Life Science: Rude Mechanicals, Human Mortals, Posthuman Shakespeare

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> Must we conclude that man became what he is by mutation, by an error of heredity? In that case, life would by error have produced a living thing capable of making errors. In fact, human error is probably one with human errancy. Man makes mistakes because he does not know where to settle. He makes mistakes when he chooses the wrong spot for receiving the kind of information he is after. But he also gathers information by moving around, and by moving objects around, with the aid of various kinds of technology. Most scientific techniques, it can be argued, are in fact nothing more than methods for moving things around and changing the relations among objects. Knowledge, then, is an anxious quest for the greatest possible quantity and variety of information. If the a priori is in things, if the concept is in life, then to be a subject of knowledge is simply to be dissatisfied with the meaning one finds ready at hand. Subjectivity is therefore nothing other than dissatisfaction. Perhaps that is what life is. Interpreted in a certain way, contemporary biology is, somehow, a philosophy of life.
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> —*Georges Canguilhem*

At the outset of this special issue, some readers may well have wondered what Shakespeare could possibly have to do with science. But the essays have invited us to reexamine what exactly we mean, today, by "science," and have suggested ways in which it may be closer to the poetry and drama of the early modern period than we might imagine. Anyone who thinks seriously about what a modern laboratory scientist actually does for a living will soon realize how tentative, piecemeal, frustrated, hopeful, in a word, *hypothetical* science really is — "true" science transacts itself at a threshold between fact and fiction that is genuinely exciting to scientists themselves and that should be equally exciting to literary critics. There is an entire practical criticism of the laboratory from which literary scholars would surely benefit: what is a laboratory, after all, if not an astonishing machine (we might even call it a theater) for producing many different "difficult," information-rich materials, across many types of media, in various states of stability and modification, sometimes improvised, sometimes highly codified, sometimes immediately legible, at other times subject to intense debate? If some scientists would never

© South Central Review 26.1&2 (Winter & Spring 2009): 197–217.

see their own work this way, nothing prevents us from doing so, and once we have, we return to Shakespeare's theater with new eyes.

In a recent book I took *A Midsummer Night's Dream* as an example of this premise and regarded it the way an imaginative scientist might, looking for shadowy resemblances to basic problems that he or she thinks about every day and finding new problems that science has only just begun to confront.[1] If we understand by "science" the many attitudes toward natural or artificial phenomena that flourished around 1600, then we can see immediately that *A Midsummer Night's Dream* is everywhere concerned with "scientific" topics. This is true at a thematic level in many of Shakespeare's plays, in that they explicitly consider problems of cosmology, medicine, mathematics, meteorological phenomena, weaponry, gardening, magic, astrology and other occult "sciences," as Henry Cornelius Agrippa called them. And in this age of historicism, few critics would deny that we gain new insight into the plays if we move outside them to consider the broader epistemological frameworks and practices concerning art and nature that informed their composition, either directly as a source or indirectly as an intellectual horizon. But one of the most important ways to examine connections between "science" and Shakespeare is to address their basic underlying concepts, and here the methods of the history and the philosophy of science are especially valuable. It isn't simply that these fields can provide new facts about what Shakespeare might have read or known or about what his contemporaries might have read or known. They give us new concepts and new techniques for making sense of Shakespeare, new ways for asking questions about his work and for proposing answers to the questions that his own work asks of us.

As a sometime-Shakespearean with an interest in science studies, one who has wandered into the world of *A Midsummer Night's Dream* and been surprised by what he finds there, I propose that one of the largest questions raised by Shakespeare's play concerns what I will call the concept of "life," a concept that has found some of its richest explorations in the history of science—I think in particular of a series of studies by Evelyn Fox Keller—and one that has recently become topical in literary criticism largely in response to the work of the philosopher Giorgio Agamben.[2] One explanation for the flourishing interest in Agamben's work among literary scholars is that it provides new thread for the methodological needle that critics have found themselves holding for the last twenty years, theoretical thread for the needle of "historicism," or historical thread for the needle of "theory," depending on what kind of book one is trying to sew together. In this sense, a book such as *Homo*

Sacer offers one model for what we might call a "new new historicism," if not quite for a post-historicism: a historicism motivated as much by argument as by archive, or by concept rather than by object, if by this we understand, too, a mode of criticism that could shake off the ghost of the Hegelian concept once and for all. On this final point, at least, Agamben may still come up somewhat short, since *Homo Sacer* remains surprisingly silent on the definition of "life" that motivates it, leaving its central concept under-predicated and sealed into a form of argument that has substituted the notion of "decision" for that of Hegelian "negation" in order to coordinate its argumentative fragments and an expanding horizon of forms of exception.

In subsequent work, Agamben has extended his analysis of "life" into a meditation on the nature of the "animal" and the "human," with a full grasp of the limits to any argument that would resolve ontological heterogeneity into the identity of a single "life" concept.[3] But a central question still remains: how *elaborate* can the being of "bare life" become? To this question *A Midsummer Night's Dream* offers a spectacular answer, presenting us not with a naked, "bare" life constituted by a sovereign decision in order to quiver before it but rather a teeming heterogeneity of living entities, a "Forest" of proliferating singularities and accidental mutations, a *copia* of specification, predication, and elaboration that assembles into a minimally-identifiable conceptual content: there, suddenly, is a particular form of "life." Viewed from this perspective, the concept of "life" becomes one of sufficient accumulation or of sufficient assemblage, a problem for which the notions of "complexity" and "emergence" have been forged in physics, biology, systems theory, and in cybernetics as a response; life emerges once a sufficient level of complexity has been reached, with the theoretical consequence that life might *never* emerge, or might emerge where we least expect it and look nothing like something we recognize. The lasting legacy of Agamben, therefore, may well prove to be that he reminded us of a fundamental Foucauldian problematic and extended it in directions that Foucault himself never pursued; one of the new legacies of Shakespeare may well prove to be that he, too, was always concerned with the concept of "life" in ways that can still surprise us.

In framing our entry into *A Midsummer Night's Dream* in this way, I mean to propose one model for a "new new historicism" grounded in the philosophy of science and in "theory" more generally, as well as to remind those who would turn to Agamben for such a model that the concept of "life" might have had an alternative genealogy, one that extends back not through the Foucauldian problematic of *biopolitics* (Agamben's primary

reference point in this regard is the first volume of the *History of Sexuality)* but rather to Foucault's discussion of "life" as a point of conjuncture for two of the most significant traditions of thought informing his own work: the history and philosophy of science, on the one hand, and the broader philosophical tradition of the "Enlightenment," on the other.[4] The figure who addressed this conjuncture most directly was Foucault's own mentor, Georges Canguilhem—it was Canguilhem, Foucault argued, who had first articulated the problem of "life," as determined by the history of the life-*sciences*, as a specifically Enlightenment problem.[5] For in studying biological phenomena, the biologist-cum-epistemologist finds himself working as both philosopher and historian, confronting what Foucault calls, emphatically and after Canguilhem, "*the concept in life*" (Foucault, "Life," 475). "When we say that biological heredity is the communication of a certain kind of information," Canguilhem argued, "we hark back in a way to the Aristotelian philosophy with which we began":

> To say that heredity is the communication of information is, in a sense, to acknowledge that there is a *logos* inscribed, preserved and transmitted in living things. Life has always done—without writing, long before writing even existed—what humans have sought to do with engraving, writing and printing, namely, to transmit messages. The science of life no longer resembles a portrait of life, as it could when it consisted in the description and classification of species; and it no longer resembles architecture or mechanics, as it could when it was simply anatomy and macroscopic physiology. But it does resemble grammar, semantics and the theory of syntax. If we are to understand life, its message must be decoded before it can be read. ("Knowledge and the Living" 316–17)

Canguilhem drew inspiration from the new theories of life-as-information that mathematicians such as Alan Turing, John Van Neumann, and Norbert Wiener had recently made popular. But to a philosopher of science who found the shape of his argument through historical inquiry, a concept of "life" understood in terms of generality and pattern, of logical rules and mathematical abstraction, presented a somewhat paradoxical example of a model that was powerful because of its *ahistoricity*; indeed, it was this ahistoricity that nourished the "philosophical" dimension to the concept-in-life, extending it across distinctions between human and non-human, biological and mechanical, macro and micro and constituting a general "vital" field in which the human found its species-being. We may well ask, however, as examples of "life" proliferate across a human

and an organic boundary, whether the "concept in life" is reaffirmed in its unity or disintegrated into a multiplicity that can no longer rise to the level of the "concept" in the usual sense?[6] If "Enlightenment" is to be refashioned into a critique of the limit "in what is given to us as universal, necessary, obligatory," as Foucault argued, then for Canguilhem this limit would seem to have passed *within* or through the "concept in life" and opened it onto the horizon of the "posthuman," perhaps even to what critic Richard Doyle has called the "postvital."[7] All by way of science, which for Foucault has preserved the project of the Enlightenment as Kant first articulated it and which furnishes the methods of a critique that would be, as he describes it, "an experimental one."[8]

So what can we discern *today* about the problem of "life" if we juxtapose the work of Shakespeare with the philosophy of science as Foucault and Canguilhem have described it and the recent arguments of Agamben? What happens, in short, when the "concept-in-life" gets *theatricalized*? Here it is worth pointing out a further limitation to Agamben's analysis that becomes immediately visible the moment we enter *A Midsummer Night's Dream*, namely his failure to consider in any systematic way the nature of literature and of fiction as constituting a kind of exceptional state, despite his repeated invocation of language and signification in order to provide an analogy for the structure of the law's sovereign ban. The consequences of this extension seem exciting: if the founding premise of fiction is an *absolute* suspension, a fully hypothetical premise of the "as if"—here *everything* proceeds *as if* it might be true but is not, *as if* it might exist but does not, *as if* it might be real but is not; here *everything* and *anything* is possible, precisely because it does not exist and can never be verified—and if, as Maurice Blanchot has argued, this fictional state results from a language that kills the world in naming it, only to have this death assume the paradoxical mode of a Lazarus-like half-life, the preservation of a life that has died but that persists in living, a world sustained by the artifice, the technology of language[9]—then we can see immediately how fiction becomes a state of exception and a peculiar mode of existence for the potentiality that is "bare" life, a life that is now stirring, now rustling, now moving, now proliferating in the rich culture of a fiction that is its growth-factor and system of life-support.

A Midsummer Night's Dream suggests just such an extension, furthermore, since the basic relationship between "Athens" and "Forest" that structures the play is simultaneously one between law and exception, reality and fantasy, city and stage, the space of the *polis* and of everything that lies outside it. We know that the topographic location of the theaters within the liberties in and around London granted them a certain

"exceptional" status; the mimetic conventions that made Elizabethan theater possible in the first place allow us to project the notion of a state of exception onto the vast plane of the invented, the fictional, or the diegetic, a world of immense potential that was simultaneously everything and nothing at once. Lysander exhorts Hermia to flee with him "to that place the sharp Athenian law / Cannot pursue us" (1.1.162–63), to be "gone from Athens" and "the peril of Athenian law" (4.1.152) that "yields you up . . . To death or to a vow of single life" (1.1.119–20), while Peter Quince and company meet "in the palace wood a mile without the town" (1.2.91) where they may rehearse their play, as Bottom puts it, "most obscenely and courageously" (1.2.96). Within the space of Athens, the law offers only choices that extinguish sexual desire; so-called "bare" life is figured here as a state of being-in-desire, which the law opposes as its negative determination, banning it, forbidding it, excluding it. Remaining within the terms of Agamben's analysis for a moment, we may see that Theseus performs an astute trick: while seeming to ascribe sovereignty to the abstract form of a law that is without human feeling or human judgment (he may not "extenuate" or intervene in the law of Athens and so would seem to exercise no authority over human desire, including his own), Theseus in fact retains sovereign power by granting an extension before the moment of the law's enforcement. "Take time to pause," he advises Hermia, while at the same time drawing Demetrius and Egeus aside, perhaps with a heavy persuasive hand, to "confer with you / Of something nearly that concerns yourselves" (1.1.125–26).

And so *A Midsummer Night's Dream* opens to the wood outside of Athens, the theatrical figure for the peculiar existence that unfolds within the shadows of the law's suspension. As I have suggested, the forest teems with forms of life at every scale of ontology and across every boundary, from God to mortal, human to animal, and beyond. But in all the profusion we should not lose sight of one ubiquitous and unusually adventurous form of "life" that seems especially to have captured Shakespeare's imagination. Who speaks, exactly? Who is "concerned?" Who escapes into the forest, away from the cold arms of the law that forbids desire? To state the problem as sharply as possible: is the dramatic character a form of "life"? A version of this question seems to me to haunt the antitheatrical objections that were so loudly voiced in Shakespeare's period, not to mention the history of criticism on Shakespeare's own characters, as Scott Maisano has pointed out: from Pope to Bradley to Bloom, the distinctiveness of Shakespearean character is that it seems so lifelike. As Pope put it:

> His *Characters* are so much Nature her self, that 'tis a sort of injury to call them by so distant a name as Copies of her . . . every single character in *Shakespear* is as much an Individual as those in Life itself; it is as impossible to find any two alike; and such as from their relation or affinity in any respect appear most to be Twins, will upon comparison be found remarkably distinct. To this life and variety of Character, we must add the wonderful Preservation of it; which is such throughout his plays, that had all the Speeches been printed without the very names of the Persons, I believe one might have apply'd them with certainty to every speaker.[10]

But in what *way* is a dramatic character "alive"? *How* it is alive, and what can its putative "livingness" tell us about the concept-in-life in general, and not simply about "human" life? This is the first caveat we must observe if we are to approach the question in a new way: we must not simply assume, like Pope, Bradley, or Bloom, that we are dealing with a human form of life. And we must also agree not to invoke *a priori* categorical distinctions between real and fictional entities: the anti-theatricalists of Shakespeare's period did not draw these distinctions, after all, and doing so tends to prevent the question from arising in the first place. One can always refuse to answer questions, but in the spirit of what has been called thinking from Socrates forward it seems important to try to resist doing so.

A longstanding way to answer the question (again from Socrates forward) has been to argue that dramatic characters imitate or simulate life but are not themselves living. The answer is limited on two grounds, it seems to me, one formal and one epistemological. Formally, the answer presumes a clear distinction between actor and character that it is the very purpose of drama to efface. Why attend the theater—what is "theater" in the first place?—if one refuses the idea of immersion in the role? Even the secondary critical pleasure of appreciating an actor's technique depends on the idea that the being of the actor and the being of the character merge and that neither would exist without the other: there can be no character without the actor, and there can be no actor without the character projected. The second objection is a broader one: it is surprising to realize how central a concept of imitation is to scientific epistemologies of life, not merely in sociological or anthropological accounts of life but in the "hard" sciences of biology and genetics.[11] It is not the only explanation, of course, but the problem of imitation funds a distinct and enduring cluster of arguments from the classical period through to our own. If life is at some level already understood in terms

of imitation, then obviously it makes no sense to dismiss a dramatic character as a mere imitation of life. It may be a different order or kind of imitation, but to describe one as "fictional" and the other as "real" or "factual" or "reproductive" soon founders on many examples one might draw from the history of poetics and of science alike.

A more fruitful way into the problem is to remember that for early modern writers the problem of the "fictive," or the "imaginary" and "invented," fell within the larger problem of the relationship between "art and nature," which itself formed the discursive domain for many arguments that we would today describe as "scientific" or "technological"; the anti-theatrical arguments we know from Shakespeare's period may be understood as anti-"technological" arguments, in the sense that they object to the unnaturalness of the *ars* or artifice implied by acting on stage. With this view in mind, I now propose that we approach the early modern theatre as a kind of machine with which to fashion or to project artificial life, and that these forms of artificial life provide an example of what N. Katherine Hayles and Timothy Lenoir, among others, have described as a posthuman condition, one in which the long-standing integrity of the category of the "human" has been variously compromised, both at the level of practice (especially in scientific research and scientific practice) and at the level of the concept.[12] However, rather than restricting the posthuman to a late twentieth-century stage of development within a longer spectrum of human-machine interfaces—as typified by nanotechnology, robotics, cybernetics, and recent forms of computer-generated texts—I will turn to Shakespeare for an example of a posthumanism that can cut across historical periods while also cutting across the "concept of the concept" itself.

There is a good deal of evidence to suggest that in the early modern period theaters *were* understood to be a kind of machine: theaters had mechanical parts that assisted in the projection of the "scene," as they called it, whether these were simple trap-doors, sound and lighting devices of the public stage (the metal sheets, grooved channels, and pyrotechnic effects that a playwright such as Jonson disdains) or the more elaborate scenic devices that Inigo Jones devised for court spectacles; at the same time, the classical architectural tradition, as communicated by the works of Vitruvius, Alberti, or Serlio, presented theaters as buildings constructed with the aid of tools and building machines in order to facilitate scenic representation. I would like to broach the comparison in a somewhat different way, however, by following the problems of "information" and "code" that for Canguilhem had become such powerful metaphors in twentieth century life sciences and that for Hayles has

come to distinguish twenty first century new media technologies. The concept of "information" was originally a quantitative one formulated by the mathematician Claude Shannon to describe the statistical measurement of a signal and its noise; it was distinct from both semantics (the meaning and content of the signal) and from pragmatics (the relevance of the signal to the user) and denoted only the formal principle of message that had been "encoded" into a series of electrical impulses for transmission. It didn't really matter what message had been sent, only *how* it had been sent and its signal-to-noise ratio.[13] Partly through Norbert Wiener's popularization of the concept in books such as *The Human Use of Human Beings*, the notion of information soon caught hold in other fields as a powerful analogy for thinking about many types of systems, whether social, biological, or linguistic. Since highly-organized systems showed a greater information rate than less organized systems, Wiener argued, information could be used to measure a system's capacity for organization and thus its capacity to resist the process of entropy that was dictated by the second law of thermodynamics. The concept of "control" was an essential correlate to "communication"—the greater the control, the higher the communication and organization—and Wiener named his new theory "cybernetics," from the Greek term for *cybernetike* or "steersman," the same term from which we derive our term "governor," in order to emphasize this crucial dimension.[14]

Nowhere was the information model more galvanizing than in the field of Artificial Life, which sought to build on early experiments in computing by Von Neumann and Wiener in order to write programs that would exhibit life-like behavior *in silico*: the self-assemblage and evolution of a complex, information-processing system that could be observed and measured in a computer environment. As Chris Langton, the founder of the field of Artificial Life, formulated the premise:

> most of the living things we know are physical embodiments of information processing entities. A good deal of what they do is based on processing information—not just materials, not just energy but information. Living organisms use information in order to rebuild themselves, in order to locate food in order to maintain themselves by retaining internal structure . . . the structure itself is information. You have to conclude that in living systems, information manipulation has really gained control, dominating energy manipulation.[15]

The premises of information theory held true at every level of the living entity, from cell to organ to individual to group; once the rules for

processing information had been identified, there was no theoretical reason why these rules could not be used to construct a system that began to exhibit "living" behavior: communication, decision-making, movement over difficult terrain, evolutionary selection. At this level of abstraction—at this level of the concept-in-*artificial*-life, we might say after Canguilhem—an essential question of definition emerged: why should an artificial system be any less "alive" than a natural system? The question seems absurd from a commonsensical or naïvely empiricist point-of-view, and yet modern robotics, computing, and biotechnology all furnish many examples of entities that demand an answer. Indeed current bio- and nanotechnological research has positively forced the question, in a neo-Cartesian form: "the current scientific model of living things," points out Rodney Brooks, a recent director of Massachusetts Institute of Technology's artificial intelligence laboratory, "is that they are machines whose components are biomolecules."[16]

Hayles has recently extended arguments from the fields of computation and Artificial Life into an analysis of electronic or digital literature, pointing out that it results from complex mathematical computations that are necessary to execute the commands of the programming code, which has itself been layered to create hierarchies of programs that compile, translate, and execute the different functions of the software. Many of these layers have been hidden from the reader-viewer, although some works of electronic literature deliberately manipulate this aspect of their production and integrate it into their signifying effects. Hayles distinguishes the concept of "code" from the concept of "language" in its colloquial as well as its theoretical senses: "code," she writes, "can be defined as a system of correspondences that relate the elements of one symbol set to another symbol set" (108). As a result, electronic literature "comes into existence as a *process* that includes the data files, the programs that call these files, and the hardware on which the programs run" (93); unlike a printed book, "the text exists in dispersed fashion even when it is confined to a single machine" (101). The importance of higher-level programming languages such as C++, Hayles argues, results from the fact that these hierarchies and embedded sequences grow more complex and increasingly intra-mediated, producing highly efficient, more adaptable, and more user-friendly programming capabilities: "The heart of this innovation is allowing the programmer to express her understanding of the problem by defining classes, or abstract data types, that have both characteristics (data elements) and behaviors (functionalities)" (58), she writes, in terms that might have been lifted directly from the theater:

> We can now see that object-oriented programs achieve their usefulness principally through the ways in which they anatomize the problems they are created to solve—that is, the ways in which they cut up the world. Obviously a great deal of skill and intuition goes into the selection of the appropriate classes and objects; the trick is to state the problem so it achieves abstraction in an appropriate way. This often requires multiple revisions to get it right, so ease of revision is crucial. (58–59)

Hayles cites Bruce Eckel, programmer and author of an influential book on so-called object-oriented programming languages: " . . . the computer is not so much a machine as it is a mind amplification tool and a different kind of expressive medium. As a result, the tools are beginning to look less like machines and more like parts of our minds, and more like other expressive mediums like writing, painting, sculpture, animation, or filmmaking" (60).

When explaining the status of playwriting and early modern authorship to our students, we often compare Shakespeare to a Hollywood scriptwriter. Why not employ the analogy of the programmer and the *coder*? If one of the defining characteristics of electronic literature is that it is "performative by its very nature" (101), as Hayles maintains, then one feels justified in proposing a counter-question: what if we take seriously the hypothesis that the early modern theater was the "new media" of the late-sixteenth century? All preconceptions to the contrary, it really isn't such a huge leap to argue that early modern plays were so many "programs" run off scripts on platforms with a complex architecture of parts or structural elements. What we call a "play" may as well be described as the actualization of a series of lines of significant units, at various scales, sequenced in combinations and nested in hierarchies, some highly formalized and familiar, others less so. Only the intervening attitudes of Romanticism make the description seem like a stretched analogy; we tend to forget the fundamentally *logical* foundation of early modern poetic composition, which resulted from the training in the *trivium* that dominated the grammar schools,[17] and in *Henry V* Shakespeare himself argues that theatrical representation requires an act of imagination that is really a type of mathematical calculation:

> . . . .But pardon, gentles all,
> The flat unraisèd spirits that hath dared
> On this unworthy scaffold to bring forth
> So great an object. Can this cock-pit hold
> The vasty fields of France? Or may we cram

> Within this wooden O the very casques
> That did affright the air at Agincourt?
> O pardon: since a crookèd figure may
> Attest in little place a million,
> And let us, ciphers to this great account,
> On your imaginary forces work.
> Suppose within the girdle of these walls
> Are now confined two mighty monarchies,
> Whose high uprearèd and abutting fronts
> The perilous narrow ocean parts asunder.
> Piece out our imperfections with your thoughts:
> Into a thousand parts divide one man,
> And make imaginary puissance. (*Henry V*, Prologue, 8–25)

That is how *he* explained to his audience the "technicity" of theatrical *mimesis*, the mystery of what happens when an actor enters the stage and begins acting, supported and facilitated by an artificial environment that allows him to project life without a soul.

Bearing Shakespeare's own plea in mind, we may return to *A Midsummer Night's Dream* and adapt Hayles's distinction between "code" and "language" to define as "code" all the different signifying systems *besides* language that enable the projection of the theatrical "scene," with its virtual locations populated by virtual objects and virtual life forms. These would include fully *embodied* or "histrionic" codes (gesture, movement, facial expressions, voice volume and tone) as well as *theatrical* codes (sound effects, lights, props, visual tableaux). One of the most distinctive aspects of theater, of course, and of the Elizabethan theater in particular, is that *language always becomes an aspect of the code*, in the sense that words function in a performative way from the very first moment they are spoken on stage, whether by locating a scene or by specifying a particular object from a larger class of objects with specific parameters and functions: *this* wall rather than any wall; *this* handkerchief rather than any handkerchief; *this* dagger rather than an abstract dagger (except for the actor playing Macbeth the dagger really *is* abstract, which indicates that Shakespeare is trying to get him to manipulate a concept as much as to grasp the handle of the knife that he will use to kill Duncan).

In addition to the hardware of the stage and its platform, then, we would find a series of codes that allow for the projection of the scene as well as a basic code-script consisting of different classes of words (nouns, pronouns, adjectives, verbs) that have a functional or performative rather than a merely descriptive effect: again, on stage, every single word, no matter how insignificant, has a function as well as a "meaning."

Nor should we imagine that this underlying code-script exists as a single coherent text, since, as Simon Palfrey and Tiffany Stern have shown, this code-script in fact existed as a series of discrete parts distributed among several different roles, each of which remained linked with but *at the same time* distinct from the other roles.[18] From a theatrical point-of-view, the so-called "play" imagined as a single, coherent unit is less important than the various *part-scripts* that would have been distributed to the actors and then assembled, with various levels of revision and alteration (which might continue from performance to performance, and especially in regional touring). The role of the actor is to act as a *translator* among the different levels of the code, from script to other theatrical effects, so that a coherent "play" is produced for the audience with a beginning, middle, and ending, a series of significant events and themes, a set of recognizable generic conventions, and a name (a title).

At every level, therefore, from script to body to surrounding performative effects, the Elizabethan theater was a multi-tiered platform from which the "play" emerged during the course of performance as an "assembled" work; what textual editing and bibliographic criticism has come to regard as the "script" is, of course, an impoverished artifact of a dynamic and essentially impermanent process that could never be fully recreated. And we know that the early modern playhouse was a highly interactive medium, first at the level of the actors, whose decisions constituted an active, shaping element of the play, as periodic objections by a playwright such as Jonson attests, or as the scenes featuring Bottom and company in *A Midsummer Night's Dream* manifest to us. And it was interactive, second, at the level of the audience, as we know from famous examples such as Beaumont's *Knight of the Burning Pestle*, or, again, from Jonson's comments to and about his audiences, or, again, from the final act of *A Midsummer Night's Dream*.

I propose, then, that in a culture without computers, indeed without any electrical mechanism or knowledge of electricity whatsoever (even lightning was not yet "electrical" to Lear or Cordelia or Guiderius or Juliet or Enobarbus or Lysander), the theater provided a device with which to experiment with different forms of life according to a variety of codes and "scripts": to examine its definitions, causes, variety, and significance, to model and to experiment with, in a word, its "character." Indeed, when we remember that the early modern use of the term "character" remained much closer to our modern sense of "code" than it did to a later notion of personhood or psychological identity, we can see the shape of an answer to our question—what can joining Shakespeare to the history and philosophy of science tell us about theatrical forms of

"life"?—emerging before us.[19] What we call "character" was for early modern writers, actors, and audience members alike a bundle or assemblage of significant units at difference scales, a code distributed across a series of registers that included words, gestures, objects and all embedded within—responding to and actively helping to shape—a "context" that was itself saturated with significant units of various types. As Wiener argued in his explication of cybernetic systems, what we call human "identity" is simply a relatively stable pattern of homeostasis: "we are not stuff that abides, but patterns that perpetuate themselves [. . .] the individuality of the body is that of a flame rather than that of a stone, of a form rather than of a bit of substance" (96, 101–02). This form emerges for the observer, including the self-observer, out of a series of minimally discernable elements (whatever the criteria of determination) that can be apprehended as assuming regularity both in the past (the verification of the pattern) and in the future (the probability or predictability of the pattern). This process can be called "viewing" or "reading"; it can equally be called "writing"; in its sharpest self-reflexive form it can be called "acting." All are processes of temporalization, in the sense of the regularlization of events *as* "events" unfolding in a lineal sequence as apprehended through the reflections (especially when in soliloquy) of self-cognizant creatures.

And what of the "concept" in this mimetic machine? Does the concept pre-exist any pattern as such and render it discernable—does the concept *reveal* the pattern—or does it emerge once the sequence has reached a certain level of complexity? Is "character" a fictional predication of a concept that is glimpsed in words and actions, or is the "character" a kind of personated excrescence, a ghost in the machine that assembles itself through the accumulation of singular "events," at whatever scale we choose to analyze them (word, sentence, gesture, speech, decision, "theme," scene, and so forth)? Viewed performatively (as it seems to me we must do), the dramatic "character" would correspond to the emergent concept of regularity of a certain type (the "personated" type), which concept is in turn signified by the proper name; the variation in speech-prefixes that we find in many of the printed editions of Shakespeare's plays is the empirical trace of this emergent process, as well as an indication that this process will always *exceed* the concept and the name that marks it so that it can endure. Because this process is so often psychological in the work of Shakespeare—we have learned to call *this* pattern of action "psychological" to no small degree from his plays, as well as from the work of editors subsequent to him—the overall form of each play as a whole emerges out of the smaller component patterns of

apprehension and understanding that each of the "characters" displays for us, in an almost fractal transposition across scales of information-processing.[20] When we consider that the substance of the dramatic "plot" and thus the overall structure of any single play was often provided by nothing less than the causes and consequences of the actions undertaken by these synthetic creatures, then we can understand how actions become predications of persons, both alphabet and grammar in a "dramatology" that produces early modern artificial life.

It would be difficult to find a better example of the process I am describing than the famous scenes in *A Midsummer Night's Dream* performed by Peter Quince and the "rude mechanicals," as Puck calls them, scenes in which Shakespeare experiments with the coded and intermediated nature of theatrical performance at several levels simultaneously: the level of syntax and punctuation, the level of the prop and location, and the level of part and character. In Hayles's terms, Peter Quince is a "compiler," a program written to match patches of code to the other simple programs, objects, and functions they are supposed to perform, and in doing so to "[translate] higher-level commands into the machine language" (*Computer* 59):

> QUINCE: Here is the scroll of every man's name which is thought fit through all Athens to play in our interlude before the Duke and Duchess on their wedding night.
> BOTTOM: First, good Peter Quince, say what the play treats on; then read the names of the actors; and so grow to a point. (1.2.4–10)

The assignation of parts follows, but not without confusion ("You speak all your part at once, cues and all" [3.1.93–94]), since the agency of the actors intrudes and modifies the play before it has even been written: "The Most Lamentable Comedy and Most Cruel Death of Pyramus and Thisbe" is emerging in all its conceptual hybridity before our eyes. The most important modification involves the addition of a framing program that will set the logical conditions for the main program that follows (which is itself, of course, a program embedded within an even larger program). Bottom and Quince debate the best numerical code for this framing program, which will have several layers of redundancy written into it to guard against its failure:

> BOTTOM: . . . I have a device that will make all well. Write me a prologue, and let the prologue seem to say we will do no harm with our swords, and that Pyramus is not killed indeed; and for the

> more better assurance, tell them that I, Pyramus, am not Pyramus, but Bottom the weaver. This will put them out of fear.
> QUINCE: Well, we will have such a prologue; and it shall be written in eight and six.
> BOTTOM: No, make it two more: let it be written in eight and eight. (3.1.15–24)

The purpose of the prologue is to control the parameters of communication for the different parts, with the result that the scenes accomplish the recursive trick of showing the code that constitutes all theatrical scenes, since Theseus and his court watch the *performance* and not the play, the assemblage of signifiers into virtual beings and the logic that organizes them:

> QUINCE: [O]ne must come in with a bush of thorns and a lantern and say he comes to disfigure, or to present, the person of Moonshine. Then there is another thing: we must have a wall in the great chamber; for Pyramus and Thisbe, says the story, did talk through the chink of a wall. (3.1.55–60)
> . . .
> BOTTOM: Some man or other must present Wall; and let him have some plaster, or some loam or some rough cast about him, to signify "wall"; and let him hold his fingers thus, and through that cranny shall Pyramus and Thisbe whisper. (3.1.63–67)
> . . .
> SNOUT: In this same interlude it doth befall
> That I, one Snout by name, present a wall;
> . . .
> This loam, this roughcast, and this stone doth show
> That I am that same wall; the truth is so. (5.1.154–161)
> . . .
> STARVLING: All that I have to say is to tell you that the lantern is the moon, I the man i'th' moon, this thorn bush my thorn bush, and this dog my dog. (5.1.252–54)

Language-as-code inflates every gesture with mimetic effect and animates the character as a creature who moves, speaks, acts, thinks, feels, and so forth. Or, as Bottom puts it in a typical malapropism, "You were best to call them generally, man by man, according to the scrip" (1.2.2–3): the line is amusing because it bespeaks the tension that always exists between a general concept of person and the specific name that "characterizes" that person, a tension that the script and the actor are supposed to suture together but which Bottom and company continually pull apart

in spite of themselves. With each rehearsal of a line, with each splitting and doubling of the actor's self, the stuttering repetition of the "rude mechanical" strains the personated concept, which stretches to include two entities in the "same" place, the same body. We find a "pullulation" in the concept, as Gilles Deleuze has put it, a teeming of individuals defined by their *sameness* and repetition and not by their difference.[21] The "character" is empirically identical to the actor and yet is not the actor; the character treads at the threshold of the person and opens it up to a double form. Unaccommodated man really is no more but such a poor, bare, forked animal after all.

In the end, Puck's nickname for the troupe focuses the question at hand: what makes the "rude mechanicals" *mechanical*? One aspect, of course, is their embodiment: they are craftsmen who work with their hands and with tools, rather than with their reason; their bodies constantly show through their role and give away the fact that they are acting, and thus are *artificial* persons; when speaking their lines, they insist on a literalism of meaning that collapses word or symbol into the body but manages also to reveal the artifice of theatrical language. But if the "rude mechanicals" are "mechanical" because they show the "human mortal," as Titania calls us, to be more hybrid, more artificial, and less conceptually coherent than it wishes itself to be, they are *rude* because they parade this somewhat uncomfortable truth shamelessly before us, even in front of Theseus, the governor who presides over the *polis* of Athens. "If we imagine no worse of them than they of themselves," Theseus remarks, "they may pass for excellent men" (5.1.214–15): the power of the sovereign lies in his capacity to repair the performance by interpreting actions, to "pick a welcome" from awkward pauses, to find "modesty" in "fearful duty," to "amend" the worst actors with his own sovereign "imagination" and in so doing to remedy the poet's inevitable excesses (5.1.100–01, 210–11). But Bottom *refuses* the sovereign command, interrupting his *cybernetike* because his distinguishing characteristic—the term is impossible to avoid in its common meaning, but Shakespeare has made it so much more—is *to persist in his mistakes*. In this way Bottom and company also confirm one of Canguilhem's intuitions: that to be "human" is to thrive in error, that knowledge is a state of perpetual dissatisfaction, and that if the concept is in life it is so only as a regulatory principle that is always inevitably exceeded.

"In the most general sense," Canguilhem has written, "organization is the solution to the problem of converting competition into compatibility. For an organism, organization is a fact; for a society, organization is a goal."[22] For Kant, the defining condition of Enlightenment as a public

and political mode of organization was obedience, a "contract of rational despotism with free reason," as Foucault has put it ("What is Enlightenment?" 37) that permitted the exercise of reason as a natural citizen and *not* as a machine. Only an "enlightened" reason operates without the support of the "statutes and formulas" that are the "mechanical tools" of tutelage; only such a reason is free of the "mechanism" that ensures "passive conduct" and "artificial unanimity"; only such a reason thinks for itself to the extent that "government . . . finds it to its advantage to treat men, who are now more than machines, in accordance with their dignity."[23] A noble sentiment, to be sure, and one well-worth adopting as a personal motto. I have often quoted Kant to my students. And yet if the Kantian formula has come to seem quaint in today's intermediated and interfaced world, surely this is because it so firmly sets aside the very categories we must begin to rethink if we are to imagine our posthuman future and even, as paradoxical as it may sound, to construct a new posthuman "Enlightenment." To do so, we would do well to return to a past moment that has never been as human as we thought it was, one that "thinks" itself not in concept but in figure, in metamorphosis, in imitation and in acting, only to find there the "shadows" of ourselves: to be a "rude mechanical"—like an actor, like a glover's son, like all of us—is to persist in error only to find that, in the end, a form of life has been accomplished all the same.

NOTES

1. With this essay I continue a line of inquiry begun in *Shakespeare's Double Helix* (London and New York: Continuum, 2007). All citations of *A Midsummer Night's Dream* are from the edition by Peter Holland (Oxford: Oxford University Press, 1994). I would like to thank Scott Maisano and Carla Mazzio for their suggestions on earlier drafts and Philip Lorenz, Mary Thomas Crane, and Ellen MacKay and Constance Furey for inviting me to deliver portions of it at the 2007 SAA, the 2007 MLA, and at Indiana University.

2. Evelyn Fox Keller, *Refiguring Life* (New York: Columbia University Press, 1995), *The Century of the Gene* (Cambridge: Harvard University Press, 2000), and *Making Sense of Life* (Cambridge, MA: Harvard University Press, 2002); Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life*, trans. Daniel Heller-Roazen (Stanford: Stanford University Press, 1988); Agamben, *Means Without End: Notes on Politics*, trans. Vincenzo Binetti and Cesare Casarino (Minneapolis: University of Minnesota Press, 2000).

3. Agamben, *The Open: Man and Animal*, trans. Kevin Attell (Stanford: Stanford University Press, 2003).

4. Michel Foucault, "Life: Experience and Science" in *The Essential Works of Foucault, 1954–84, Vol. II: Aesthetics, Method, and Epistemology*, ed. James D. Faubion (New York: New Press, 1998), 465–478. Neither tradition, it should be noted, was equivalent

to a "humanism," at least in Foucault's view; cf. Foucault, "What is Enlightenment?" in *The Foucault Reader*, ed. Paul Rabinow (New York: Pantheon, 1984), 43–45.

5. Foucault, "Life: Experience and Science," cf. Georges Canguilhem, "Epistemology of Biology" and "Knowledge and the Living," both in *A Vital Rationalist*, ed. Francois Delaporte, trans. Arthur Goldhammer (New York: Zone Books, 1994), 67–90, 287–319.

6. Cf. Richard Doyle, "Emergent Power: Vitality and Theology in Artificial Life," in Lenoir, ed. *Inscribing Science* (Stanford: Stanford University Press, 1998), 304–327. According to Doyle:

> By focusing on the 'genomes' of synthetic organisms, A-life performances succeed in producing the effect of 'lifelike' behavior in the context of simulation, with no original. They thus effectively mask the absence of any unified notion of life in contemporary life science, by preserving the idea that there is something called 'life,' giving a sense of reference to the concept of 'life' even as it is being displaced. (323–24)

7. Foucault, "What is Enlightenment?," 45; see Richard Doyle, *On Beyond Living: Rhetorical Transformations of the Life Sciences* (Stanford: Stanford University Press, 1997); Doyle, *Wetwares: Experiments in Postvital Living* (Minneapolis: University of Minnesota Press, 2003).

8. Foucault, "What is Enlightenment?," 46, 50.

9. "Literature and the Right To Death," *The Gaze of Orpheus*, trans. Lydia Davis, ed. P. Adams Sitney (Barrytown: Station Hill, 1981), 21–62.

10. "Preface" to *Works of Mr. William Shakespear*, ed. Alexander Pope, 6 vols. (London: J. Tonson, 1723 – 25), 1:xxii. Cf. Scott Maisano, "Infinite Gesture: Automata and the Emotions in Descartes and Shakespeare" in *Genesis Redux: Essays in the History and Philosophy of Artificial Life*, ed. Jessica Riskin (Chicago: University of Chicago Press, 2007), 63–84 and Random Cloud-Randall McCloud, "'The very names of the Persons': Editing and the Invention of Dramatick Character," in *Staging the Renaissance*, ed. David Scott Kastan and Peter Stallybrass (New York: Routledge, 1991), 88–96 (citing a portion of Pope's "Preface" as an epigraph on 88). Justin Kolb at the University of Wisconsin-Madison is currently preparing a full-length study of the problem of "character" in early modern drama in light of the work of Bruno Latour.

11. See Turner, *Shakespeare's Double Helix* (London and New York: Continuum Press, 2007) and Bernadette Bensaude-Vincent, "Nanobots and Nanotubes: Two Alternative Biomimetic Paradigms of Nanotechnology," *Genesis Redux*, 221–236.

12. See Timothy Lenoir, "Makeover: Writing the Body into the Posthuman Technoscape" *Configurations* 10 (2002): 203–220; N. Katherine Hayles, *How We Became Posthuman* (Chicago: University of Chicago Press, 1999); Hayles, "Refiguring the Posthuman," *Comparative Literature Studies* 41 (2004): 311–16; Hayles, *My Mother Was a Computer* (Chicago: University of Chicago Press, 2005).

13. See Kay's discussion of the problem in her *Who Wrote the Book of Life* (Stanford: Stanford University Press, 2000) and the excellent survey by William Aspray, "The Scientific Conceptualization of Information: A Survey," *Annals of the History of Computing* 7.2 (1985): 117–140.

14. See Norbert Wiener, *Cybernetics: Control and Communication in the Animal and the Machine*, 2nd ed. (Cambridge, MA: Massachusetts Institute of Technology Press, 1965); Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin, 1954); Wiener, *God and Golem, Inc.* (Cambridge: Massachusetts Institute of Technology Press, 1966).

15. Cited in Steven Levy, *Artificial Life: The Quest for a New Creation* (New York: Pantheon Books, 1992), 108. At the first conference on Artificial Life, Langton issued a manifesto:

> Artificial Life is the study of artificial systems that exhibit behavior characteristic of natural living systems. It is the quest to explain life in any of its possible manifestations, without restriction to the particular examples that have evolved on earth. This includes biological and chemical experiments, computer simulations, and purely theoretical endeavors. Processes occurring on molecular, social, and evolutionary scales are subject to investigation. The ultimate goal is to extract the logical form of living systems. Microelectronic technology and genetic engineering will soon give us the capability to create new life forms *in silico* as well as *in vitro*. This capacity will present humanity with the most far-reaching technical, theoretical, and ethical challenges it has ever confronted. (Cited in Levy 113–14)

16. Rodney Brooks, "The Relationship Between Matter and Life," *Nature* 409 (2001): 410. Cf. Karin Knorr-Cetina, *Epistemic Cultures: How the Sciences Make Knowledge* (Cambridge, MA: Harvard University Press, 1999), 145, discussing "the transformation of organisms into production sites and into molecular machines" and Bensaude-Vincent, 221–236.

17. See esp. Rosamond Tuve, *Elizabethan and Metaphysical Imagery: Renaissance Poetic and Twentieth-Century Critics* (Chicago: University of Chicago Press, 1947) and "Imagery and Logic: Ramus and Metaphysical Poetics" in *Renaissance Essays from the Journal of the History of Ideas*, ed. Paul Oskar Kristeller and Philip Wiener (New York: Harper and Row, 1968), 267–302.

18. Simon Palfrey and Tiffany Stern, *Shakespeare in Parts* (Oxford: Oxford University Press, 2007).

19. I draw on Peter Womack's excellent discussion of "character" in his *Ben Jonson* (Oxford: Basil Blackwell, 1986); on Jonathan Goldberg's extraordinary *Writing Matter: From the Hands of the English Renaissance* (Stanford: Stanford University Press, 1990), esp. 55, 117–21; and on Jean-Christophe Agnew's analysis of "artificial persons" in his ground-breaking account of theater in *World's Apart* (Cambridge: Cambridge University Press, 1986), 55, 117–121

20. In the work of Jonson, by way of comparison, this same phenomenon assumes a somewhat different form, since Jonson exploits the necessary gap between character and concept by turning it into a more theoretically self-conscious dramaturgy, an "art" of composition loosely but coherently designated by the phrase "comicall satyre": never quite historical (and thus libelous) nor quite allegorical (and thus masqued), the Jonsonian character splits the difference between referent and concept and swells through the act of imagination necessary to connect them. For Jonson, this act of imagination is always moral, the "understander" only the educated audience member who can apprehend a new taxonomy of social virtues and vices hovering immanently "in" or "over" the dramatic character, whose actions are so many ethical signatures for the moral concepts necessary for navigating urban experience. Since Jonson is everywhere concerned with what we could (anachronistically) call *social* life, the ethical concepts that emerge out of his drama are always predicated in ways that reflect this; indeed it is in the combination of variety and regularity of this predication that we can discern Jonson's notion of the "social": a world of consumption; of artifice; of classes, types, and groups of persons; of instrumental language, both positive (praise, wit) and negative (flattery, insult); of imitation of many different kinds.

21. Gilles Deleuze, *Difference and Repetition*, trans. Paul Patton (New York: Columbia University Press, 1994), 12–13.

22. Canguilhem, "Knowledge and the Living," 302.

23. Kant, "What is Enlightenment?" in *Foundations of the Metaphysics of Morals*, ed. and trans. Lewis White Beck (Indianapolis: Bobbs-Merrill, 1959), 86, 92.