Cognitive Ecology as a Framework for Shakespearean Studies

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"COGNITIVE ECOLOGY" is a fruitful model for Shakespearian studies, early modern literary and cultural history, and theatrical history more widely. Cognitive ecologies are the multidimensional contexts in which we remember, feel, think, sense, communicate, imagine, and act, often collaboratively, on the fly, and in rich ongoing interaction with our environments. Along with the anthropologist Edwin Hutchins,[1] we use the term "cognitive ecology" to integrate a number of recent approaches to cultural cognition: we believe these approaches offer productive lines of engagement with early modern literary and historical studies.[2]

The framework arises out of our work in extended mind and distributed cognition.[3] The extended mind hypothesis arose from a post-connectionist philosophy of cognitive science. This approach was articulated in Andy Clark's *Being There: Putting Brain, Body, and World Together Again,* and further developed by Susan Hurley and Mark Rowlands, among others.[4] The distributed cognition approach arose independently, from work in cognitive anthropology, HCI (Human-Computer Interaction), the sociology of education and work, and science studies. The principles of distributed cognition were articulated in Hutchins's ethnography of navigation, *Cognition in the Wild,*[5] and developed by theorists such as David Kirsh and Lucy Suchman.[6]

These models share an anti-individualist approach to cognition. In all these views, mental activities spread or smear across the boundaries of skull and skin to include parts of the social and material world. In remembering, decision making, and acting, whether individually or in small groups, our complex and structured activities involve many distinctive dimensions: neural, affective, kines-

thetic, sensory, interpersonal, historical, political, cultural, technological; indeed, each dimension in this necessarily partial list is itself wildly heterogeneous. Many cognitive states and processes are hybrids, unevenly distributed across the physical, social, and cultural environments as well as bodies and brains, hooking up in both temporary and more enduring ways with other people and with certain things—artifacts, media, technologies, or institutions—each with its own history and tendencies. In other words, this is a systems-level mode of analysis. System here is not to be seen at the relatively abstract level of Michel Foucault's *episteme* or even Pierre Bourdieu's *habitus,* but instead as dynamic, material, and non-localizable. In this view system ''cannot be understood in its development or function as strictly localized within one level of analysis.''[7] In a dynamic model of system, no one element can be identified as *the* unit of analysis. Rather, thought is distributed across insides (internal mechanisms constraining attention, perception, and memory); objects (artifacts and environments); and people (social systems). Because our practices of remembering or decisionmaking in cultural settings always involve the coordination of many disparate resources at once, we cannot assign any general analytic priority to one of these dimensions[8] The integrative label ''cognitive ecology'' particularly highlights the point that disparate but tightly interconnected elements within any such culturallyspecific setting operate in a complementary balance that shifts over time.

Although firmly grounded in contemporary sciences of mind, cognitive ecology thus has little in common with the rigid rationalist logicism of classical forms of cognitivism. Thinking is not the product of stable and determinate internal structures. Communication and action are not the mere expressions of the real cognitive processes in the head, but are thinking or remembering in action. A raft of loosely allied movements in the situated, embodied, and distributed cognitive sciences reject the individualist ''classical sandwich,'' by which ''mind'' stolidly mediates between input and output, perception and action, instead studying more-or-less intelligent practices in their cultural-historical settings.[9] As Hutchins describes it, the rule-governed top-down models of classical Artificial Intelligence have given way to increasing recognition of the inseparability of mind, body, and culture: rather than a brain-bound model of cognition that reduces thought to ''internal symbolic events,'' the proper unit of analysis is the ''cultural/cognitive ecosystem'' (''Cognitive Ecology,'' 707, 712).

For many philosophers of mind and cognitive scientists, the troubling claim in this integrative vision is that the boundaries of skull and skin do not encompass the mind. Although this is a materialist theory, mind is not identical to brain, for the naked brain alone—the naked human brain in particular—is not the sole basis of our psychological capacities. Human brains are adapted to latch on to, create, manipulate, incorporate, and assimilate external resources—tools, languages and notations, notebooks and neighbors—that have themselves become apt for incorporation. The individual is essentially incomplete, in being deeply sculpted and continually transformed by plugging in to wider socio-technical networks.[10] The idea is not that the isolated, unsullied individual first provides us with the gold standard for a cognitive agent, and that mind is then projected outward into the ecological system: but that from the start (historically and developmentally) remembering, attending, intending, and acting are distributed, co-constructed, system-level activities.

But for literary theorists and cultural historians, we suspect that the awkward terms are ''mind'' and ''cognition,'' both so historically labile and genealogically suspect, both so often redolent of reifying assumptions.[11] Many see ''cognition'' as excluding affect, and as wrapped up in managerial dreams and rationalist follies.[12] So we could just talk about remembering, feeling, reasoning, perceiving, dreaming, hearing, planning, walking, singing, communicating, and so on, given that one key departure here from universalizing individualism is that we reject the ideal of abstracting away to some single feature common to all these disparate activities. But we join Hutchins and Clark in polemically reclaiming the term. ''Cognition'' need not have the rationalist and individualist connotations: it does not exclude emotion, or even focus on ''thinking'' alone. Rather, ''the idea is that high-level cognition is produced by the culturally-orchestrated application of low-level cognitive processes to cultural materials.''[13] We retain the language of remembering, thinking, and decision-making because social and cultural histories need to acknowledge the extraordinary complexity of the collaborative intelligent agency and expertise of their actors. ''Mind'' is skilful activity rather than a stock of knowledge: the analysis of mind must therefore be fundamentally historical in character, because changing cultural artifacts, norms, and institutions are not external but partly constitute it.[14]

There are many potential examples of the relevance of cognitive

ecological models to early modern literary and cultural history. In this brief overview, we develop two: early modern theatrical history and recent historical interest in ''things.'' Cognitive ecology facilitates a system-level analysis of theater: this model of cognitive ecology would posit that a complex human activity such as theater must be understood across the entire *system,* which includes such elements as neural and psychological mechanisms underpinning the task dynamics; the bodily and gestural norms and capacities of the trained actors; the physical environment(s), including the relationships between playing and audience space; cognitive artifacts such as parts, plots, and playbooks; technologies such as sound or lighting; the social systems underpinning the company, including the mechanisms for ''enskillment''; the economic models by which the company runs; the wider social and political contexts, including censorship, patronage, and commercial considerations; and the relative emphasis placed upon various elements of the enterprise, including writerly or directorial control, clowning, visuality, and improvisation. No one of these elements is primary, but instead each affects and modulates the others.[15]

For an example of how such a model might work, we can consider the cognitive ecology of attention in the theater. Any performance has designs on mechanisms of attention and perception, but these are not simply biological phenomena, but are fundamentally also properties of social and material systems. Vision is a skilled practice; as Christina Grasseni suggests in her work on the development of ''skilled vision'' for identifying good breeding stock among Tuscan cattle: ''Vision, like the other senses, needs educating and training in a relationship of apprenticeship and within an ecology of practice.''[16] While attention and perception are cognitive mechanisms, they are also fundamentally cultural in nature, shaped by rich social knowledge of particular cultural fields. Early modern audiences possessed a rich intuitive understanding of social conventions and hierarchy that would have been integrated into the economy of attention on the early modern stage. Yet attention is also technologically mediated. Shakespeare's players had the resources of sound, including voice, sound effects, and music. These were used extensively in commanding attention; offstage sounds such as flourishes, alarums, and knocks directed audience and actors' attention, and high intensity sounds often began the plays.[17] The vocal and gestural expertise of the players was essential in manipulating and managing attention and perception. In ''The Charac-

ter of an Excellent Actor,'' possibly written by John Webster, the actor is described as engaging the audience through his physical and kinetic prowess: ''by a full and significant action of body, he charmes our attention.''[18]

In contrast, contemporary theaters rely heavily upon the technology of lighting to literally throw focus on particular stage areas and to attract the audience's eyes. In this environment, the work of attention is given over almost entirely to the lighting technician. This change in the cognitive ecology of the theater has a far-reaching effect. Lighting is a powerful technology for managing attention and manipulating mood and affect. Yet it is also a demanding taskmaster and profoundly alters relationships among actors, audience, and behind-the-scenes theatrical workers. Lighting requires that blocking be planned in advance; the on-the-fly conventions of movement across the stage that governed Shakespeare's actors cannot be employed once movement must be coordinating with lighting technology. The use of lighting requires technical rehearsal and centralized planning of the sort associated with concept-oriented directing. The coordination of the actors with this particular technological system becomes of overriding importance.

This is only one of many examples of *interplay* of internal cognitive mechanisms and social and material environment. Cognitive ecologies are always dynamic—as one element changes, others may take up the slack, so to speak. A model of cognitive ecology would predict that some systems will place more or less weight on internal mechanisms, on central control, or on particular forms of cognitive artifacts and social systems; as one element changes, the others shift as well. For this reason, a model of cognitive ecology can help to shape and theorize much recent innovative work in theatrical history. An ecological model is highly compatible with the emphasis on company-centered and repertory-based theatrical histories such as *The Children of the Queen's Revels* and *The Queen's Men and their Plays.*[19] As Sally-Beth McLean and Scott McMillin argue, the Queen's Men relied upon an improvisational, open style that invited clowning and audience participation, to some extent at the expense of writerly control. In contrast, the children's companies prior to 1600, with their limited repertory and relatively long rehearsal times (in contrast to the adult male companies), used a schooling model in which explicit direct instruction was apparently common.

Moreover, the recent work on the apprenticeship system in the

adult companies by David Kathman could be shaped through an ecological model focused on the ''enskillment'' processes used to train the boy actors.[20] Other contemporary anthropological research on the induction of novice practitioners into a skilled workplace setting has confirmed the importance of the social and environmental surround. Grasseni argues that perception is not an inert mechanism, but instead must be trained through a process of ''education of attention'' (43). In such a system ''specific sensibilities and capacities . . . are engendered through the active socialisation of apprentices into structured and shared contexts of practice'' (46–47). This framework demands that we examine the ''process of enskillment in a culturally, socially, and materially structured environment'' (43). Kirsh's argument that Distributed Cognition is the study of the ''variety and subtlety of coordination'' has profound implications for the way we understand skill—as Downey writes, ''learning a skill is the development within the novice of an ability to coordinate the body with the environment.''[21] Skill is profoundly social. Even when practiced in isolation, skill is undergirded by a myriad of social practices, technologies, and tools and emerges within rich social, material, and somatic environments.

Similarly, objects and artifacts must be seen as integral to a model of cognitive ecology. Bodies, spaces, artifacts, and environments are all coordinated in a cognitive ecological model, and agents both shape and are in turned shaped by their manipulation of objects. As Grasseni writes, ''any mental process is artefact-mediated, and any thought is cultural. Cognitive artefacts are then the key vehicles through which culture becomes part of the environmental system'' (47). Here the work of Tiffany Stern, Simon Palfrey, and Paul Menzer on the importance of the cognitive artifact of the cue-script is also amenable to analysis through an ecological framework. [22] Palfrey and Stern argue for the profound shaping of early modern theatrical practice by the actors' parts. Parceled out to individual players, these parts formed the basis of the private study that was the primary mode of preparation for performance. Since these parts contained only the player's own lines and his cues, they afforded careful attention to the changing passions of the role. ''Affordance'' is a term coined by J. J. Gibson. An ''affordance'' is that feature of an object or an environment that invites a certain mode of use and discourages others, as a chair ''affords'' sitting. While a chair can be used to stand upon, using it in this way goes against the grain of the design; one can sit on a ladder, but not very com-

fortably.[23] The affordance of the cue-script is access to unfolding sense of the "passions" of each character—information that is actually quite difficult to glean amid the myriad of other distractions in a playbook. In contrast, a playbook obscures the salient material for an actor—his own lines—with the result that most contemporary actors use the technology of highlighting to draw attention to them. As important as the cue-script is, however, it is only one element in the wider ecology and should not be seen as the master locus of control. While the cue-script affords some activities and constrains others, these actions must be seen within the wider context of human skill and activity in which they are situated. Players aimed at "artful accomplishment" of the smoothest possible performance. [24] This model implies coordination, planning, and error correction, through an ongoing mutual modulation of the unfolding time-pressured event. Such modulation could be achieved even in performance through gestures (subtly or otherwise signaling the interlocutor to await the full cue, for example). Despite the individual study of the part, and despite the dispersal of the play into these atomistic units, theater is a group exercise and involved group expertise.[25] The social dynamic of rehearsal and performance would include attention to mistakes and self-correction, of the sort no doubt facilitated by the use of the repeated cue, through the entire array of embedded experience and tacit knowledge that underpins successful group coordination.[26]

This example confirms the particular ways in which embodied individuals, skilful groups, and parts of the physical and technological environment are interanimated in distinctive historical settings. Cognitive ecology can thus also enrich recent work on things and in historical phenomenology. For Jonathan Gil Harris, for example, both objects and sensations are time travellers, saturated with the imprints of many other times.[27] So matter is untimely, out of time with itself, in that the sedimented past resists absorption and will not be superseded. It's not that the past haunts the present in some spectral way, but that it actively works in and through present objects. Anachronism is thus a feature of things, not of certain theories, because multiple traces—many apparently obsolete— are always pluralizing and problematizing settled chronologies. With objects riddled by traces, coordinating or competing, poly-temporality may be intrinsic to matter: but this does not dictate any particular temporality as inherent in a thing. Its temporality is rather generated by what happens, by what we do with it and how

it responds, by reworking and reading and reactivating. Harris reads ''the sulphurous odor of *Macbeth*'s fireworks,'' for example, as generating ''polychronic experiences'' of ''a compression of different times,'' conjuring in deadly conjunction both ''the spectre of the Gunpowder Plot'' and the older olfactory coordinates of Catholic ritual (119, 139). Matter is always in process, implying and inviting the dynamic formation of new hybrid assemblages in which bodies and objects distribute agency across a ''symbiotic system comprising supposedly disparate elements that act in concert'' (144).

To the views in poststructuralism and science studies with which Harris aligns this account, we can now add the integrative framework offered by cognitive ecology. As we have sketched it, the distributed elements in any richly interconnected cognitive assemblage are all changing at different rates as they interact in changing assemblages. The traces and potentialities left by these interactions are not erased as the system moves into new states, or as some of its elements migrate. This cognitive ecological approach thus stands to enrich a range of questions currently engaging early modern studies, including in theatrical history, historical phenomenology, object studies, and body studies. Moreover, such an approach helps to build theoretically and historically informed accounts of skill, within a genuinely embodied and extended model of cognition.

Notes

1. Edwin Hutchins, ''Cognitive Ecology,'' *Topics in Cognitive Science* 2 (2010): 705−15.

2. The term cognitive ecology itself was borrowed by the biological sciences from cognitive science as a means of integrating behavioral ecology ''with an understanding of the underlying psychological and neural mechanisms,'' Sue Healy and Victoria Braithwaite, ''Cognitive Ecology: a field of substance?'' *Trends in Ecology and Evolution* 15 (2000): 22–26, esp. 22; see also Reuven Dukas and John M. Ratcliffe, eds., *Cognitive Ecology II* (Chicago: University of Chicago Press, 2009) and Janet Dixon Keller, ''Human Cognitive Ecology: an Instructive Framework for Comparative Primatology,'' *American Journal of Primatology* 62 (2003): 229−41.

3. See Evelyn Tribble, *Cognition in the Globe: Attention and Memory in Shakespeare's Theatre* (New York: Palgrave MacMillan, 2011); John Sutton, ''Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process,'' in R. Menary, ed., *The Extended Mind* (Cambridge, MA: MIT Press, 2010), 189−225.

4. See *Being There: Putting Brain, Body, and World Together Again* (Cam-

bridge, MA: MIT Press, 1997); Susan Hurley, *Consciousness in Action* (Cambridge, MA: Harvard University Press, 1998); Mark Rowlands, *The Body in Mind: Understanding Cognitive Processes* (Cambridge: Cambridge University Press, 1999), and *The New Science of the Mind: From Extended Mind to Embodied Phenomenology* (Cambridge, MA: MIT Press, 2010).

5. Ed Hutchins, *Cognition in the Wild* (Cambridge, MA: MIT Press, 1995); see also Bruno Latour, ''*Cogito ergo sumus!* Or, psychology swept inside out by the fresh air of the upper deck: review of Hutchins 1995,'' *Mind, Culture, and Activity* 3 (1996): 54–63.

6. David Kirsh, ''The Intelligent Use of Space,'' *Artificial Intelligence* 72.1–2 (1995): 31–68; David Kirsh, ''Problem solving and situated cognition,'' *The Cambridge Handbook of Situated Cognition,* ed. P. Robbins et al. (Cambridge: Cambridge University Press, 2009), 264–306. See also Lucy Suchman, *Human-machine Reconfigurations: Plans and Situated Actions* (Cambridge: Cambridge University Press, 2007).

7. William Clancey, ''Scientific Antecedents of Situated Cognition,'' *Cambridge Handbook of Situated Cognition,* 11–34, esp. 17

8. David Kirsh, ''Distributed Cognition: A Methodological Note,'' *Pragmatics and Cognition* 14 (2006): 249–62. See also Steven D. Brown, ''The Quotation Marks have a Certain Importance: Prospects for a 'Memory Studies,'' *Memory Studies* 1.3 (2008): 261–71.

9. The term ''classical sandwich'' originates with Susan Hurley, *Consciousness in Action* (Cambridge, MA: Harvard University Press, 1998). See also John Haugeland, ''Mind Embodied and Embedded,'' in *Having Thought: Essays in the Metaphysics of Mind,* ed. John Haugeland (Cambridge, MA: Harvard University Press, 1998), 207–37; Margaret Boden, *Mind as Machine: A History of Cognitive Science,* 2 vols. (Oxford: Oxford University Press, 2006); Andy Clark, *Supersizing the Mind: Embodiment, Action, and Cognitive Extension* (Oxford: Oxford University Press, 2008).

10. See Clark, *Supersizing the Mind;* Sutton, ''Exograms and Interdisciplinarity.''

11. See Anna Wierzbicka, *Semantics, Culture, and Cognition: Universal Human Concepts in Culture-Specific Configurations* (Oxford: Oxford University Press, 1992); Paul S. MacDonald, *History of the Concept of Mind: Speculations about Soul, Mind and Spirit from Homer to Hume* (Aldershot: Ashgate, 2003).

12. For a discussion of ''cognitivism'' as roughly equating ''managerialism,'' see Slavoj Žižek, ''Cultural Studies versus the 'Third Culture,''' *The South Atlantic Quarterly* 101. 1 (2002): 19–32.

13. Edwin Hutchins, ''Enaction, Imagination, and Insight,'' *Enaction: Towards a New Paradigm in Cognitive Science,* ed. J. Stewart, O. Gappene, and E. di Paolo (Cambridge MA: MIT Press, 2011), forthcoming.

14. John Sutton, ''Spongy Brains and Material Memories,'' in *Environment and Embodiment in Early Modern England,* ed. Mary Floyd-Wilson and Garrett Sullivan (Basingstoke: Palgrave, 2007), 14–34.

15. For a fuller account of Distributed Cognition and theatrical history, see Evelyn Tribble, *Cognition in the Globe: Attention and Memory in Shakespeare's Theatre* (New York: Palgrave, 2011).

16. Christina Grasseni, ''Skilled Vision: An Apprenticeship in Breeding Aesthetics,'' *Social Anthropology* 12 (2004): 41–55, esp. 41.

17. Bruce Smith, *The Acoustic World of Early Modern England: Attending to the O-Factor* (Chicago: University of Chicago Press, 1999).

18. [John Webster?], ''The Character of An Excellent Actor,'' in *Actors on Acting,* ed. E. T. Cole and H. K. Chinoy (New York: Crown, 1949), 89.

19. Lucy Munro, *Children of the Queen's Revels: A Jacobean Theatre Repertory,* (Cambridge: Cambridge University Press, 2005); Scott McMillin and Sally-Beth MacLean, *The Queen's Men and their Plays* (Cambridge: Cambridge University Press, 1998); see also Roslyn L. Knutson, *Playing Companies and Commerce in Shakespeare's Time* (Cambridge: Cambridge University Press, 2001).

20. David Kathman's recent work on apprenticeship includes ''Players, Livery Companies, and Apprentices,'' in *Oxford Handbook on Theatre History,* ed. Richard Dutton (Oxford: Oxford University Press, 2009), 413–28; ''How Old Were Shakespeare's Boy Actors?,'' *Shakespeare Survey* 58 (2005): 220–46; ''Grocers, Goldsmiths, and Drapers: Freemen and Apprentices in the Elizabethan Theater,'' *Shakespeare Quarterly* 55. 1 (2004): 1–49.

21. G. Downey, ''Scaffolding Imitation in Capoeira: Physical Education and Enculturation in an Afro-Brazilian Art,'' *American Anthropologist* 110 (2008): 204–13, esp. 211

22. Tiffany Stern, *Rehearsal from Shakespeare to Sheridan* (Oxford: Oxford University Press, 2000); Simon Palfrey and Tiffany Stern, *Shakespeare in Parts* (Oxford: Oxford University Press, 2000); Paul Menzer, *The Hamlets: Cues, Qs, and Remembered Texts* (Newark: University of Delaware Press, 2008).

23. J. J. Gibson, *The Ecological Approach to Visual Perception* (Boston, Houghton Mifflin, 1979), 127–36; Bruce McConachie discusses the usefulness of Gibson's term in relationship to spectatorship and attention in*Engaging Audiences: A Cognitive Approach to Spectating in the Theatre* (Basingstoke: Palgrave Macmillan, 2008), 74.

24. Lucy Suchman, ''Centers of Coordination: A Case and Some Themes,'' *Discourse, Tools, and Reasoning: Essays on Situated Cognition,* ed. L. B. Resnick (Berlin: Springer, 1997): 41–62, esp. 50.

25. See R. Keith Sawyer, ''Improvisational Cultures: Collaborative Emergence and Creativity in Improvisation'' *Mind, Culture and Activity.* 7. 3 (2000): 180–85.

26. Menzer, *Cues, Qs,* discusses error correction and social coordination in his discussion of the cue-scripts for *Hamlet.*

27. Jonathan Gil Harris, *Untimely Matter in the Time of Shakespeare* (Philadelphia: University of Pennsylvania Press, 2009).