watching those instruments resist and fail, readjusting or re-accommodating to the performances of the instrument, running the experiment again, and so on. "Scientists," writes Pickering, "are human agents in a field of material agency which they struggle to capture with machines . . . reciprocally and emergently intertwined in this struggle" (1995, 21).

Despite the fact that their ideas go far beyond performance studies' human-centered approach, the theorizing by Callon, Law, Latour, and Pickering about nonhuman, material agency has come under fire by others working in the field, most notably in the work of physicist and feminist cultural theorist Karen Barad. Interested in what she labels "a post-human performativity for matter," Barad asks similar questions as the Actor Network theorists, such as "Why did language become to be more trusted than matter?" and "Why are language and culture granted their own agency and historicity while matter is passive and immutable?" But she is also highly critical of the political emptying out of performativity from theorists like Pickering, in which "questions of meaning, intelligibility, significance, identity formation, and power," are ignored (Barad 2003, 807).¹⁹

Influenced by Butler's politically charged notion of gender performativity as well as physicist Niels Bohr's philosophical work on quantum mechanics, Barad proposes a replacement of the atomistic notion of nonhuman "things in themselves" with what she terms *agential realism*. Things in and of themselves that maintain their own separate identities continually place us back into the territory of representation, precisely because they are imagined to exist as bounded entities that can be described and represented in

language. In her reading of Bohr, things in the world do not have immutable boundaries, but rather are continuously reconfigured based on cultural, political, and material constraints and relations (Barad 2006).

According to Barad, if we are going to ascribe agency to nonhuman things we must not see agency as a property of things as ANT and Pickering's material dance do but as a performance in and of itself, much like Butler depicts the performance of gender. As an "ongoing reconfiguration of the world," writes Barad, "agency is a matter of *intra-acting*: it is an *enactment*, not something that someone or something has" (1999, 7). The enactments of human, nonhuman, or hybrids such as Donna Haraway's cyborg and simian entities shape their constantly emerging and transforming agencies rather than treating them as *a priori* subjects or objects.

Whereas the performances described in the science studies landscape emphasize the actions done within human-machine entanglements, the *performative science* described by Hans Diebner has more in common with one of performance studies' central, albeit more anthropocentric, tenets: an emphasis on the "emergent, temporal, contingent, provisional, indeterminate, dynamic, destabilizing" (Conquergood 1989, 83).

Diebner's notion of performance is intimately bound up with his research into complex *dynamical systems* whose behavior becomes unstable over longer time evolutions. Just as performance is a time-based, nonrepeatable (in the sense of the exact same situation) practice, so too is the behavior of fluid flow dynamics or cognitive systems that defy the scientific cornerstone of exact reproducibility due to their continual variance over time. The stability of a fixed research object suggesting an objective observer from a distance, something clearly challenged by both performance studies and STS paradigms, breaks down as the researcher becomes actively involved in the "moment in which the action is taking place"; a moment not altogether controllable or repeatable (Diebner 2005, 21).

Furthermore, the scientist working with such complex phenomena is actively manipulating the parameters of the various mathematical and computational models she is using and thus, engaging, as Callon also describes it, in a performance with the very systems being studied. Performative science, for Diebner, is thus articulated as "an uncircumventable and constituent element of concrete practical investigations," which involves not only the performances of systems under investigation but also a general strategy in creating *public* interfaces between science and art (2005, 25).

The Cut

Despite the different connotations of performance in the technosocio-scientific context, the move toward agencies, collectives, and networks articulates a common thread: that humans, things, and matter are not fixed but always in a process of change and becoming. In contrast to stable systems with variables that can be measured and observed from

without, culture is dynamic, "transacted through performance," or what Conquergood aptly labeled the shift from *mimesis* to *kinesis* (Conquergood 1989, 83). Various described as *posthumanist*, what so many of these nonhuman performances hinge on are hylozoic tendencies, the sense that all matter is animate, that lie beyond our human experience, whether embodied in rocks, trees, microbes, or digital computers.²⁰

This animism of the nonhuman must at first seem altogether strange, but as Latour continually reminds us, the cuts between the inanimate and the animate are the results of modernity's artificially constructed great divide between nature and culture. In contrast, premodern societies mix everything up: signs and things, the social and the natural and the human and nonhuman. Such concepts arise not only from those investigating socio-technical phenomena. In his controversial work *The Spell of the Sensuous* (1997), the ecologist and magician David Abram discusses how shamans and sorcerers in traditional cultures act as intermediaries between humans and the larger community of beings, ensuring that the relationship is "balanced and reciprocal." "Along with the humans, the multiple nonhuman entities that constitute the local landscape, from the diverse plants and the myriad animals . . . that inhabit or migrate through the region, to the particular winds and weather patterns that inform the local geography, as well as the various landforms—forests, rivers, caves, mountains—that lend their specific character to the surrounding earth" (Abram 1997, 10).

In fact, Abram details an entire list of Indonesian, Native American, First Nations, and Aboriginal cultures who make no cut between the animism of the human and the world (Abram 1997, 69). According to anthropologist Richard Nelson, vast spiritual power is imbued upon the natural landscape surrounding the Koyukon of northwestern interior Alaska such that an unspoken code of morality toward nature exists. The forest "watches like a sea of eyes," and demands respect while the "interpenetration of human and nonhuman utterances" in the Koyukon language act as an embodiment of a distant time when common languages were shared between humans and animals (147).

Likewise, in the *Alcheringa* or *Alchera* (loosely translated as "Dreaming") creation story, indigenous Australians describe the seamless connection that connects the inner human world with the landscape; a space in which there is no distinction between human, plant, and animal. More attuned to our own neurotic culture of Western modernism, even Sigmund Freud in *The Uncanny* (1920) addressed debates around how uncanny, strange or even dread-like feelings are unleashed: "Intellectual uncertainty is aroused as to whether something is animate or inanimate, and when the lifeless bears an excessive likeness to the living" ([1920] 2003, 140–141). Whether these anthropological accounts or Latour's celebration of premodernism serve to reify the exoticism of non-Western culture to our technocratic West is another question beyond the scope here. What these accounts do convey, however, is the possibility of imagining a world without cuts between living phenomena and matter.

Artistic Performances with Humans and Nonhumans

With anthropologists exploring the performances of rocks and birds and scientists finding agency in scallops, missile systems, and particle accelerators, I want to return to the central question of this book: how have technical objects or beings historically come to have been entangled with artistic performance practices? How can we understand the construction of artistic processes and events in which the human may no longer be the sole locus of enactment but performs in tandem with other kinds of beings: a tangle of circuits, an array of sensors, shape-changing materials, or a "space thundering with images and crammed with sounds" (Artaud 1958, 87)?

Consequently, artistic performances that integrate technical systems into their intended strategies of artifice are as hybrid as Latour's natural-cultural imbrolios, fusing multiple concepts of performativity simultaneously: as real-time actions played out in front of a spectator alongside the agency of machines trying to equally effect changes in the material conditions of the world. Watching what the twentieth-century playwright and director Bertolt Brecht called the apparatus of the stage from a distance, one in which things mechanically go up and down in the *fly space* of a theater or rotate on a turntable may be easy enough, but what are we to say about the Gordian territories that jumble together performers and spectators, spectators and scenographic environments, computers and actors, theater and urban space, architecture and machine, the research lab and the temporary festival?

Still, Latour's call for a symmetrical anthropology that gives things their due lands us in a dualistic framework between the human and the not. This may be forgiven when dealing with scientific practices that utilize nonhuman forces, but it is a much trickier territory when dealing with the all-too-human arena of performance, as such a split gives a convenient locus to theorists for where or where not to locate agency.²¹ Instead, my appropriation of the term *entangled* from its anthropological connotations suggests that human and technical beings and processes are so intimately bound up in a conglomeration of relations that it makes it difficult, if not impossible to tease out separate essences for each.²² When the cultural anthropologist David Howes writes that objects should be seen as bundles of sensory properties and interconnected experiences that activate the human senses in complex and culturally varied ways, he is also invoking a space that refuses to make a demarcation between inanimate technology and human interpreter (2006, 114–115).

Another useful formulation closer to our context is the notion of *machinic* as articulated by the late French psychotherapist Félix Guattari: "Common usage suggests that we speak of the machine as a subset of technology. We should, however, consider the problematic of technology as dependant on machines and not the inverse" (1995, 33). Critical of both mechanist (the machine is a construction of parts) as well as vitalist/anthropomorphic (the machine is a living being) tendencies, Guattari's notion of the machine is not simply a

technical device but a bundle of heterogeneous *forces* perpetually criss-crossing and transforming each other in a constant state of becoming.

A panoply of “materials and energies,” “semiotic or algorithmic” components (like calculations, programs or equations), and “individual or collective representations and information,” Guattari’s *machinic* entangles “social bodies, industrial complexes, psychological or cultural formations, such as the complex of desires, habits and incentives that create particular forms of collective behavior in groups of individuals, or the aggregation of materials, instruments, human individuals, lines of communication, rules and conventions that together constitute a company or institution” (Broeckmann 1999).

Furthermore, as a “heterogeneous assemblage of components” that are co-constitutive with each other, the machine is also productive, specifically by way of its power to *enunciate*—to make “statements” through forces. “For each type of machine,” wrote Guattari in his last work, *Chaosmosis*, “we will pose a question, not about its vital autonomy—it’s not an animal—but about its singular *power of enunciation*” (1995, 34). Guattari’s invention and use of terms like *collective assemblages* and *collective enunciations* suggest that the machine is unique precisely because it has such enunciative power, not only in its ability to speak through the medium of language, but through all kinds of materials of signifying expression. “Just as social machines can be grouped under the general title of Collective Equipment, technological machines of information and communication operate at the heart of subjectivity, not only within its memory and intelligence, but within its sensibility, affects and unconscious fantasies” (4). Guattari’s machine is, in fact, the apparatus that has this enunciative power—the ability to engender new forms of subjectivity and experience, making marks in and on the world.

If one of the hallmarks of performance is its material embodiment in the world, whether that body is defined by human form, a sound that rattles the chest, or a machine trying to decode the nuance of a choreographed gesture, then why should we make a cut between ourselves and the technologies we design to create sheer artifice and, at the same time, a world that is not represented but lived? What would it mean to examine a history of artistic performance practices using technologies as *machinic* performances in the spirit that Guattari used the term: as an immanent, collective entanglement of material enunciations that operate on, shape, and transform the world in real time?

Entanglements

The theories of performance and performativity all too briefly surveyed here nevertheless provide a fruitful set of conceptual frameworks for comprehending the history of practices that makes up this book. Although the work presented does not advocate for a reading of such practices through a single theoretical frame (e.g., “Actor Network” or agential realism), what the exploration of the performative turn in STS gives is more nuanced ways of understanding machinic performance beyond the tired dichotomies of digital versus

analog, real versus virtual, or networked versus local. In this way, this book reverses Schechner's original dictum to bring the tools of social science to analyze the arts and instead employs concepts from philosophy and technocultural studies to understand how technology has been used in experimental artistic practices of performance that take place on the stage as well as in clubs, stadiums, festivals, research laboratories, and urban space.

Contrary to the idea that performance has so many significations that the use of the word becomes meaningless, I want to set out specific contexts by which to view machinic entanglements. First, although the work here spans diverse areas such as architecture, electronic music, theater, and urban interventions, the common thread that links such a polyphony of practices together is their physical, real-time situatedness involving collective, co-present spectating, witnessing, and/or participation within the framework of a spatiotemporal event.²³

Emerging from learning theory and anthropological studies of human-machine interaction, the term *situated* denotes actions, whether originating in human beings, machines, or materials, that occur in a concrete real-world context at a particular time and place versus an *anytime, anyplace* simulation, such as what takes place in online environments. In what anthropologist Lucy Suchman almost twenty years ago termed *situated action*, situation suggests "simply actions taken in the context of particular, concrete circumstances" (1987, viii). "The coherence of situated action is tied in essential ways not to individual predispositions or conventional rules but to local interactions contingent on the actor's particular circumstances" (27–28).

In contrast to many existing studies of performance and digital technologies, I thus will eschew a focus on such forms as MOOs, MUDs, CD-ROMs, solo-based computer gaming, purely Internet-based performances, online meta-verses and virtual communities such as Second Life, and similar examples of what has been branded with the monikers of digital performance, "cyber performance," or "cyber theater."²⁴

Furthermore, despite such a technocultural phenomenon as screen-based computer games, there is already a growing body of existing and forthcoming literature that focuses on the dramatic aspects of this work.²⁵ With regard to gaming, I wish rather to explore situated models emerging in the form of flash mobs or location-based media that strategically aim for an embedding of performances into the urban context, thus transforming the city into a temporarily demarcated event space. If the focus on the physically situated event might thus appear at first to be rather restricted, I hope to compensate by broadening the sites of performances focused upon from the theater and the concert hall, to the academic research laboratory, the club, temporary festivals, the interior of the human body, the exterior skins of buildings, public spaces, urban streets, and even the desert.

Second, existing works that deal in particular with technology and stage-based performances principally understand technology as *media technology*, and mainly, image-based

projected media.²⁶ This has the effect of quickly bringing us back to well-trodden post-modern oppositions between live versus mediated or presence versus absence.²⁷ Consequently, the discourse invoked becomes the same (mainly) ocular-centered one of image representation, thus ignoring other senses like touch, hearing, taste, or smell. I propose to use the word "technology" in a broader and more critical sense. Although one facet of classical philosophy of technology has come to understand it as a constructed tool, object, or—better yet—process that participates, through human action, in either *unmasking* (Karl Jaspers) or *revealing/framing* (Martin Heidegger) the world, I want to use technology in the spirit of what Latour calls *mediation*.²⁸

Technologies are not simply inert or neutral artifacts that are, as Heidegger termed it, *ready to hand*: waiting for human presence to activate them and thus extend human action into the world, revealing and framing it in a particular manner. Instead, technologies are similar to Guattari's machine, constructing and ordering social-cultural-political relations.²⁹ Technology does something in and to the world by modifying existing relations and constructing new ones between humans, tools, processes and the environment in which all are deeply entangled. "Techniques are . . . not means," declares Latour, "but mediators, means, and ends at the same time; and that is why they bear upon the social fabric" (1999, 197). In this spirit, then, I will not focus on what philosopher of technology Andrew Feenberg has called "the hermeneutic understanding of technology" (2000) or what technology *means*, but rather explore what it does, how it does it, and what the repercussions are across the artistic practices that utilize it. More to the point, the question I ask is how technology has mediated and scrambled meanings and categories among artists, events, and spectators, and in what specific contexts it has done these things.

Third, one could argue that *any* performance practice that utilizes some kind of constructed instrument or procedure deserves to be discussed in the pages that follow. For the most banal example, consider the fact that most forms of modern theatrical performance involve the use of woodshop tools designed to cut materials for scenery or the employment of computer-controlled lighting and sound equipment in works that are not in the least interested in thematizing or embedding issues of technoculture into their making. Of course, though this is true, it would also require many more volumes than I can write. In order to restrict the focus, therefore, I narrow in on performance practices that consciously and intentionally entangle technologies so that they are inseparable from the form and operation of the work.

Fourth, the long history of technological entanglement with performance practice has been ignored or downplayed not only in theater and dance histories—even ones purporting to study such issues as *the death of character* (Fuchs 1996) or *post dramaturgy* (Lehmann 2006)—but also in the recent surge of writing about the new media.³⁰ Upon mentioning the fusion of performance and technology, one is immediately directed to Brenda Laurel's much-lauded work 1991 work *Computers as Theatre*, which focuses on the dramatization

of narrative models of computer interaction anchored in Aristotle's *Poetics* (1967) but says little about the issues of performance as an embodied practice.³¹ In fact, interestingly enough, *Computers as Theatre* uses the mimetic, representational idea of theater as its prime model and Aristotle as its ironic father, leaving the antirepresentationalist stance of many performance artists working with machine systems in the twentieth century behind in the dust.³²

Moreover, many analyses of technology with stage practices set machines aside as so much dead matter or, to bring up the tool model again, like a pencil wielded in the genius artist's hands. If writers do get down to the nitty-gritty details of describing techniques, they are usually mystified or misunderstood, something that is mostly overlooked in aesthetic theory and criticism but would never be accepted in the detailed studies of scientific laboratory practices conducted by ethnographers of science and technology. Besides not giving a voice to Latour's fabled nonhumans, such technical sloppiness is all the more problematic in the fact that creators working on developing and/or co-opting techniques in the construction of performances do so in sophisticated and nuanced ways and are quite aware of how the underlying technological specificity of tools and processes can be utilized to larger effect.

Finally, my approach does not aim to reinforce teleological myths of progress or narratives of influence, for example, the tendency to argue that the fantasies of earlier movements like Futurism or Constructivism have finally reached their apotheosis in our superior hardware and software of the twenty-first century. Each episteme is certainly influenced by past ones in refashioning its techne, but this tendency is perhaps more due to our need to find continuity within what we experience as a history of ruptures and violent breaks with the past that we feel technology imparts on us. I want here to investigate how certain practices that attempted to materialize technological ideas arose due to their specific contexts. Whether such ideas were realized purely in their (imagined) material form is irrelevant. The important point is that such concepts could already be imagined through the social-technical-cultural-economic networks of their time.

Structure and Organization

Given the ground rules just outlined, I can now describe the general structure of what lies ahead. Chapters 1 and 2 set out a detailed basis for examining the dynamization of theatrical and architectural space and the transformation of stage environments into new kinds of spatiomechanical, electrotechnical apparatuses. Chapter 1, "Space 1: Scene/Machine (1876–1933)," surveys the machine-age influence on the practice of defining theatrical-scenographic space, starting with composer Richard Wagner's *Festspielhaus* in Bayreuth, Germany, in 1876. As a harbinger for the directions that theatrical scenography would take over the twentieth century, Wagner utilized stage technology to create a degree of unprecedented control over the perceptual experience of his spectators. I then

pursue this machine transformation of scenography in the classical pre-World War II European performance avant-garde from the early Italian and Russian Futurists and Russian Constructivists to Weimar Germany and the Bauhaus, the Swiss and French schools of Dada, and the work of Antonin Artaud.

Chapter 2, "Space 2: Media Scenographies (1950–)," covers the period running roughly from 1950 to the present, beginning with the work of Czech scenographer Josef Svoboda in the mid 1950s. The chapter continues with analysis of the increased role that electronic, audiovisual practices played in non-text-based theatrical work in the 1960s through the 1990s, from what theater critic Bonnie Marranca famously labeled the Theater of Images to the new formalist aesthetics of media generation artists from New York, the West Coast of the United States, Europe, Canada, and Japan. Chapter 2 concludes with a discussion of how contemporary architects brought with them to the stage not only new materials and construction technologies in the last decades of the twentieth century, marking a return to the machine aesthetic, but also new impulses originating from architectural discourse.

Taking chapters 1 and 2 as its starting point, chapter 3, "Performative Architectures," focuses on the visionary fantasies of creating ephemeral, transformative, and kinetic architecture. Specifically, I argue that architecture must be seriously taken into account due to its ongoing fascination with movement, event, duration, action, and material transformation. The chapter is divided into three separate conceptual threads (kinetic architecture, event, and screen/scene). The first thread considers the continued desire for machine architectures: dynamic, kinetic structures that would liberate construction from its monumentality and stasis. The second thread discusses architectural experiments using strategies arising in the sociopolitical volatility of the 1960s and 1970s that turned away from construction and toward ephemeral actions. The final thread ponders the twenty-first-century move toward *mediatechures*, architectures of "pixels and light" (Tschumi) that transform the entire surface of buildings into huge media displays, and ends with an analysis of the tension between architecture as embodied material (scene) and digital representation (screen) contained in the paradigm of the urban screenscape.

Chapter 4, "The Projected Image: Video, Film, and the Performative Screen," investigates the ways in which televisual and projected media have influenced the perception of the physical site of performance in stage based as well as the visual and media arts. The televisual discussion surveys the impact of television, both as a sociocultural phenomenon as well as a distinct sculptural object, moving between performance practices in the visual arts world to the video monitor's use in theater, opera, and live spectacle. The second section focuses on the architectonic use of film and large-scale projection technologies in stage performance that challenged the live performer's position as the center of the stage universe, forging him into one element among many in a much larger mediated space. Chapter 4 ends with the territory of audiovisual performance, shifting the locus of

performance away from the stage and toward the club, the international exposition, and the media festival and replacing the human performer on stage mostly or entirely by the screen surface.

Chapter 5, "Sound," discusses the impact of technologies in the areas of music and sound, particularly how new instruments and processes changed the experience of musical performers and audiences, shifting the concert hall from a passive arena of listening to an interactive zone of improvisation between sound-making technical apparatuses and their players. Beginning with the appearance of electromechanical instruments like the Teleharmonium and the theremin in the 1920s, it continues with the application of studio-based electronic technologies to live musical performance in the work of European and American composers in the 1960s, exploring indeterminacy, music-theater genres that expanded the concert hall, and finally, real-time computer-based interaction. In particular, I analyze the early impact that microcomputers had on live musical improvisation and collective musical composition, moving into the increasing interest in software environments as musical instruments in the 1980s and then surveying more recent digital genres like laptop- and network-based music. The chapter concludes by examining gesture-based music performance that attempts to augment bodily-based instrumental practices with digital tools.

Chapter 6, "Bodies," appraises the long history of technology's influence in dance, theater, and body-based performance art practices. With origins in early chronophotography and the machine obsessions of choreographers, dancers, and directors in the 1920s, I propose that mathematical and architectural rules, body-based conditioning techniques (e.g., biomechanics, choreutics, eurythmics, eukinetics), and procedural systems pursued in the 1960s by the proponents of postmodern dance should be equally seen as technologies alongside the more accepted devices of sensors, cameras, and computer imagining techniques. The chapter then segues into the performance practices of a diverse range of artists in the 1960s through the 1990s who sought to alter, resculpt, or transform the body by using both primitive and sophisticated technologies and ends with an in-depth analysis of the impact of digital technologies on dance and performance in the 1990s and after.

Chapter 7, "Machines/Mechanicals," focuses on the genre of mechanical or robotic performances in which such constructions are given the same performance status as humans. Based on curator Jasia Reichardt's argument that the characteristic of liveness in machines can be attributed less to their appearance and instead to their behavior, the chapter surveys the machine performance, *Schrott Kunst*/industrial art scenes, and machine sound art of 1990s European and American subculture. The second half, on performing machines, focuses on the shift from human-based operation toward machine autonomy involving self-organizing behavior based from environmental input, processing, and control by way of computational models. Taking up art historian Jack Burnham's notion of *system aesthetics*, the chapter finishes with the phenomenon of autonomous, cybernetic

sculptures and robotic performances that have taken place in galleries or theaters without the need of human actors.

The book's final chapter, "Interaction," considers the impact of computational technologies on artists and researchers creating environments that blur the distinction between performer and spectators. Here, I extend Myron Krueger's notion of *responsive environment* to include the creation of hybrid media spaces that, although working with similar techniques, go far beyond the traditional performing arts frames of theater, dance, or visual-based performance art. The immersive and interactive *participant-activated* environments of the 1960s form the conceptual and historical basis to discuss responsive environments in the 1980s and 1990s that pushed the line between art and research, while challenging purely screen-based interaction that denied the existence of the participant's body.

The chapter then transfers to the urban realm, where I detail works that try to reconceptualize the urban space into a post-Situationist enterprise of play through the advent of new networking and mobile technologies. Taking into consideration works that attempt to turn spaces in the city into new sites of public performances by way of architectural and media strategies, mobile systems, and pervasive games, I conclude the book by examining the ramifications of the performative transformation of the everyday through increasingly sophisticated and hidden pervasive technologies.