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Literature Meets Biology: An Evolutionary Approach to Literary Studies

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LITERATURE MEETS BIOLOGY:

AN EVOLUTIONARY APPROACH TO LITERARY STUDIES

INCLUDING A READING OF HEJINIAN'S *MY LIFE* AND SHAKESPEARE'S *KING LEAR*

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Introduction

Fifteen years ago, a conversation began between the human sciences and the humanities when the English professor Joseph Carroll, fed up with the direction literary criticism had taken, picked up Charles Darwin's seminal book, *On the Origin of Species*, and decided he had found the solution to literary criticism's incoherence. Carroll applied Darwin's biological theories to the human behaviors of reading and writing fiction. The eminent biologist E.O. Wilson then remarked that he, too, had been thinking along those lines in the '60s and '70s, well before Carroll, when he was in the midst of a great controversy surrounding his theories of sociobiology and coming up with the idea of consilience between disciplines. In 1998, Wilson published his book *Consilience: The Unity of Knowledge* detailing his vision. Carroll wrote a couple books, *Evolution and Literary Theory* and *Literary Darwinism,* using theories from another important work: *The Adapted Mind,* a collection of writings edited and contributed to by Jerome Barkow, Leda Cosmides and John Tooby, which built on Wilson's earlier work. The premise is that the human mind has been shaped by natural selection and adapted to its environment with specific traits or tools, one of which seems to be art, or storytelling, or creativity. Stephen Pinker harshly critiqued social sciences and humanities that deny human nature in his book *The Blank Slate*. Brian Boyd examined possible adaptationist explanations for the human propensity to invent fictions in *On the Origin of Stories*. He called the theory evocriticism since it combines evolution with literary criticism. The conversation that started as a low murmur began to attract attention. Much of it was dismissive or hostile, but some was hesitantly curious. This thesis joins their conversation.

Like Carroll, I stumbled on the idea of a new paradigm for literary studies through an interest in science and a frustration with the current state of literary criticism. From a vague desire to explore a connection between science and literature I moved to a strong insistence on reevaluating the way we study literature to include a basis in a scientific understanding of human nature. A firm foundation in what we can observe, test, and repeat will give us a much better place from which to leap into the creative conjecture of literary studies.

Evolutionary psychology is a burgeoning field in the sciences that offers one place to begin our understanding of human nature. Evolutionary psychology starts with the claim that human minds are products of evolution and can be understood in terms of adaptations for specific functions. What those adaptations are, how they evolved, and what purposes they serve are not yet completely known. Because it is a new field, false starts and conjectural leaps led to overeager identification of brain modules for everything, including qualitative reactions that could be explained better by several adaptive functions overlapping to produce complex behaviors, or simply cannot yet be explained by the theories we have. For example, we do not have specific spots on the brain where "fear" goes or a lump out of which "love" springs. Critiques of evolutionary psychology on these grounds are well founded and must be heeded. But that does not mean the entire endeavor should be disregarded, and currently, as the research matures, it gains in credibility. Another vital source for data applicable to the humanities is established science informed by broader research in evolutionary biology, including the social sciences such as psychology and anthropology. If claims from evolutionary psychology are too young, we can still use evolutionary biology to look at behavioral patterns. While we still debate the exact adaptive functions in the human brain, we can observe certain adaptive behaviors found across species, such as parenting strategies.

Importantly, the intermixing of science and literature must be careful, using in-depth studies, not simply borrowing ideas at the surface level. Admittedly, it is difficult in a world of incredibly specialized education to have the time or capacity to take on multiple fields of study. However, a broader picture of human knowledge cannot be ignored when research leaves the closed halls of a department to enter the world, either as a practice, in teaching, or in publications. If we ignore the bigger picture or fail to communicate our ideas convincingly and clearly, then literary theory will remain an isolated study that struggles to justify itself. For example, people not trained in the humanities see some of literary theory's foundational claims, such as the blank-slate theory or the denial of the existence of reality, as unsupported, radical assertions that undermine the validity of literary theory and criticism. So despite the difficulty of cross-disciplinary research, we must try to reintegrate the humanities, both internally and with the rest of academia.

In order to strengthen English departments, attract students, and have a deeper understanding of the literary works we study, we must have a system of literary theories made of the best qualities of all criticism, theory and literature, combined with basic coherence and consilience with other modes of knowledge. E.O. Wilson coined the term "naturalist literary critic" to describe a humanities scholar who integrates his or her work with other bodies of knowledge in complementary ways, much like scientists in different areas of study try to reconcile their theories with related disciplines, such as physics, chemistry, biochemistry, and biology. The different levels of analysis nest together, complimenting each other. When they disagree, this is a red flag for further study. In literature, this framework would revive the humanities through interdisciplinary discussion, clarity of communication, and support for our

working models of human nature and the world provided by rigorously reviewed data from the sciences.

The following thesis first outlines the problems with literary theory today, then introduces evocritical theory, briefly describes evolution, and finally pulls all of these elements together by applying evocriticism to two texts. This format is common to evocriticism because it combines science and literature, which most people aren't simultaneously expert in, so each aspect must first be explained sufficiently before supported claims can be made. The following chapter develops the argument that critical analysis and literary theory need input from current empirical science to reach strong conclusions. The second chapter describes the current literature in evocriticism and outlines this method for analyzing texts. The third chapter explains the major evolutionary concepts I will use. Finally, the last chapter demonstrates evocritical approaches with two examples of how this type of literary criticism can work by looking at Lyn Hejinian's poem *My Life* and Shakespeare's *King Lear* before moving on to the conclusion, which sums up my approach to evocriticism and literary theory.

Chapter 1: The Present State of English Departments

I. The Descent of Humanities

What if the humanities no longer studied what it means to be human and English departments no longer studied the heights of human achievements in literature? The state of the humanities, and in particular English literature, is largely in disarray. Enrollment has declined, budgets have shrunk, and the scholarly conversation has become small and specialized. Students stay away from English departments in droves. The few who do still major in English graduate with a degree that is difficult to translate for employers, and though they may have learned many valuable skills, English students' writing portfolios are often full of language and ideas that require extensive knowledge of literature and literary theory to comprehend. The remaining scholars of the discipline find they mostly talk to themselves; other people (in both the general public and in other areas of academia) frequently ignore or ridicule the ideas and language coming out of critical theory as incomprehensible nonsense.[1] Often the humanities deny human nature and sometimes insist culture completely constructs reality. Publications resort to polemics to draw readers into arguments rather than debates. The entire endeavor suffers. These patterns are current problems for many English departments.

For example, in the last forty years the percentage of undergraduates majoring in the humanities has declined by half. While this may be partly due to economic factors, as students switch to business majors or career-track majors like law, nursing, or education, it is largely due

[1] *The Onion* offers a humorous example of this attitude in the article "Grad Student Deconstructs Take-out Menu," which tells the story of an English grad student who "was finishing a particularly difficult course-pack reading on the impact of feminism, post-feminism, and current 'queer' theory on received notions of gender and sexual preference/identity. Realizing he hadn't eaten since lunch, the PhD candidate picked up the Burrito Bandito menu. Before he could decide on an order, he instinctively reduced the flyer to a set of shifting, mutable interpretations informed by the set of ideological biases—cultural, racial, economic, and political—that infect all ethnographic and commercial 'histories.'" The article goes on to mock nearly every fashionable theory. Of course, this mockery only amuses the hip crowd that reads *The Onion.* Most people simply don't know or care about what goes on in English departments.

to the English departments themselves. We tend to isolate ourselves with ideals (studying literature is an art requiring discipline of the mind in order to oppose the capitalist, imperialist systems of oppression) impractical for people who need to function outside the university. English departments may talk about the cognitive thinking and communication skills students develop, which are important in any career, but these broad concepts are hard to market to employers who want specific, relevant experience. The economic disincentives driving students away are closely linked with the cultures of English departments, which downplay economic considerations and dispute material realities. While other factors contribute to the decline of English departments, current methods and literary theory exacerbate the problems.

But, hope exists. English departments and professors still succeed in turning a love for literature into a method for exploring, understanding, and analyzing the world around us, and then communicating that knowledge with others. Though numbers in humanities departments have declined and literary theory is a jumble of splintered factions, the literary tradition is strong. And many different theoretical perspectives can be a positive source of variation from which new ideas spring, if we could find a common language and a little more coherence. Hopefully that coherence and common language will come with the new movement to reintegrate the humanities with the rest of academics and with what can be determined about objective reality that is developing.

First, a closer look at the current problems in English departments is necessary before moving on to the burgeoning efforts to address them. English literature as a discipline is disorganized, with few fixed rules. We do not have a common method for study, a canon, or even a language to use in which the terms, definitions, or grammar are agreed upon. The methods for study we do learn most often rely on the authority of certain texts or authors rather

than current, objective information.[2] In addition, the study of literature has become closely linked with political agendas in complicated ways so that the study of a text often becomes a wrangling of the text into some relationship with a political system. Too often, these political theories and readings become hypocritical, exchanging one oppressive system for another.[3] Or, they are ineffectual; either paralyzing action by constructing a totalizing system that always incorporates any effort at resistance,[4] or diverting action in directions where it does little good because the basis of the theory is faulty. This last problem stems mostly from a common fallacy in the humanities: that humans are blank slates by nature, whose behaviors are completely inscribed by culture and so if we change culture we will change unwanted behaviors. The next section will further explain the difficulties associated with the blank-slate theory of human nature that leaves out biological factors.

Each of these problems needs to be looked at more closely, and none are black and white. To a degree, open-ended study, building on previous work, and political awareness are essential to any field. However, lack of direction, dependence on tradition more than experience, and textual distortion to support or oppose causes can be detrimental. In this section, I look at these aspects mostly as problems that need to be addressed, but I do not think everything we are doing

[2] For example, we learn Marxism, Foucault's history, Freudian analysis, and Derridian deconstruction and Lacanian linguistics, rather than economics, sociology, history, psychology, or linguistics as they currently exist in their fields. The required text on literary theory for the Introduction to Graduate Studies course at the University of Montana was printed in 2008, but the large majority of the anthologized works, meant to be a basis for our own literary criticism, was written between the 1920s and 1970s. In the later chapters, which we never got to in a volume over 1,200 pages long, some writing is included from as recently as 2003. However, that excerpt supports its thesis by referencing Jacques Derrida and Lévi-Strauss.

[3] I notice this most frequently in feminist theory that essentializes males and females, even though it does so in the name of empowering women. Sometimes claiming higher value for "female" traits like intuition, a connection with the earth, and nurturing nature can be just as restrictive as the patriarchal system that gives females those same attributes but undervalues them.

[4] Foucault's theories of power relations and the panopticon do not seem to replace an oppressive system with another so much as claim to reveal an oppressive system and then foil any sort of change by saying resistance is futile and only feeds the existing structures.

in English departments needs to be summarily thrown out. We do need a more careful basis for our claims and better communication all around.

II. Current problems with literary theory

When we do a close reading of a text, analyzing the language and other formal elements, and fit that data into a specific approach, we are trying to understand not only the literature, but also the external world and human nature. Therefore, it is very important we use the best theories of human nature and the most objective and supported observations of the world when we approach a text. In the forward to *Literary Animal,* E.O. Wilson writes, "To explain what they [authors] have accomplished, or have not accomplished, and why and, further, how literature evolves and, finally, the role it plays in culture—all that is the responsibility of the literary theorist" (xi). Between literary theory, theoretical application, and literary analysis, we create a framework, look closely at the text to see what it does and tries to do, fit it generally into the context of literary and cultural history, and explain readers' responses over time. When we write criticism we always come from a theoretical perspective, whether it is explicitly stated or not. Criticism also molds theory; as we apply theory through literary analysis we adjust and shape the theory.

A contributing factor to the disorganization in literary theory today is that we often try to answer what a text does or does not accomplish, why, how, how that has changed over time and the role it plays in culture all at once. Or worse, we answer one question and then defend our position from other scholars who read the same literature but try to answer a different question. One way to fix the conflict is to separate the questions into proximate and ultimate levels of

analysis. Proximate questions usually ask who, what, where, when, and how and the answers are descriptive. Ultimate questions ask why and the answers are explanatory. Proximate and ultimate levels of analysis are both necessary and complimentary, but can sometimes lead to confusion and conflict. If one person examines what happens in a text and how, and another critic looks at the role the text plays in culture and why, the two outcomes will be different. If the two scholars attack one another's conclusions because they see them as mutually exclusive, competing theories, rather than two levels of the same study, then fracturing and discord will follow, rather than progress.

This sort of conflict is often what underlies the accusations of stubbornness, spiteful factions, and confusion that William Chace, English professor and university president emeritus of Emory University, levels at English departments: "English has become less and less coherent as a discipline and, worse, has come near exhaustion as a scholarly pursuit." Chace blames the lack of a set canon and "a variety of critical approaches jostling against each other" as professors pursue their own interests at the expense of any common ground from which to build a solid discipline. In "The Decline of the English Department" Chace writes in the *American Scholar,*

> To teach English today is to do, intellectually, what one pleases. No sense of duty remains toward works of English or American literature; amateur sociology or anthropology or philosophy or comic books or studies of trauma among soldiers or survivors of the Holocaust will do. You need not even believe that works of literature have intelligible meaning; you can announce that they bear no relationship at all to the world beyond the text. Nor do you need to believe that literary history is helpful in understanding the books you teach; history itself can be shucked aside as misleading, irrelevant, or even unknowable. In short, there are

> few, if any, fixed rules or operating principles to which those teaching English and American literature are obliged to conform.

While I think open fields, cross-disciplinary study, and intellectual freedom are good, the humanities also need a solid foundation that defines the discipline. To pursue knowledge, one needs boundaries, even if just to cross them.

Although I disagree with what Chace pinpoints as the causes of the problems—he disparages people who try to use cross-disciplinary knowledge, whom he calls amateur anthropologists and psychologists—and I find his suggestion to return to a classic canon problematic, he is correct in pointing out the disconnect and miscommunication within the humanities and between academic departments. Using sources outside our realm of expertise does raise the problem of not always being knowledgeable enough to critically choose sources related to our analysis, which partially validates Chace's epithet "amateur." However, the solution is to go further in our studies or form partnerships with professionals in the field we would like to incorporate.

In part, the decline of literature as an academic study is caused by a divorce between literary theory and bodies of knowledge produced by the sciences. Instead of using available evidence and research on crossing topics, literary critics often use literary theorists to support claims. In English departments, constructivists dismiss science as "just another ideology," or useful for practical, technological purposes but antithetical to art. Some literature scholars study representations of science in literature, or the culture of science, but few integrate the findings of science with the study of literature or believe literature can contribute anything concrete to the sciences. But the vision of an oppositional binary between humanities and sciences does not truly represent the relationship between science and literature. Rather they hold in common a

search for the fundamentals of human nature, which a study of contemporary science on human universals, biological evolution, adaptation, neuroscience, memory, and linguistic psychology can help illuminate in conjunction with in-depth analysis of cultural products. This thesis is not a dismissal of literary critics in favor of scientists only. Someone educated in literature and the arts has significant skills of analysis necessary for studying literature and the arts and useful problem-solving methods for the sciences like strong pattern recognition and narrative-forming skills that help fit discrete information into explanatory stories (which can then be retested against more information). However, this is a call for restructuring English studies to begin to include relevant scientific findings and clear out faulty theories.

For example, logocentrism, one of those faulty theories central to many areas of literary theory, demonstrates some of the major problems with the state of literature studies today. Logocentrism gathers many of the ideas I object to in literary studies. The term "logocentric" comes from the French theorist (and authority figure in literary theory) Jacques Derrida, who used the term based on its Greek root (*logos*) to mean the centrality or privileging of language and reason in Western thought. Derrida critiques Western logocentrism, arguing that meaning and truth cannot be determined either in language or through logic. Derrida claims language is not grounded in reality because there is no such thing: ultimate referents can never be determined with certainty. The critique contradicts itself by claiming the meaning of words cannot be determined while using words to explain the idea and expecting meaning to be conveyed. Derrida also creates a new foundational truth (meaning cannot be determined because there is no foundation) at the same time he says any foundational claims are false. It's a catch-twenty-two and there's no way out, by Derrida's very definition of language.

After Derrida, the critique of Western logocentrism became the basis for cultural relativism. Cultural relativism freezes us in a world of multiplicity where we cannot choose between alternative ideas, no matter how radical or reasonable the ideas may be, because truth cannot be determined. All behaviors are seen as cultural and none can be preferred over others, or judged to be good or bad. In gender studies, logocentrism references the way white males retain authority in Western culture. Now, people who claim to be working toward balanced gender relations cast reason and words as tools of dominant, white men in Western culture, instead of a tool available to all people. This argument is simplistic and does more damage than good by overlooking the accomplishments of scientists who are women, or black, or non-Western and by setting up an antagonistic relationship with science. Instead of eliminating discrimination or understanding it, discrimination is simply redirected. This move seems as closed and restrictive as the patriarchal systems gender studies opposes and steps into the realm of political activism through literary criticism when scholars use these theories to read texts. Analyzing a text from a political standpoint becomes a problem when these political principles skew readings of texts.

Many theoretical frameworks link literary criticism to liberal or radical political ideologies. We read books, plays, poems, and other cultural products such as advertisements, television programs, and sports in the context of their support for or resistance to societal norms. These political causes are often based in civil rights movements, such as class, race and gender/sexuality equality, which I strongly support. Unfortunately, criticism with a political agenda often starts with assumptions and explanations about culture and human nature that are not always supported by observation.

For example, scholars might study how Victoria's Secret catalogues commodify women and set up unrealistic aesthetics of women's bodies. This hypothetical study would then show how the catalogue oppresses women and indoctrinates them into a patriarchal social system where women are seen as objects of the male gaze and the unrealistic bodies displayed are used to undermine women's confidence and keep them trapped in subservient roles. It's a powerful reading that is both believable and empowering for the scholar: While men and the media may be blamed, the ultimate culprit in this situation is culture itself. This reading claims society has taught us gender roles and expectations, brainwashing us into unconscious compliance with harmful dominance hierarchies. The scholar's job is to expose and deconstruct these cultural systems so society can build a new paradigm based on equality and celebrating difference. This reading makes some questionable assumptions: Is there evidence women act more subservient to men after they have been exposed to Victoria's Secret? Is there evidence humans learn all or some gender roles? Why do gender roles persist decades after the women's movement, despite women's greater investment in childrearing (and therefore teaching culture)? Do cultural artifacts create or reflect our behaviors? Where does culture come from in the first place? To me it is not that the reading is incorrect, or even goes too far or not far enough. It is simply that it starts with too many presuppositions without proofs.

Besides being disorganized, over-reliant on authority, not having enough proof, and forcing political agendas, often literary theory, and by extension the criticism that uses it, is simply ineffective at achieving its goals, especially the goal of social change. In *The Cultural Logic of Late Capitalism* Frederick Jameson writes about the ineffectiveness of theory when it creates an isolated, self-contained system:

> The more powerful the vision of some total system or logic—the Foucault prisons book is the obvious example—the more powerless the reader comes to feel. Insofar as the theorist wins, therefore, by constructing an increasingly closed and terrifying machine, to that very degree he loses, since the critical capacity of his work is thereby paralyzed, and the impulse of negation and revolt, not to speak of those of social transformation, are increasingly perceived as vain and trivial in the face of the model itself. (5)

With no reference outside the system, no action can be taken and no thoughts can arise that do not feed into the very system the theories view as detrimental and oppressive. Jameson suggests acceptance of this closed system may increase bleak feelings of helplessness, apathy, or hopeless struggle. Because we have insulated many contemporary, fashionable theories from rigorous review and cross-examination, they have become closed systems cut off from new developments in their fields.

In addition to their isolation, many schools of literary theory are ineffective because they believe some fundamental assumptions scientific research refutes. Specifically, postmodernism, poststructuralism, constructivism, humanism, some feminism, Marxist criticism, and new historicism use an extreme version of Standard Social Science Model (SSSM), a theory of human nature derived from cultural studies and some anthropology. The SSSM says all humans are born as blank slates. In other words, everything about human behavior is learned from culture, which usually has a malevolent plan to exploit the masses, uphold the status quo, and keep an elite minority in control. Stephen Pinker goes into great depth on the subject, its history, and difficulties, in his book *The Blank Slate.* Basically, the blank-slate theory says that without instincts and equipped only with an amazingly broad, innate ability to learn, humans enter a

world built by culture, which paradoxically always preexists humans. Then, culture inscribes the person with its version of humanity, dictating everything from food preferences, clothing styles and language to gender and mate preference, without reference to physical constraints, genetic history, or inherited traits.[5]

This view of the way of the world leads to three basic conclusions about the role of the humanities: First, the idea of cultural inscription of human behavior gives us a culprit to blame for discrimination and other human evils. Second, culture is a point for intervention. If we can change culture, we can change reality. Which leads to the third conclusion: humanities scholars are the best equipped to work to improve society by studying and changing culture. But we base these conclusions concerning culture, change, and our roles as agents of change on false assumptions when we start with the premise that humans are blank slates at birth whose behavior is culturally constructed. This theory ignores behavioral propensities inherent in primates such as dominance hierarchies and territoriality that recur in each generation and must be continuously addressed: changing culture in one generation does not completely solve social problems. We must study and change culture with the additional knowledge that everything we do must be redone. Human nature is not unchangeable, but it will take more than teaching ideals to accomplish.

Some constructivists adhering to blank-slate human nature theory are apprehensive about including biology in the humanities because the science is outside most humanities scholars'

[5] Characteristics and behaviors are influenced by culture and biology at the same time. For example, language is a universal human trait determined by culture but made possible and limited by physical constraints and inherited genetic history. The specific language a person speaks depends on the language spoken around that person during development. The mechanics of speaking and hearing depend on physical constraints such as the larynx, lungs, tongue, ears and multiple sites in the brain working together. Language in people who are deaf may use eyes and hands to communicate, but the information goes to the same areas of the brain. And the ability to communicate is not solely learned. If children find themselves in an environment without an established language, they have the ability to invent a new language with grammatical rules during a certain period of development, although adults no longer have the same ability. Stephen Pinker records this information in *The Language Instinct.*

expertise. They worry looking for biological factors in human nature and cultural patterns would disqualify literary critics from working to understand our lives and affect change where it is needed. Some also fear that if we say human evils are biologically based it seems to suggest the solution is changing biology with horrifying projects like eugenics and social Darwinism. But by denying biology and blaming culture, humanities scholars can denounce racist and classist plans to "improve" society through "biological" and "natural" "cleansing" projects and get on to the good work of painstakingly reeducating people and endlessly dissecting popular culture, which never seems to improve. However, once again, humans are both cultural and biological animals.

Biological and some anthropological evidence directly contradicts the blank slate/cultural constructivism theory.[6] Humans are living organisms subject to evolution, formed through the interplay of millions of years of environmental circumstances and genetic responses that enable adaptation to those forces. Our minds are products of the complex organ of the brain, built with proteins according to inherited instructions stored in DNA. Denying biology is wishful, and wasteful, thinking. Many cognitive scientists believe there are systems in the brain that function with specific purposes, such as a basic intuitive understanding of physics, geometry, biology, psychology and engineering, spatial sense, number sense, a sense of probability, intuitive economics based on reciprocal exchange, a mental database with a system of logic, and language.[7] Some also find modules for facial recognition and social intelligence such as cheater

[6] Anthropology is a divided discipline. Some anthropologists find universal characteristics in all human cultures and look at the evolutionary history of hominoids to understand current traits, including cultural diversity, as inherited adaptations. Other anthropologists see human diversity as evidence for the blank-slate theory because they do not see how such vast differences can be accounted for if behaviors are innate.

[7] Stephen Pinker lists and defines these brain modules in *The Blank Slate* (220) with endnotes referencing specific sources for each one.

detection.[8] Not only do these functions develop without being taught, but also lesions on the brain that damage only localized areas can affect these specific functions and not others. For example, someone's ability to recognize faces can be impaired without affecting other types of memory or their ability to identify a person through other means (such as voice or situation). Humans are born with certain capabilities that are then further developed and reinforced through learning.

To get a full picture of our species we must look at all the forces contributing to our behavior and see them as one interlocked system for which we need all sorts of experts to even begin to comprehend. If one person cannot see the full picture, then cooperation between people with different areas of expertise is required until individuals can expand their personal knowledge. The next chapter develops the idea of cross-disciplinary research and dialog as a way of revitalizing education. It presents evocriticism as a new method of literary criticism and a new theory for the reasons we create and study literature. After a brief history, it moves on to the possibilities evocriticism opens, and then cautions against a few weaknesses in some applications.

[8] John Tooby and Leda Cosmides describe a test on human reasoning capabilities that shows a greater success rate if a conditional problem is couched as a social contract in which the correct answer can be arrived at through cheater detection and show how this can be explained as an adaptive mechanism in the brain (183).

Chapter 2: Introducing evocriticism

I. A new paradigm

In the past fifteen years a new movement to reintegrate the arts and sciences has been developing from multiple sources. From literature we have Joseph Carroll's literary Darwinism, evolutionary literary criticism (or evocrit) from Brian Boyd, and works by Ellen Disanayake, Jonathon Gottschall, Dennis Dutton and others who write on the arts as human adaptations. From the sciences we have consilience and sociobiology, cognitive literary theory, neurolit, and evolutionary psychology working on understanding human behaviors such as art and literature from a scientific perspective. John Tooby and Leda Cosmides play key roles, as do Stephen Pinker, Richard Dawkins, Stephen Jay Gould, and Noam Chomsky. While not all of these people work directly on combining arts and sciences to study humans, their work in their respective areas has significantly influenced scholars who are directly involved in the movement. The various labels for these analytical approaches reflect the authors' backgrounds and, to an extent, the content of their theoretical frameworks.

For example, literary Darwinism grows out of Darwin studies, which looks at Charles Darwin's historic influence on literature and also reads Darwin's texts as literature. Literary Darwinism goes in a different direction by applying Darwin's concepts regarding evolution to literature and by looking for instances of behaviors within literature that coincide with predictions made by Darwin's theories of natural and sexual selection. Cognitive literary theory uses data from cognitive sciences, such as neurology, to study how literature works in the brain. The broadest term for these types of approaches is evolutionary literary criticism. It includes literary Darwinism but goes beyond it to include more current research and encompass other

branches such as neurolit. In other words, evocriticism draws on all the areas of science influenced by evolutionary biology such as genetics, psychology, neuroscience, and anthropology as potential tools for literary analysis depending on which best suits particular works.

Evocriticism has two branches. One applies the concepts of evolutionary biology to literature or art as a whole and explains the act of making creative works as an adaptation that would have been advantageous to our survival and reproductive success during the time we first emerged as a species. The second branch of evocriticism applies certain aspects of evolutionary biology (whether it is at the species level looking at universal human traits or at the level of expressions of traits such as physical and chemical aspects of the brain) to specific works of literature. Evocriticism must still exist within a multiplicity of criticism. One evocritical essay cannot wholly explain *Hamlet,* but it can give new insight into the themes with which the play wrestles. Evocriticism means using the best tools of our time to gain a deeper understanding of a piece of art with the foundation of a knowable and explicable, common human nature that evolved over time, even if parts of human nature are as yet unexplained.

The debate over literature as an adaptation is fierce and varied, and even those who agree brains have been molded by selection pressure into adaptive modules do not agree on what literature's functions are or what selection pressures created it. Stephen Pinker somewhat infamously claims art is "mental cheesecake," or merely a drug, meant only to stimulate our pleasure responses without actually conferring an advantage (*How the Mind Works* 528). He later says fiction might serve an adaptive function, but other art is produced to stimulate pleasure responses initially evolved for other purposes ("Toward a Consilient Study" 171). It is possible art is simply a side effect, a type of biological 'spandrel' as Stephen Jay Gould claimed, that

looks complex but is actually a result of other design features and not actually an end in itself. Or perhaps the arts are primarily a means of gaining status and mates, part of sexual selection that prefers otherwise useless characteristics in a species in order to mark strong genetic material for future offspring. The debate is ongoing. Each of these ideas may hold some truth, but on the whole they seem narrow and incapable of explaining the universal human drive to engage in the arts over a long period of time (which should be selected out of the gene pool if it were merely stimulating pleasure receptors but with no congruent benefit). Likewise, sexual selection does not seem an adequate explanation of an activity performed by men and women alike, prior, through and beyond sexually active years and regardless of the desire or ability to reproduce. In *On the Origin of Stories*, Brian Boyd suggests the most convincing theory about the purpose of art I have so far come across: he postulates the arts are a social adaptation meant to first sharpen our mental abilities through sustained and rigorous play with pattern and mental feats, then to strengthen social bonds and confer status within a social hierarchy through sharing attention, and finally create a competitive environment in which creativity is pushed further and further in our arms race for aesthetic novelty.

The second branch of evocriticism moves from this wide-angle lens, using the vast expanse of evolutionary time to look at the broad category of art, to a narrow lens using materials and perspectives from evolution to look at a particular text. An example of the second branch of evocriticism at its most elementary level is Michael Stasio and Kathryn Duncan's analysis of Jane Austen's novel *Pride and Prejudice* as an illustration of human mate selection behaviors. The article, "Prehistoric Preferences in *Pride and Prejudice,*" looks at characters' mate choices based on theories of unequal sexual selection pressures on males and females (stemming from unequal levels of parental investment between the sexes) leading to different adaptive

preferences in mates. This second branch of evocriticism focused on individual texts can be incredibly diverse, pulling information from all realms of science and looking at any text, from popular entertainment to high culture.

Evocriticism combines our understanding of evolutionary biology and psychology with our knowledge of culture to better understand the integrated system that molds human behavior. Where most literary study only draws on half the equation, using culture to explain everything about human identity, and where many sciences have previously ignored cultural environments to focus exclusively on biological and chemical explanations, evocriticism draws on both.

By using the best, most current information available and cross-disciplinary communication, the humanities can begin to address some of the problems causing their decline in university systems and in the public's perception. In *Forming the Critical Mind,* James Engel writes,

> Each critical point of view…starts from one or more assumptions or convictions about cosmos, chronos, psyche, or logos [the shape and nature of the universe, history and time, human nature, and language]. And though criticism may question its own assumptions, it never escapes them: if one is discarded another replaces it. In this sense criticism can never be completely scientific, for its hypotheses never undergo genuine verification, and the more they tend to exclude in order to be controlled and accurate, the more they tend to distort what is occurring in the production and experience of literature. (264)

While criticism may not be scientific, its knowledge of cosmos, chronos, psyche, and logos can be. We always operate from a model of the universe and a theory of the nature of humans when we ask questions about literature: What do we learn about the specific historical, cultural and

physical environment portrayed? Why do characters or people act as they do? What do we learn about the human condition from this piece? What does this work do? What does it hide?

If we adopt models of psychology, linguistics and society that are based on empirical evidence we could make breakthroughs in literary theory and criticism by reengaging with people outside our immediate scholastic community. The infusion of new approaches to texts should help revive English as a scholarly pursuit by interesting more people and making sense with other modes of knowledge and experience. While looking at literature from one more new perspective might show us things we may have overlooked or misinterpreted before, and generate a slew of new readings, more importantly, evocriticism can correct false assumptions about human nature, build common ground across disciplines, and project confidence and purpose to new recruits, university administration, and the public. I envision a revolution in English departments in which race, gender, postcolonial, economic, ecological, queer, historical, and psychological studies still thrive, but with a basis in rigorously tested data from scientific fields to support their descriptions of the world rather than old authorities, outdated philosophies, political ideals, anecdotal evidence, and vague thought experiments.

A scientific approach to literature need not be a dry reduction of fiction to certain universals we set out beforehand to find. Cataloging instances of certain linguistic or narrative patterns and situating them within the history of human evolution and behavior is only the first step. Consilience between humanities and sciences would not be one taking over the other, but rather independent research using the best tools of each field and periodic sharing of knowledge, with a lot of cross checking to see if observations still make sense from a different perspective. Cross-campus dialog keeps departments from becoming isolated and helps prevent people from building on faulty ideas.

II: A Cautious Approach

As Boyd says, an evolutionary perspective should not replace one grand theory with another but rather should tackle specific aspects of a text with specific functional explanations undecided in advance. Evocriticism should not simply be a new way to generate fresh readings that are basically preordained by the preselected biological aspect. Rather, evocriticism should

> allow us to see human experience, which is after all the subject of literature, in the widest available context, in time—in terms of what brought human nature into being—and in scale, in an understanding of our world that extends from physics to chemistry to biology to psychology to culture. It can allow ways of understanding human minds, as producers and consumers and subjects of literature, that are neither parochial nor deceived by what seems obvious, automatic and "natural." It can help free us from the confused and untenable idea that reality is a linguistic or social construct, while acknowledging that the way we see the world is one that has coevolved with our needs. (Boyd 11)

Evocriticism should also not be an attempt to force formulaic "scientific method" on criticism. Rather, criticism needs to be aware of science and draw on technical data and perspectives. Evocriticism also requires a move toward greater coherence as we take ideas out of their isolated, jargon-dominated communities, and translate them into a common vocabulary. Evocriticism should create common ground where all the jostling critical approaches can meet. In addition, to communicate foreign ideas it works best to use simple, concise, clear language. For evocriticism to work at all it must be more coherent than current models of theory.

When writing from an evocritical perspective, a few precautions must be taken in order to avoid some of these problems. First, when crossing disciplines all scholars must be careful how they choose literature from fields other than their own. Evocritical scholars must be rigorous critical thinkers when incorporating scientists' research with which they have less familiarity. Not all science is created equally, just as not all literary analysis reaches the same level of insightful revelation. Cross-disciplinary partnerships or at least consultations are important to evocriticism as it grows in an environment of the "two cultures" where sciences and humanities have been isolated from each other and one person is not educated thoroughly in both areas.

Second, using evolution in literary theory must be done carefully and precisely. For example, terms should be explicitly defined, not simply borrowed and used as metaphor. For instance, the word "evolution" has been used metaphorically for social change, but this is not evocriticism. As Brian Boyd writes in his article "Jane, Meet Charles," "Culture does not operate, as evolution does, by means of impersonal selective advantages incorporated into design over thousands of generations; it involves transformation as much as transmission at each step; and it makes possible deliberate design" (11). Using the word evolution to mean the change in culture we see over historic time, instead of the force that shapes species over geographic time, reduces the strength of the theory, which is using the predictive powers of evolution's mechanisms to explain phenomenon.

We also must be careful to fully understand how evolution works. A common misunderstanding of how to apply evolution at the cultural level falls into the trap of the group-selection hypothesis, in which individuals make decisions based on the greater good of the group, in competition with other groups. Research in biology has repeatedly shown that the appropriate level of operation for selection is at the individual level. Treating a self-interested

group as an entity under selection pressure does not work because the arrival of a self-interested individual within the group always destabilizes the greater-good strategy. In order to explain cooperation we need to look at the way a behavior benefits the individual either through kin selection or by reciprocity in social situations. If an individual can be recognized and remembered, that opens the way for helping and even sacrificing for unrelated individuals because the altruistic individual can anticipate receiving a return in the future, building a positive reputation, and increasing status in a social hierarchy.

Evolution can be constructively used to look at culture, not as a monolithic entity with its own agenda, but as a group of selfish individuals in the same environment. In his article "Jane Meet Charles," Brian Boyd explains how. He quotes Dan Sperber's evolutionary model for culture saying that Sperber suggests that to explain culture

> is to explain why and how some ideas happen to be contagious. This calls for the development of a true *epidemiology of representations.* . . . All epidemiological models . . . have in common the fact that they explain population-scale macro-phenomena, such as epidemics, as the cumulative effect of micro-processes that bring about individual events, such as catching a disease. In this, epidemiological models contrast starkly with "holistic" explanations, in which macro-phenomena are explained in terms of other macro-phenomena—for instance religion in terms of economic structure (or conversely). (Quoted in Boyd 10)

Boyd then goes on to explain,

> Since the social constructionist model requires minds without form and populations of individuals without individual interests to learn through passive imitation or absorption that is imposed by a "culture," it cannot in fact explain the

> origin, transmission or growth of the Culture on which it relies so heavily. In evolutionary anthropology by contrast ideas catch on because evolution has built minds they can catch on to. (10)

Boyd's examples show how a careful application of evolution can help explain cultural characteristics that a social constructionist model cannot.

III. Conclusion

Literary criticism can use science to push further into the depths of what we study and reveal what ticks inside. Writers have long known a close relationship between science and art leads to the greatest insights into our human lives. John Milton incorporated the strange and unsettling observations of his contemporary Galileo into his epic poem, *Paradise Lost*. Mary Shelley wrote a haunting story examining the boundaries between life and death, human and monster, individual and society, using the science of her time. A.R. Ammons incorporates science into his poetry as a means to understand our world, and ourselves and because it is interesting, and we love to know. Lyn Hejinian appeals to we who love to be astonished and asks us to look deeper at events, language and memory, with clearer vision. Science is the study of natural laws in the most objective way we have found to build a body of knowledge that describes the reality of the world around us. Evocriticism uses scientific knowledge of evolutionary biology as a foundation for examining human cultural products.

Evocriticism as a method for studying literature is new and still being defined. It can mean both a theory of the possible adaptive functions of literature and a way of interpreting literature. Each text should be looked at individually and then the evocritic must choose the

most relevant research based on the aspect of the text the evocritic wishes to explore. Evocritics can use a wide variety of research in many areas of biology and human sciences to better understand individual texts and literature as a whole. Evocriticism is not defined by a single theory of the adaptiveness of the arts, or by a specific set of scientific data that can be systematically applied to all texts. Evocriticism is united by an evolutionary view of human nature as a complex system of adaptations interacting with the cultural and physical environment. The next section outlines the theory of evolution and then shows how it is relevant to our understanding of human nature and therefore literature.

Chapter 3: An Introduction to Evolution

Part I: Mechanisms of change

The theory of evolution is at the core of the biological and human sciences today. Evolution opens new paths of discovery in agriculture, medicine, genetics, animal behavior, anthropology, and, more recently, psychology, linguistics, society, and culture. Knowing the forces that shape life on earth helps people make discoveries across a wide range of disciplines. Evolutionary biology is a lens through which we can look at the world and begin to answer not just what happens and how life works, but also why. A very recent development is the application of information gleaned from evolutionary biology to the humanities to understand better not only why we create art and literature but also what specific works might mean, how human nature shapes them, what influence they have on their audience, and why they appeal to us. After explaining the basic principles of evolution, I will touch on how evolution applies to human nature—the subject most relevant to literature.

Evolutionary biology is a relatively new science (about 200 years old) that seeks to understand the changes that occur over time in living organisms. Although we had theories of evolution before, not until Charles Darwin wrote *On the Origin of Species* in 1859 did we have a plausible concept to explain the mechanisms that could cause evolution. After carefully observing nature, collecting specimens on a five year journey on the ship *Beagle*, measuring the variations of certain characteristics in individuals of numerous species, recording his data in journals, and contemplating the evidence for twenty-one years, Darwin introduced the idea of natural selection. Natural selection is the process through which a species changes over generations if several conditions are met. First, individuals of a species must vary and some of

those differences must be inheritable. Then environmental pressures act on the variations through successful or failed reproduction.[9] If organisms gain physical or behavioral advantages in reproduction from a heritable trait, then that trait may be passed on in the next generations preferentially (because organisms with reproductive advantages have more offspring) and spread through the population. Natural selection works on the level of gene expression in an individual organism.

Though Darwin didn't know it, genes are the medium through which the next generation inherits those traits. The products from different forms of the same gene can provide an organism with different adaptations. Some adaptations may be suited to a particular environment providing these individuals the greatest chance for survival into the next generation. Genes may help an organism build fast, strong leg muscles to flee from predators, short reproductive cycles so the organism can quickly fill a niche, or a propensity toward caring for its young, investing time, energy, and resources into offspring who share genes. So natural selection pushes organisms down certain paths by selecting (through inheritance and reproduction) genes that give individuals qualities that adapted them to their environments. Survival of the fittest means the continuation of genes through reproduction. When the environment changes, the individuals that survive are not necessarily the strongest, biggest, or smartest, they are the ones who are most adapted to the altered environment in which they find themselves.

With natural selection, other mechanisms in the world that help produce evolution are sexual selection, genetic drift, migration, and mutation. In a sexually reproducing species, the

[9] We often think of evolution in terms of "survival of the fittest" and think traits are selected or rejected based on their contribution to an organism's *survival*. However, this is not entirely correct. Some traits that are selected for can decrease the individual's chance of survival, but increase their number of offspring. For example, some male spiders commit suicide during mating. This behavior seems to increase the number of eggs the individual suicidal spider fertilizes (Andrade). Often the traits that decrease survival but increase fertility are products of sexual selection.

methods of choosing partners for reproduction guide the evolution of animals as sexes choose and compete for mates, sometimes on criteria not otherwise advantageous. The classic example is the male peacock's train, which is a disadvantage in the environment because it makes the peacock easy for predators to spot and hinders his escape, but also, it appears, shows the health and quality of the peacock's genes to interested females. So sexual selection may push against natural selection, and this explains some otherwise very odd aspects of living creatures. The next mechanism of evolution, genetic drift, is the change in qualities that don't impact fitness and so are outside the pressures of the environment. These qualities simply drift across the spectrum of available expressions. The third mechanism, migration, causes evolution when a population moves to a new geographic location with different environmental pressures that influence the course of change, or when a group previously split from the population rejoins and through crossbreeding changes the genetic makeup of the population as a whole. Finally, mutations factor into changes in species. Mutations are random mistakes in copying the genetic code. Most mutations are unviable. Many of the rest are detrimental. A very few confer some advantage and quickly spread through the population through successful reproduction. Chance in the environment also affects the survival and reproduction of organisms. The most well adapted genes in the world won't save you from an earthquake or meteor. Evolution explains how life on earth changed into diverse species, from lichen to gazelles, *E. coli* to Gila monsters. It also explains where adaptive traits within a species come from.

While we often think of adaptive traits as physical structures, like a bird's wings, a chameleon's camouflaged skin, or a shark's teeth, adaptations can also be behaviors. Evolution also sheds light on how creatures act, including humans. Behavior, in part, is how something acts or reacts to its environment, like the fawn that holds very still to avoid detection. Behavior

usually follows survival/reproductive interests because behavior that goes against genetic interest tends to be weeded out of the gene pool. In *The Selfish Gene* evolutionary biologist Richard Dawkins explains genetic interests. The selfish gene is not a gene for selfishness but a metaphorical way of understanding genes: genes that serve their own best interests are more likely to be passed to the next generation. Selfish genes, however, do not necessarily cause selfish behavior in organisms. Cooperation and altruism may be the best survival strategy, so genes may serve their own best interest by favoring social behavior and cooperation. Perhaps especially in our extremely social human species, love, kindness, cooperation, and sharing are behaviors that evolved and are inherent in our species. Those behaviors can help us gain status, resources and mates, and so become part of "competition" in the Darwinian sense, even though they seem to be the opposite of competition.

II: Evolution and human nature

For literature, human behavior is the most important subject. Mostly, the humanities use culture and history (our social environment) to explain human nature. And clearly, we are products of our environment. A child who grows up hearing English will speak English, not !Kung. But our genes are also part of the environment. A major part of the environment for genes is other genes. Every living organism grows according to the genetic information it receives from its parents, which evolved within a habitat that shaped that organism's physiology, behavior, and nature. The external environment is written into the genetic code that gets passed to the next generation. Therefore, genes and culture evolve together, interacting with one

another. Humans live, grow, reproduce and die in a biological world, following a cycle shared with all other life on earth.

But human nature is not limited to our bodies; it explicitly, even primarily, refers to our minds. In *Consilience*, E.O. Wilson gives a succinct and apt definition of human nature: "It is not the genes, which prescribe it, or culture, its ultimate product. Rather, human nature is something else for which we have only begun to find ready expression. It is the epigenetic rules, the hereditary regularities of mental development that bias cultural evolution in one direction as opposed to another, and thus connect the genes to culture" (164). The mind is part of the body, subject to environmental pressures and shaped over generations by natural selection, which then shapes the environment. In *The Adapted Mind*, John Tooby and Leda Cosmides write, "There is a universal human nature, but …this universality exists primarily at the level of evolved psychological mechanisms, not of expressed cultural behaviors" (5). If we look at expressed cultural behaviors, human diversity seems nearly infinite and universality is hard to see. Human behaviors vary wildly, sometimes in ways that seem diametrically opposed. To say humans share a universal nature seems easily contradicted by a quick inventory of the world's people. However, as Tooby and Cosmides assert, people from different cultures do share a list of universal features. If we look at the level of evolved psychological mechanisms or if we use broad definitions of behavioral categories like *art, cooking,* and *making tools* rather than *Cubism, entomophagy*, and *constructing large Hadron colliders*, or focus on physical responses like facial expressions or flight-or-fight reactions then we begin to see a universal human nature. But *universal human nature* is a strong phrase with lots of baggage. Can it be defended? We see with little difficulty a universal human body, despite the difference between Sumo wrestlers and Russian ballerinas. We share most of that body with other primates, much with other mammals

and a good portion with vertebrates. We have some traits in common with earthworms, such as digestive systems and circulatory systems. But within a species, the body is not just a set of features that commonly overlap; it is a large set of universal characteristics. Our minds, which are part of our bodies, also have a set of features that commonly overlap.

Researchers have different ways of conceptualizing the structure of the human mind and human behavior. Eric Alden Smith's book chapter titled "Three Styles in the Evolutionary Analysis of Human Behavior" describes how researchers looking at human behavior from an evolutionary perspective break into three main camps: evolutionary psychologists, behavioral ecologists, and those who subscribe to the dual inheritance theory (DIT), also called gene-culture co-evolution. Evolutionary psychology, behavioral ecology, and dual inheritance theory all start with the premise that there is a human nature common to the species and that it can be understood. People researching in this area will fall somewhere in the spectrum of the genetic/environmental debate with all three groups agreeing that it is some combination and differing only on the matter of degree and the specific processes or sources for behavior. Evocritics draw on research from all three camps, depending on the texts they read and the level of analysis at which they work.

The first group, evolutionary psychologists, looks for cognitive modules in the brain that have evolved through natural selection to perform certain adaptive functions. "Evolutionary psychology is psychology informed by the fact that the inherited architecture of the human mind is the product of the evolutionary process" (Tooby and Cosmides 7). These modules are universal to all humans, fairly specific, and created by environmental forces at a distant time, the EEA (environment of evolutionary adaptiveness). These brain modules are inherited in the shared human genetic code and are the mechanisms that enable our behaviors. For example, one

proposed module that seems to be well supported after extensive tests, is a language module. This module is an area of the brain with an innate set of rules for language acquisition, which occurs at a specific developmental stage for all humans, and includes Universal Grammar, an idea first proposed by Noam Chomsky. (For a thorough explanation of the theory of a language module and an excellent argument for how it is an innate psychological mechanism, not purely a learned behavior, see Stephen Pinker's book *The Language Instinct.)*

The second group, behavioral ecologists, look to the environment for the mechanisms motivating behavior. They look at expressed behaviors rather than genetic or cultural inheritance, cognitive mechanisms or phylogenetic history. Rather than looking at panhuman characteristics, behavioral ecologists study the variation between groups. Behavioral ecologists include most ethnographers and many cultural anthropologists. This group focuses on the way traits are expressed within an environment. No organism lives in a vacuum. The environmental surroundings, not just in the sense of the EEA, but whatever ecosystem an organism finds itself in currently, have a profound effect on the organism's behavior and expression of traits. Behavioral ecologists study this relationship.[10] Finally, if evolutionary psychology is mostly concerned with genetics, and behavioral ecology mostly with the environment, including the social-cultural environment, then dual inheritance theory is where they meet in the middle. DIT approaches human behavior from two separate but related angles. Genes and culture are both mechanisms for transmitting information and behavior through inheritance. DIT claims both

[10] A recent work in literary studies, *The Nature of Being Human: From Environmentalism to Consciousness,* by Harold Fromm, ties behavioral ecology together with literature in a melding that combines evocriticism with ecocriticism. Fromm quotes Carroll: "No organism can be understood except in its interactive relations with its total environment….The felt quality of experience within a natural world is one of those fundamental conditions of experience (Quoted in Fromm 184). Fromm then goes on to comment, "This joint consideration of Darwinian adaptationism and ecology has, in fact, produced the discipline of behavioral ecology. One can see how its insights might have great bearing on the creation and interpretation of literary works, given the role of place not only in nature writing but in poetry and fiction as well" (184).

culture and genes contain variation and are subject to selection forces and therefore evolve. These three approaches are not mutually exclusive, however, and a full understanding of human behavior may require using all methods available to see behaviors in their full context.

Traditionally religion or philosophy supplied our beliefs about human nature. Those theories came with some pretty heavy prescriptions for how we must live our lives, such as women's subordination to men, an "innate" baseness that culture must punish and control, or a "natural" goodness that society corrupts but that we must strive to restore. Today, biology and psychology collect observations about how humans think and act, doing their best to avoid culture-specific biases, to try to understand what motivates us by looking at current environmental factors as well as the evolutionary background humans inherit and pass on genetically.

Talking about genes and people is tricky, especially when we use metaphors to describe gene function and survival in terms of conscious purpose.[11] For instance, when we say genes "want" something we mean that genes in certain environments survive while genes in other environments don't. Genes "want" certain behaviors because those behaviors enable the organism to survive. Desire and selfishness in genes are simply a matter of selection preference for genes that improve survival and reproduction. Desire and selfishness in a person are different. These terms describe emotions and actions rather than outcomes. Humans may desire things that hurt our chances of survival, such as fast motorcycles and chocolate cheesecake, or our violently jealous sister's lover.

[11] The language of the concept of "selfish" genes, and genes' "desires" is metaphoric, and borrowed from Richard Dawkins. Dawkins carefully reminds readers when he uses metaphor to explain a concept. In his chapter "Battle of the Generations" he writes, "The word 'favourite' carries no subjective connotations, and the word 'should' no moral ones. I am treating a mother as a machine programmed to do everything in its power to propagate copies of genes which ride inside it. Since you and I are humans who know what it is like to have conscious purposes, it is convenient for me to use the language of purpose as a metaphor in explaining the behaviour of survival machines [organisms]." (123)

Scientists often find competing mechanisms that mediate between multiple desires and needs across the animal kingdom, but it seems especially true of people. Capturing the idea that people think opposite thoughts at the same time as an inherent part of how the mind works, contemporary American poet Lyn Hejinian writes, "The synchronous keeps its reversible logic, and in this it resembles psychology, or the logic of a person" (60). Our biology provides us with a multifarious background from which we make choices.

One fear art scholars seem to have about integrating science with the humanities is that an explanation of human nature that includes biology eliminates choices. Biological determinism is the idea that if we say human behavior is influenced by our biology, whether it is our unique inherited DNA or the genes we share as a species, mammal, or animal, we will be saying individuals do not have a choice in their behaviors, or that behaviors cannot be controlled through learning and decision-making. Despite this fear, a biological picture of the human species that shows an evolutionary advantage for aggressively defending territory does not mean shooting someone for cutting through the woods at the back of your property is inevitable or acceptable behavior. It may be a natural response, but we also have evolved as social beings with other ways of solving disputes and an equally evolutionarily advantageous propensity for conflict resolution and punishment of offenders. Explaining our habits as humans and examining our history as a species does not eliminate responsibility or restrict our behavior. Science that finds universals in human nature does not dictate actions. As Wilson explains,

> No serious scientist or humanities scholar has ever suggested [genes dictate particular forms of culture]. Instead, complexes of gene-based epigenetic rules predispose people to invent and adopt such conventions. If the epigenetic rules are powerful enough, they cause the behaviors they affect to evolve convergently

> across a great many societies. The conventions—evolved by culture, biased by epigenetic rules—are then spoken of as the cultural universals.

Every individual grows in a specific time and place, surrounded by other individuals. Every living species evolved within an environment and ecology that shaped the organism's physiology, behavior and nature. The separation of nature and nurture makes little sense, especially, perhaps, with humans whose nature is so social (nurture IS nature). Social anthropologist Jerome Barkow writes, "It is increasingly apparent that much of human intelligence is social intelligence, the product of selection for success in social competition: There is little doubt that we were selected for the ability to predict and influence behavior of potential rivals for resources, present and potential allies, possible mates, and of course, close kin" (628). The environment that shapes our genes is highly social. In the introduction to *Shakespeare and the Nature of Love*, Marcus Nordlund writes,

> There is nothing that is absolutely 'essential' about us, since even the most hardwired aspects of our nature require adequate environmental input—such as hormonal levels in the womb, nutrition, and some sort of social environment—in order to develop. In the same way, there are few things about us that are truly 'accidental' in the sense that they have no connection to an evolved human nature; most human behaviors can sooner or later be traced back to their roots in evolved dispositions and needs.

As Lyn Hejinian writes toward the end of her poem, "Nature is infinite mediation" (159). We are in a constant balancing act between the characteristics we are born with and the environment we encounter. "The world changes from sun to sun, the world is incomplete—so

the scientist's work is never done" (Hejinian 145). The literary critic's work is never done either. The next chapter takes up the challenge of evocriticism.

Chapter 4: Applying Evocriticism

With the previous background information on evolution we can look at some adaptive physical and behavioral traits, some possible reasons they may have developed, and their impact on individuals now. The following close readings will demonstrate evocriticism's application using two texts: a contemporary poem by the American Language poet Lynn Hejinian and Shakespeare's sixteenth-century tragedy, *King Lear*. These readings will reveal the range and adaptability of evocriticism across genres and through time.

In the first close reading I look at Lyn Hejinian's poem *My Life.* This reading is fairly standard literary criticism with a few important differences that make it evocritical: it engages with current scientific knowledge, assumes humans have a shared biological nature that affects physical and behavioral traits, and relates the text to the larger conversation about the adaptive purpose of art. Even though it does not frequently refer directly to evolution, it shows how literary criticism can be "evocritical" by applying to literature specialized scientific studies with evolution at their core.

The reading moves between two levels of analysis. The first is proximate: I look at what happens in the poem. Hejinian uses form to mimic the way memory works in the brain, layering images, information, and emotional content to build a full picture of a human life. I take explanations of memory from current brain research on memory in order to form a solid basis for this description. Knowing how memory works in the physical brain helps us understand the environment the poem enters and how it interacts with brain structures, personal memories and associations to form new pathways and stimulate responses. Because Hejinian frames the poem as an autobiography, it is important to understand how the human brain creates memories, which the

author then rearranges in an artistic poetic-memoir form, and how this form differs from traditional autobiographies. Then I look at the poem from an ultimate level of analysis: why does the poem's form catch our attention? This analysis relies on Brian Boyd's evocritical explanations of literature as a human adaptation developed from play and the social animal's need to share attention as well as what we know about the memory functions of the brain to explain why the poem is successful.

I. "We Who 'Love to Be Astonished'": How *My Life* Gets Our Attention

People love patterns. We find them or invent them constantly. Our brains are wired to find shapes, edges, and colors; to notice movement or change; to recognize "same" and "different" in sight, sound, touch, taste and smell. We see faces in clouds and canals on Mars, which shows our ability for pattern recognition extrapolates design where none exists. Humans also love to be astonished. A break in a pattern or an unexpected turn of events catches and holds our attention more than repetition or status quo. Experiments on babies give evidence for this claim. The developmental psychologist Karen Wynn showed objects to babies until they were bored and looked away. She then hid the objects behind an opaque screen momentarily before removing it again to reveal the objects. If the same number of objects remained, the babies glanced at them and then lost interest again. However, if the number of objects unexpectedly changed, the astonished babies focused their attention longer (Pinker, *Language Instinct* 68). Art balances our desire for predictability and surprise.

The contemporary American poet Lyn Hejinian finds this balance, smoothly moving between the familiar and unexpected in form, story, and language. In her autobiographical, book-

length poem, *My Life*, Hejinian uses a non-traditional, disjunctive style to stimulate our responses through language, holding our attention successfully while she explores her own memories and the nature of memory to tell her story. *My Life* focuses on memory, attention, and their relationship to art. Using cognitive neuroscience informed by evolution to explain the adaptive mechanism of memory, and Brian Boyd's theories on the adaptive value of art, we can see why Hejinian's experimental form and references to memory succeed in captivating an audience.

This approach is evocritical because it uses current discoveries in science about universal human neurological characteristics to understand the way the poem works in our brains and ties that to a view of literature as an adaptation for garnering shared attention. Other critics have read *My Life* using a feminist approach as part of experimental women's writing and claim Hejinian uses a non-traditional autobiographical style in order to challenge what they consider to be the predominantly male biographical mode. Another scholar also fits the poem into the historic art movement of Language poetry and explores the poem from a genre perspective to examine it as a biography that mimics mnemonic devices instead of traditional chronological narrative. Each of these critics examines the poem's unique form and comments on its use of memory. While I think they do good work situating the poem in historic and feminist political contexts, none go in depth enough on how memory actually works to fully explain what the poem does with memory or why the poem succeeds in catching our interest.

i. Form

Before discussing the content of *My Life,* it will be helpful to understand a bit more about Hejinian's formal choices. *My Life* is a book-length poem without line breaks, which challenges

some of our expectations of contemporary poetry. It also tells an autobiographical story without following a conventional narrative arc. Hejinian divides *My Life* into forty-five small sections, equal to her age at the time of printing the last edition, that each contains forty-five sentences to equal the number of years.[12] This design feature regulates her form but is not immediately apparent to the reader. However, we do see motifs within the poem, with repeating language, similar-sounding or -looking words with very different meanings, and variations on thematized subjects. She jumps from image to image and between ideas; every sentence is a non sequitur. ("As for we who 'love to be astonished,' there are fences keeping cyclones" (81).) Her sentences don't immediately form a narrative, with fleshed out characters and plot like a novel or memoir, but rather act cumulatively, layering disjunctive thoughts until the reader begins to see a poetic shape and understands the gist of a story from the repeated threads.

These formal choices differ from traditional autobiography in which chronologically ordered events lead logically and inevitably to the author's situation at the time of writing. Critic Laura Hinton writes, "*My Life* reconfigures...autobiography, in which a self-as-personality is constructed through condensations of 'past' representational scenes, and in which a narrative persona seems to exist as if behind a gauzy veil," while Hilary Clark agrees: "Hejinian's emphasis on moments and patterns suggests that the method of the *Life* as a whole will be synchronic, not diachronic" (Hinton 149, Clark 318). That is, she looks at moments as they exist in a single point in time rather than as they develop and change through time. Carla Harryman suggests, "Hejinian proposes . . . a kind of 'personness,' which is very far from the self-obsessed autobiographical subject" (121). All of these critics link Hejinian's style to a feminist method for challenging traditional autobiography, which they see as male. However, an argument could also be made that

[12] The first edition had thirty-seven chapters, each with thirty-seven sentences and was printed when Hejinian was thirty-seven years old.

Hejinian uses a more right-brain approach of creating patterns rather than the more left-brained activity of structuring the patterns in a logical or chronological narrative, instead of discussing the autobiography in terms of gender.

With a sort of caveat at the beginning of her poetic autobiography, Hejinian tells us, "There were more storytellers than there were stories, so that everyone in the family had a version of history and it was impossible to get close to the original, or to know 'what really happened'" (27). Admitting the gap between individual versions of an event and the original event, Hejinian makes readers examine their own stories and the very definitions of truth and history. Really, her form and style suggest the poem is about being human and the struggle to understand the world around us—to see in a new way, past our constructed illusions, not about a certain woman named Lyn Hejinian. The visual and sensual details she gives spark mental images in the reader's mind. After she catches the reader's attention with these pictures, Hejinian introduces her own thoughts and suggestive bits of language. She reveals her own cognitive process—the way words look physically on the page, highlighting their strangeness by slipping words out of their normal context or substituting them with the words we expect—for example, "writer solstice" instead of winter solstice. Another instance that throws language into relief and demonstrates the many associations we have with words and ideas becomes apparent when she puts the words "violins" and "violence" near each other in the sentence "Is that violence or violins" (112). The nearness in sound between the words (and sometimes, with a bad violinist, the nearness in sound between the noise coming from the instrument and the noise of a cat in a violent confrontation) creates a link between ideas that wouldn't normally occur. Hejinian introduces abstract concepts, asks readers to contemplate meaning, and encourages us to examine the way we see the world, our expectations and our memories. These unexpected associations shake us out of our complacency.

The following example illustrates how Hejinian does not use a conventional, chronological narrative, but instead uses vivid memories situated next to each other in the poem based on associations and relations between words and sounds: "A moment yellow, just as four years later, when my father returned home from the war, the moment of greeting him, as he stood at the bottom of the stairs, younger, thinner than when he had left, was purple—though moments are no longer so colored. Somewhere, in the background, rooms share a pattern of small roses. Pretty is as pretty does" (1). She jumps from a very early memory of her father, which she has associated with certain colors, to a separate image, somehow linked to rose-patterned wallpaper. These memories evoke old photographs where the exact context has been lost but the imagery lingers. The next sentence, "Pretty is as pretty does," moves from the prettiness of a pattern of small roses to a cliché saying that questions the actual value of prettiness. The sentences link associatively rather than logically or narratively.

Another excerpt shows how she uses this style of writing to create vivid images and hint at a story: "Last night, in my dreams, I swam to the bottom of a lake, pushed off in the mud and rising rapidly to the surface shot eight or ten feet out of the water into the air. I couldn't join the demonstration because I was pregnant, and so I had a revolutionary experience without taking revolutionary action. ...To some extent, each sentence has to be the whole story" (93). The dream conveys a sensory experience, swimming underwater to a muddy bottom and then the rush of action shooting through the water and then, unexpectedly, farther, high into the air. In contrast, her pregnancy is mentioned in passing as the circumstances that kept her from political activism but still completely changed her life. She hints at a narrative here, and we can glean information about her life, but she does not explain it for us. Instead, she explains her method: To some extent, each sentence is a whole story and can stand alone. This style is what Hilary Clark calls synchronic.

In Hejinian's poem, each remembered event exists as a fully complete moment contained in a single sentence. Because she focuses on images and events as they are in a single point of time, we do not see the same sort of progression of an idea, person, or event from immaturity to fulfillment. Instead of introduction and development, we get introduction and reintroduction. When we learn more it is because she has presented the idea from many angles, in many different situations, not because she reveals a meaning that she intended from the beginning. This stylistic choice of representing events as discrete entities and using varied repetition in recall evokes neurologists' depiction of the brain's memory function. Much of this poem uses memory not as a transcription of what has gone before but rather as poetic association between remembered images. The scholar Hilary Clark writes, "The basic 'rhythm of cognition,' of memory itself, is indeed poetic or rhetorical—that is, associative and repetitive. In its oral-poetic style, *My Life* is arguably closer to the springs of memory, to the way we truly remember, than is autobiography based on careful narrative shaping and selection" (332).

In statements and phrases, Hejinian seems to say the same thing as she scatters suggestions through the poem: "To follow the progress of ideas, or that particular line of reasoning, so full of surprises and unexpected correlations, was somehow to take a vacation" (12). "What follows a strict chronology has no memory" (16). "The synchronous, which I have characterized as spatial, is accurate to reality but it has been debased" (21). "The lobes of autobiography" (27). Separated by chapters full of unrelated images, memories, words, ideas, and sounds, the reader must hold multiple threads in mind at once, to do the work of finding links, and therefore to create links as this poem builds, held in our own memory, with our own associations and patterns. We invent meaning. Hejinian writes, "An extremely pleasant and often comic satisfaction comes from conjunction, the fit, say, of comprehension in a reader's mind to content in a writer's work" (121).

ii. Memory

In the poem, memory recurs as a major theme, both embedded in the form of autobiography and overtly as a subject of inquiry. In her first mini-chapter, Hejinian tackles the slipperiness and selectiveness of memory. "If only you could touch, or, even, catch those gray great creatures," she laments (7). "Long time lines trail behind every idea, object, person, pet, vehicle, and event…a word is a bottomless pit" (8). She begins her poem with a few visual snippets of memory from early childhood and then explains the difficulties of memoir. She honestly describes the process of selection and the problem of reconstruction. "Perhaps initially, even before one can talk, restlessness is already conventional, establishing the incoherent border which will later separate events from experience," she muses (9). Memory is not exact re-creation but selective representation developed for adaptive purposes. Memory of the past helps people predict the future and helps people choose actions when we notice patterns in experienced events and form expectations. Autobiographical memory helps create a sense of self over time. Sharing memories helps bond community members. Memory enables us to create and pass on culture. Memoir combines the collected data of memory with the art of storytelling.

Scientists divide memory into three types—explicit, implicit and emotional memory—according to a group of psychologists at the University of Arizona researching the biopsychological effects of stress and trauma on memory (Payne et al.). The first kind, explicit memory, records events in our lives and what we learn from those events. Explicit memory is further divided into episodic and semantic memories. Episodic memory is the details of an event such as time and place. These are Hejinian's visual references and mini-stories, such as going to the zoo to see a hippopotamus ("As for we who 'love to be astonished,' we might go to the zoo and

see the famous hippo named 'Bubbles'" (23)). Semantic memory is the knowledge acquired from the event, like entries in a mental encyclopedia and dictionary. For instance, what a hippo looks like or what a zoo is would be part of semantic memory. The knowledge learned does not always have to be retrieved with the event itself, but can be recalled out of context and applied in new situations. The second type of memory, implicit memory, refers to the skills, actions, and habits we get through experience but that are expressed as behaviors instead of being explained as knowledge. For example, riding a bicycle uses implicit memory. It would be hard to explain what exactly one does, or knows when one mounts a bike, finds balance and pedals away, but the knowledge imprints in our memory. Finally, the third kind of memory, emotional memory, is a system that stores strongly fearful or pleasant memories and the information we learn from the experiences that produce them.

At the University of Iowa, Ralph Adolphs and Tony Buchanan, research scientists in neurology, probed the nature of emotional memory and looked for its location in the brain by testing people who have damage in specific parts of their brain versus a control group of people with normal brain function. They showed test subjects positive, negative and neutral emotionally charged pictures or videos then determined what information people recalled best. Their research addresses the question of whether, "in the service of a species' survival, evolution [has] equipped organisms with a specialized set of mechanisms that encode, consolidate, and retrieve memories in a domain specific manner, operating differentially in emotional and in nonemotional contexts." They conclude, "Indeed, evidence from cognitive psychology and neuroscience suggests that such distinct emotional memory mechanisms exist and depend on specific neural structures" (42). For example, the amygdala affects memory retention on the basis of emotional association:

> There is evidence that the *retrieval* [as well as encoding and consolidation] of autobiographical memories may depend, in part, on the amygdala. Likely, the majority of our distant autobiographical memories are associated with an emotional response, suggesting that perhaps the amygdala plays a role both in the encoding and retrieval of these memories by virtue of their emotionally arousing nature. (Adolphs and Buchanan 57)

Hejinian's emotionally charged memories punctuate the poem in isolated spots, separate from her other types of memory. Although Hejinian mostly seems to keep an emotional distance between her memories and the reader, she does mention emotionally charged memories, though still refrains from blatantly conveying her own emotions. For example, she says, "He looked at me and smiled and did not look away, and thus a friendship became erotic"; "Sadness and thirst, and hence sadness and water, have ever since been associated in my imagination"; "In the school bathroom I vomited secretly, not because I was ill but because I so longed for my mother" (105, 32, 26). The sentence before her memory of vomiting is "We were sticky in the back seat of the car," while the sentence that follows reads, "Now, bid chaos welcome." This juxtaposition reinforces the compartmentalization of memories in the brain. Compartmentalization of functions reflects how adaptive modules evolved to manage different types of stimuli.

By using principles of evolutionary theory, the scientists in Iowa find adaptive mechanisms in the way memory works common to all humans. Because these adaptations are integral to the human species, we recognize the way others' minds work and use that knowledge when creating and appreciating art. Neuroscience today shows significant evidence that memory is a physical pattern stored in certain parts of the brain depending on content. Memory is not one system in the brain, located in one spot, but several overlapping systems. Memories may be stored in the

amygdala, the hippocampus, or in Broca's region. Because the brain divides memories by type and stores them in different areas, memories are not a continuous narrative. In both our brains and in the poem *My Life,* events, images, information and emotion are arranged in bits and pieces of memory stored in various locations and linked by association.

In *The Blank Slate*, linguistic psychologist Stephen Pinker writes, "Images are not stored in the mind like snapshots in a shoebox; if they were how could you ever find the one you want? Rather, they are labeled and linked to a vast database of knowledge, which allows them to be evaluated and interpreted in terms of what they stand for" (216). Hejinian illustrates the phenomenon and subsequent gaps in memory when she writes, "A lot of questions, a few answers, the progress of questioning, the spot on the brain where these words will go. For example, I remember the blue coat with the red piping, but I don't remember myself in it" (89). Hejinian connects ideas, images, and language that would not be connected narratively, but have some other association, by situating the ideas near each other on the page. For instance, Hejinian writes, "Meanwhile a mouse in the wall is rolling around its acorns. They are dumb buttons, those that govern bombs. As for we who 'love to be astonished,' the saxophone is a diplomat" (152). These sentences are not connected narratively, but associations between words build links. The relatively small problem of a mouse infestation in the house is contrasted with the threat of mutual destruction, and the president's red button that can set off another world war. We see how similar the words "dumb" and "bomb" are, and see the irony in the associated (though never mentioned in the poem) phrase "smart bomb." The talk of bombs and government leads to the discussion of diplomats. It may be astonishing, but during the Cold War, one of the United States most successful diplomatic programs was called the "jazz ambassadors." Musicians such as Art Blakey, Louis Armstrong, Dizzy Gillespie, and saxophonist Benny Carter traveled all over the world

playing music in order to create a positive perception of the United States and democracy in communist countries. Coincidently, my brain was able to make the link between U.S. diplomatic history and the saxophone because of an art exhibit last spring at the Montana Museum of Art and Culture called *Jam Session: America's Jazz Ambassadors Embrace the World.* I went to the exhibit with my husband, who also plays jazz saxophone. Hejinian's next sentence, "The spouse is working on its high tones, while opposite its opposite sits writing in a book," resonates frequently with my own experience. Because memories are linked in a vast database, when Hejinian gives us a small bit of information in a sentence that isn't directly connected to the sentences around it, our brains supply the links.

In other words, memory does not produce the smooth, tightly fit narrative we expect in a book. The polished story connecting character with plot, describing interiority, revealing goals, and offering interpretation results from careful craft using other parts of the brain. While Hejinian obviously has carefully crafted her poem, she also exposes the process by which she composes and leaves a lot of work for the reader. She titles the work *My Life* then gives us these pieces in part because we recollect our lives as fragmented events, though we may think of it as continuous. Each time we recall an event we have to reformulate what happened, like a mini movie in the mind, or restate information. So memories are not written in a permanent language that can be re-read each time we need to access it. One reason for this is that, although neurologists locate memory functions in the hippocampus, amygdala, and Broca's region, only Broca's region also controls language. Therefore, most memories have to be translated from a different type of encoding into words. When we remember emotional events and wish to share them we must translate the memory from a mental image into words.

Harryman observes the parallel between the way we recall memories and Hejinian's style: "Hejinian is interested in the question of the subjective mental fact, not as only that which is defining, definable, or principled but also as an event that is fuzzy, vague, not fully explicable" (120). Consequently, Hejinian organizes her poem by association and proximity rather than narrative logic and chronology. As Hejinian says, "One can run through the holes in memory…The gap indicated that objects or events had been forgotten, that a place was being held for them, should they chance to reappear" (41). "What memory is not a 'gripping' thought," Hejinian asks, telling the reader "only fragments are accurate. Break it up into single words, charge them to combination" (75). She recreates the way the mind works while thoughts are in progress: in fragments, single words, brief images, a color, all together, forcing the reader to do the work of stitching them together to find meaning. She writes, "Some are crystal, some have membranes, but moments are bubbles drifting up, many go up at once" (118). Hejinian claims, "It is precisely a special way of writing that requires realism. This will keep me truthful and do me good" (144). She tells us she tries to present facts, and this haphazard collection of memories and thoughts seems like the most useful and true method.

While experience is continuous, and the brain creates narratives with a continuous logic, memories are not continuous. We do not have a single chronological continuum in our minds where information is inserted in the order it is received. Memories and information are stored by type, context, and importance. For instance, neurosurgeons have found a small location on the brain dedicated to naming tools, separate from areas that name other objects.[13] A single bit of

[13] In the BBC television series "Brain Story" neurosurgeon George Ojemann maps out areas of the patient's brain involved in language prior to surgery by having the conscious patient count and identify images in a slideshow while he applies small amounts of electricity to different parts of the brain. When electricity is applied to an area the patient is using, the thought cannot come out as speech. The neurosurgeon then marks that spot with a tiny label. For instance, Ojemann found a separate area for naming tools. The exact location varies among people, and Ojemann has shown that even a basic language function, like counting, relies on a widespread network of sites. But those sites exist physically in the brain and can be mapped.

information can also be duplicated in several different areas as new associations are made and as ideas or events overlap. Hejinian chooses to write a poem that represents the way we store and recall memories, rather than the way we experience events or recreate experiences. Her repetition of phrases in new contexts, such as the phrase "for we who 'love to be astonished'" or other repeated phrases like "a pause, a rose, something on paper," or "what is the meaning hung from that depend" become markers that trigger new interpretations and evoke previous associations each time we encounter them. In this way, Hejinian forces the reader to participate analytically in order to enjoy the poem and the extent to which she succeeds in retaining our attention depends upon the reader's willingness to engage with the form.

iii. Art and attention

Art is an act of attention grabbing. Indeed, art often grabs our attention based on our emotional and semantic memories and the patterns of expectation we build from those memories. Whether a remembered event is defining or fuzzy, as Hejinian writes, each memory is a "gripping" thought. Explicit and emotional memories are internal simulations of events in the past that caught our attention and held it. Hejinian's repetition of the phrase "For we who love to be astonished…" with assorted endings to the phrase, plays on our desire for pattern found in what we remember from the past and also for something out of the ordinary that strikes us as worth remembering for the future. For instance, she writes, "As for we who 'love to be astonished,' my heartbeats shook the bed." Those long lines trailing behind every idea lead us down novel paths and highlight unanticipated connections between explicit memories. "As for we who 'love to be astonished,' a weasel eats twenty times as much as a lizard of the same size." She captures our attention with

seeming non-sequiturs. Sometimes she astonishes us with information—"a moth has more flesh than a butterfly could lift"—or disturbing statistics— "McDonald's is the world's largest purchaser of beef eyeballs"—and sometimes with apparently ordinary observations—"As for we who 'love to be astonished,' every Sears smells the same"—after we have been set up to expect the extravagant or strange. She makes us see what we might take for granted as actually extraordinary. "As for we who 'love to be astonished,' mother love," she writes and for a moment we see the normal mother's love for her child as extraordinary.

We access memories to predict the future or explain the present by fitting the memories into patterns. In *On the Origin of Stories* Brian Boyd writes, "Patterns set up expectations, which they may satisfy, overturn, or revise" (Boyd 91). Repetition of certain phrases creates one of the patterns in this poem. Hejinian introduces phrases as section titles, and then periodically uses the phrases again in later sections. As a phrase repeats the reader begins to trace the pattern, and notice variations. The author frames these phrases with new contexts each time that revise the meaning, sense, or feeling of the phrase. In later chapters, the use of phrases introduced early on sometimes creates a feeling of nostalgia. A phrase may be humorous in one setting and provocative in another, overturning our expectations.

Although many animals recognize patterns and even create patterns to communicate with other members of their species, such as the honeybee's dance, people create patterns as a form of play and delight in patterns that do not convey information immediately useful for food gathering, predator avoidance or courtship. We also like patterns that convey fictional information. We move pattern recognition and creation into the realm of art and use patterns and art for entertainment, cognitive play, and brain exercise. Poetry is a perfect example of our creative use of pattern for play and exercise. What makes pattern recognition and its uses possible, and makes

cognitive play and brain exercise important, is humans' large brain-to-body ratios in comparison to other animals. Scientist E.O. Wilson describes the human brain as possibly the most voluminous of any large animal species ever. But volume is not its only massive feature. Evolution has also maximized surface area: "The human cerebral cortex is … a sheet about one thousand square inches in area, packed with millions of cell bodies per square inch, folded and wadded precisely like an origami into many winding fissures, neatly stuffed in turn into the quart-sized cranial cavity" (Wilson 105).

With this amazing organ we have developed high intelligence, enabling self-awareness, analytical capabilities, memory, and pattern recognition: We can see, judge and choose our behaviors and speculate about alternative actions and outcomes. With poetry we can show off virtuosic skill with language, make patterns of sound and sense that attract others' attention, and exercise our brains as we use non-narrative language to convey information. With storytelling, we can run through hypothetical situations, share information, and practice for real-life situations. (Hejinian calls her autobiography "a healthy dialectic between poetry and prose" (89).) Not only scientific experiments on language development and narrative in children, but also anthropological work that shows storytelling as ubiquitous in all societies indicate storytelling is part of what makes us human, that we cannot help but invent stories. All humans make representations of other things, symbolic and fictional as well as true. While artistic forms vary dramatically from tattooing to Mozart, art and art appreciation are universal. The anthropologist Donald E. Brown's list of human universals, gathered from anthropologists' ethnographies, supports the claim that all human cultures show artistic behaviors. Abstraction in speech and thought, a sense of aesthetics, dance, music, body adornment, jokes, language, language that is not a simple reflection of reality

(fiction), myths, narrative, play, and poetry/rhetoric have been found in all cultures, to sample the list of artistic, universal human attributes.

In addition to our high intelligence, we are ultrasocial animals. One hypothesis about the adaptive function of storytelling is to form social bonds. "Art offers us social benefits by encouraging us to share attention in coordinated ways that improve our attunement with one another" (Boyd 101). In an interview, Hejinian talks explicitly about the function of her poetry as a force that creates social cohesion: "Poetry is an enormously social activity, and not only because poets have to invent their communities and sustain friendships with each other in order for poetry to get a readership, but also because it already calls out for that, it really is an ongoing making of a world through thought and exchange of thought" (quoted in Dworkin).

Boyd argues convincingly for other adaptive functions of art and literature as well: cognitive development through intense play and engaging the attention of others. Boyd proposes that "(1) art begins as solitary and shared patterned cognitive play whose self-rewarding nature reshapes human minds, and that it intensifies its impact by raising (2) the status of individual artists and (3) our general inclination to cooperate closely with one another," and these functions of art gradually lead to (4) creativity as we compete for each other's attention (121). Boyd offers an evolutionary explanation for the universal behavior of art, suggesting ways in which art helps us survive in our environment and has biological roots.

> We play with sound and image and story on our own; we learn efficiently from one another; and we enjoy sharing the pleasures of art with others. Engagement in art, as participant or spectator, has the same self-rewarding nature as play, and since its very goal is to capture and reward attention, it can succeed to the point of compulsiveness. (Boyd 105)

In *My Life*, Hejinian refers to her process of grabbing her readers' attention: "The degree to which you're sucked in, you soak it up," she says (127). Describing the act of experiencing art, in this case reading poetry, Hejinian writes, "The intellect lingers, this too is erotic—the anticipation of the pleasure of making sense" (149). Art and pattern tickle our pleasure sensors in the brain. Consequently, we feel positively rewarded when we interpret art, and anger and frustration when artwork stumps us. When Hejinian talks of the erotics of intellect she refers to the pleasure we feel when our minds are engaged in processing information. When she writes poetry for an audience who enjoys it, she engages with a feature of the mind shared by all humans. None of the other adaptive functions of art can occur without first establishing shared attention.

But not all art holds our attention equally and not all artists are equally adept. For an artist, the trick is knowing how to earn an audience of mostly strangers and then hold their attention long enough for some sort of communication and recognition to take place. Hejinian accomplishes this by creatively combining autobiography and poetry. If Lyn Hejinian had recounted her life as a narrative, we would have read a fairly ordinary story about a baby-boomer girl born to middle-class parents in California who went to school and summer camp, felt homesick, spent a few vacations on the sea shore, went to college, spent a summer as a counselor at her old summer camp, traveled a bit, got married to a jazz musician, had two children, bought a house, and made a career of writing. As a story it lacks conflict, adventure, lofty goals or perilous obstacles. We only give our attention if we stand to gain something from the exchange. A story that only tells us what we already know, in a predictable manner, is not worth the time we could spend elsewhere. But because Hejinian uses a non-traditional form that echoes how memory is stored in the brain, we are sucked in. She balances an ordinary plot with an innovative, unpredictable form.

iv. What the Poem Accomplishes and Why

In response to a question about the nature of Language poetry, Hejinian says, "This writing is a kind of unfolding procedure related to analytical thinking—which was, by the way, a way of acknowledging the intense social importance of poetry." She sees poetry as a way of critically examining the world and then sharing knowledge. As she says in the previously mentioned interview, "The quest for knowledge has always been connected with a language project of some kind or other." Hejinian wants the reader to take something from the poem besides entertainment and sensual engagement. In the poem she writes, "After crossing the boundary which distinguishes the work from the universe, the reader is expected to recross the boundary with something in mind. 'About things' is not so much a comment counting" (107). That is, after reading this work Hejinian hopes a reader who is asked what the book is about will not respond, "It is about things," or it is about an American woman writer. Instead, Hejinian wants readers to learn something from her autobiography besides personal facts about her life—to take a lesson, or observation, or way of thinking from the constructed world of the poem out to the external world. Readers should have important ideas in mind when they finish reading, not just a concrete plot full of "things" that happened. Hejinian shocks readers into engaging with the text in a more emotional and intellectual way rather than gliding along in an easy narrative stream by juxtaposing images and words and exploiting our expectations, for example by slightly shifting clichés or establishing and breaking linguistic patterns. If someone asks what *My Life* is about, she hopes the answer includes some idea along the lines of the way humans create representations of reality through memory, how we construct narratives with language, or the importance of social

awareness and activism in everyday life, rather than saying the poem is about a middle-class California girl who leads an ordinary life.

In connection with this goal of getting the reader to do analytical work, Hejinian invokes the individual in order to access the universal. Hejinian writes, "The universal is animated by individuality" (37). *My Life* explores our common human psychological lives by engaging all types of human knowledge and psychological mechanisms, most notably memory. Hejinian uses explicit and emotional memories to create a picture of universal human experience in the way our minds work (rather than in the specific details of events) and tries not to bury it under her own interpretation. Offering a strong emotional message might distance the reader from the underlying purpose of the poem because it would connect the representation of "my life" more concretely with "Lyn Hejinian's life" and allow the reader not to do the analytical work for which she hopes.

Because of her formal choices, Hejinian hooks our attention. She explains she wants to grab our attention in order to communicate with readers and form a social bond. She believes this communication and bond will be strong enough to change our social relationships and make individuals more socially aware and responsible by exercising our analytical skills. These intentions fit in with Brian Boyd's theory of art as a tool for getting others' attention in order to intensify our "general inclination to cooperate closely." When Hejinian writes, "As for we who love to be astonished, consciousness is durable in poetry," we understand how she uses astonishment to capture our attention and imprint information outside herself (140). We also know information is especially durable if it is encoded within an artistic form that appeals to the brains of future people. To the extent that she succeeds she does so by connecting with universal human traits. Scientific background on the types of memory and the brain modules that make memory possible explain those universal traits and illuminate the process Lyn Hejinian used to write her

memoir, as well as the process her audience goes through when reading the poem. As in music, meaning is derived from relationships between things (in the poem those things are words, memories and gaps; in music they are sounds and silences) rather than from the individual parts alone. "Now such is the rhythm of cognition" (131). "Such is the rhythm of cognition, and the obvious analogy is with music" (145).

v. Evocriticism and *My Life*

The preceding interpretation of *My Life* is evocritical because it integrates current research from the field of neuroscience, which is based on principles of evolution that allow us to see the human brain as an adaptive organ with specialized functions, with a postmodern poem in order to better understand the poem. The reading looks at the physical form of the brain and correlates memory processes with Hejinian's form. It then claims Hejinian uses a disjunctive form in order to make readers have a stronger connection with the poem through creating meaning instead of having meaning thrust upon them. Hejinian's purpose in these choices is to make readers better people, people who think deeply and autonomously and act accordingly. She has a political agenda, which we see in the poem through references to protesting, marches, boycotts, and elections, and that is also known from her association with the group of politically active poets called the Language poets. The poem's success depends on how well the form resonates with universal traits in the human brain, and therefore how it retains our attention. This point leads to the discussion of art and attention, informed by the evocritic Brian Boyd and his theories of the adaptive value of the arts, why artistic behaviors may have developed, and their current affect on individuals.

An evocritical reading of the poem adds a new dimension to the critical conversation because it goes beyond describing how the poem is different from traditional autobiographies, or how it fits into feminist writing, and begins to explain why the poet made certain formal choices and why those choices intrigue readers from a scientific point of view supported by research outside literary theory. This reading reveals the range and adaptability of evocriticism when contrasted with the next critical interpretation. Evocriticism is useful regardless of genre, era, style, or subject. For example, evocriticism can be used to look at a prose poem from the twentieth century or a sixteenth-century tragic play. It can use specific, specialized areas of study like where emotional memories are stored in the human brain, or broad theories of behavior found in all sexually reproducing species like the following discussion of parental investment. In the final conclusion, I will discuss further possibilities for evocriticism. For now, the following section incorporates evolution more directly into the text and looks at patterns of behavior and the human nature that guides actions.

II. Selfish genes and darker purposes in King Lear

i. Unequal parental investment, sibling rivalry and generational conflict

Critically analyzing *King Lear* using current scientific understandings of evolution and theories about human nature is important because Shakespeare based his characters on humans and human nature he observed. He could write about biological traits and evolutionary adaptations for survival like parental investment, sibling rivalry, and genetic interests not because he was a Darwinist before his time but because he shared and observed human behaviors for which evolutionary theory later provided explanations. In the following interpretation, I retrace those biological traits and evolutionary adaptations behind social interactions to get a clearer picture of what happens in the play: siblings compete with each other and with their father for a greater share of their father's resources to such an extent that they fight to the death, in an extreme portrayal of the "darker" side of human nature.

We read *King Lear* from a variety of viewpoints, looking at the social, political, and material pressures immediately affecting the characters' choices, as well as the underlying familial tensions stemming from an evolved human nature. Two ways of reading this play include looking at the political and historical consequences of the characters' actions, or looking at the personal and familial motivations for those actions. Because the main characters, the Lears and Gloucesters, rule over people and land, their decisions have political and historical consequences. However, their motivations are primarily based in personal and familial interests. To understand the choices characters make, I use biological explanations of parental investment, sibling rivalry and generational conflict as parts of an evolved human nature. While many critics see the consequences as the central idea of the play, in this reading I concentrate on the

fundamental reasons for the characters' actions. These two levels of analysis are complementary, not exclusive. In this section, I discuss Shakespeare's tragedy *King Lear* using relevant biological terms from Richard Dawkins' book *The Selfish Gene*. I also show how an evocritical reading relates to established criticism. The purpose of this reading is to better understand the play in light of what we know about animal behavior, which in turn shows how evocriticism can compliment already existing studies and add to the critical conversation.

The second part of this analysis references a handful of articles from established critical literature to show how my reading fits with a range of perspectives. I chose articles that spoke to my argument; they only scratch the surface of what has been written on *Lear*. Each reading adds something to our understanding of the play. For example, Meredith Skura argues for a political reading, saying the play's "balance between father-king and child-heir illuminates both the play's human tragedy and its political relevance at the beginning of the seventeenth century" (121). The father-king and child-heir inhabit public and private roles simultaneously. Skura focuses on the political consequences of Lear's decision to veer from social tradition and political precedent by giving away his kingship to his three daughters rather than dying and passing the entire inheritance to the eldest child. Another Shakespeare critic, Jonathon Dollimore, claims that "*King Lear* is, above all, a play about power, property and inheritance" (78). He argues that the reality of finite physical resources and the struggle to control them dominates the play. Leon Shaskolsky Sheleff analyzes the personal aspects of the play: "The key to the story of King Lear, the real cause of his personal tragedy, is his rejection of the only daughter, Cordelia, who bore him true love, in contrast to the hollow professions of love exacted from his other daughters" (17). For psychological reasons, Lear chooses to believe Goneril and Regan's flattering but false words of love instead of Cordelia's blunt but true promises. Many

scholars read the play as a conservative story upholding social institutions, ultimately reestablishing the status quo, because nearly every character crosses some line of normative social law and then, whether he or she had good reason or ill intent, suffers for it.

King Lear follows the conduct, sometimes extraordinary and cruel, sometimes expected and even altruistic, of the individuals in two aristocratic families, the Lears and the Gloucesters. I focus on the Lears. At the beginning of the play, King Lear gathers his courtiers, his three daughters, the older daughters' husbands and the youngest's suitors to witness the division of his kingdom. He gives two reasons for his action: to confer all cares and business on the strength of the younger generation, and to ensure "that future strife may be prevented now" (1.1.41). Yet after claiming he wants to prevent strife, Lear forces his daughters to compete for his resources with flattering statements of love that must outdo the others. He asks his daughters to tell him how much they love him in order to solidify his decision on how to divvy up the kingdom. Almost at once, the proceedings begin to go awry. Lear's youngest daughter, Cordelia, does not offer flattery. Enraged, Lear banishes her then puts himself at the mercy of his other two daughters, Regan and Goneril, who do not love him. These unloving daughters proceed to take Lear's retinue, dignity, and sanity and then start a civil war that ends with death for nearly everyone involved, including all the Lears. While this story is a tragic tale of familial betrayal and greed that ends in disaster, Shakespeare does not offer a moral lesson for our consumption so much as a bleak picture for our contemplation. Shakespeare shows the sometimes selfish, violent behaviors that result from the dark purposes inherent in human nature, such as unequal parental care, sibling rivalry, and generational conflict.

To understand the disasters in Shakespeare's *King Lear* first we must examine what is natural behavior in the parent-child-sibling triangle and what happens to cause the breakdown of

this family. These crises are rooted in human nature. Using an understanding of parenting strategies favored by natural selection and patterns of kin behavior, we gain insight into the fatal family dynamics portrayed in *King Lear*. While we cannot know the entire, complex cause of a specific family's dysfunction, we can learn from the general characteristics families and humans share. The parent-child and sibling-sibling relationships in *Lear* follow systems of competition caused by conflicting goals we can also observe elsewhere in nature. However, it is important to remember the pattern these characters follow is not the only natural order. In nature, cooperation also drives natural selection of genes, organisms and species. Nevertheless, because the fathers, children, sisters and brothers mostly compete in Shakespeare's play, I will highlight the genetic basis for competition within a family as one explanation for the tragic events.

In the first scene, the love test Lear sets up operates principally on the personal, psychological and familial level as we see from Lear's reaction when the test does not go as he planned. Furious with Cordelia, Lear disregards his maps; upsets the balance of power spread between three rulers, telling his two sons-in-law to "digest" Cordelia's third of the land (a vague command with open interpretation); breaks off his negotiations with Burgundy and France, and banishes the Earl of Kent when he tries to be reasonable. Basically, Lear ignores all political and social consequences because his pride has been wounded and he petulantly wants to punish his daughter instead of making decisions based on what is best for the state. Lear acts as his daughters' father (rather than king) when he interrupts the division of his kingdom, which seems premeditated at the beginning, and says,

Tell me my daughters—

. . . . . .

Which of you shall we say doth love us most?

Although it may be a political allegory and perhaps a cautionary tale on breaking social and political contracts, foremost *Lear* tells the story of family conflict. The biological reasons for family conflict, such as differing evolutionary fitness interests between generations and sibling rivalry caused by unequal parental investment, are some of the human forces at work in the play. *Lear* is the story of the evolutionary pressures to survive, subject to millions of years of inherited, selected behaviors, some of which long predate the development of morality or social obligations.

In order to know what personal, psychological, and familial forces are at work in this opening scene we need to understand the evolutionary basis for behaviors in kin relationships. First, to understand the parent-child relationship an explanation of parenting from a genetic perspective is necessary. Richard Dawkins says parental investment is the finite amount of time, energy, and resources a mother or father has to distribute between offspring or reserve for future offspring. Because a parent shares the same amount (50 percent) of its genes with each child, the best parenting strategy, genetically speaking, is the one that produces the most offspring who survive and also reproduce.[14] All things being equal, the parent does best by giving each child an even share. However, children at different stages of development have different needs and different fitness levels. A parent's best strategy might be to help a younger child more because the older is more self-sufficient. Or it may be to let the younger one die and help the older if the choice is either-or, because the parent has already invested more time in the older child—to get the younger one to the same level as the older would take a greater investment. This could be a genetic basis for the social custom of primogeniture.

[14] Of genes that differ. As members of the same species, all humans share most (some 99 percent) of the same DNA.

In the play, the king divides his kingdom unequally between his three daughters, giving a "more ample" third of the territory and offering the "largest bounty" to the one who says she loves him most, requiring them to compete for his favor. Lear, however, seems to have a history of favoring Cordelia. He means to continue this favoritism by giving Cordelia the bigger "third" of his kingdom. Goneril and Regan know this plan. When Lear asks, "Which of you shall we say doth love us most, / That we our largest bounty may extend," the words "most" and "largest" obviously indicate inequality and preference (1.1.48). Thus with this imbalance in parental care between his daughters, Lear sets the stage for sibling rivalry. This brings us to the second type of kin relationship, sibling-sibling connections, behind the personal and familial forces in the play.

Parents favor some children over others in certain circumstances, which causes competition. Sibling rivalry is the struggle between organisms that share parents over food, territory, protection, status and other resources. Since their needs are nearly identical, siblings may compete fiercely and even resort to killing their bothers and sisters. Referring to species, Charles Darwin notes, "Competition should be most severe between allied forms, which fill nearly the same place in the economy of nature" (90). And this same observation applies to individuals. Siblings share the closest niche in nature of all and their needs are filled from an identical source, so competition is strong. For instance, in some bird species, such as the great egret, chicks will battle each other viciously, often leading to the death of later-born, smaller nestlings. Hyena twins demonstrate this same tendency in mammals; pups sometimes kill a littermate while aggressively fighting over their mother's milk.

A familiarity with *King Lear* brings to mind many of these behaviors. King Lear sets up sibling rivalry through unequal parental investment, which leads to intense competition between

his children, ending in their deaths. We see the beginning of the contest between the sisters in the first scene of the play. After Lear disowns Cordelia, she turns to her sisters and says,

> I know you what you are,
>
> And like a sister am most loathe to call
>
> Your faults as they are named. (1.1.272)

This tactic looks like taking the higher ground (I am your sister and so out of sisterly loyalty I won't utter the names your faults deserve) but actually it's a veiled insult. Regan responds, "Prescribe not us our duty," the classic you-can't-tell-me-what-to-do sister response (1.1.278). Goneril throws in a jab:

> Let your study
>
> Be to content your lord, who hath received you
>
> At Fortune's alms (1.1.279)

—Go please your fiancé, as he only took you out of pity. This clash between the sisters foreshadows the later battles that end with Goneril sentencing Cordelia (and Lear) to death and poisoning Regan before finally stabbing herself.[15]

On the other hand, siblings are also closely related and their shared genes may be fitter (survive better to reproduce in the next generation) if those genes encourage kin selection, which is the selfish altruism of helping a relative. Siblings are closely related kin and usually desire

[15] Goneril's suicide contradicts the previous competitive, selfish motivations presented. The reason for her reported suicide could be one of several: First, we are not entirely sure she does kill herself. The death happens offstage and is relayed by another character, who may not be reliable or completely knowledgeable. It is possible Regan stabbed Goneril as she was dying, because Regan suspected she had been poisoned by Goneril. We also know that Cordelia's hanging was intended to look like suicide, but was actually murder. Alternatively, if Goneril did commit suicide, that action would be motivated by conflicting processes. Human psychology is complex, with many factors contributing to behaviors. Guilt and regret are evolved human emotions that help us function in a social environment. Also, some behaviors are maladaptive if taken to an extreme. This applies to Goneril's suicide, of course, but also to the level of competition between the siblings and between the generations. Obviously, the behaviors of the characters in this play fail to help anyone succeed in gaining resources, reproducing, or even surviving.

some parental investment in a sister who shares half her genes. Kin selection and family altruism arise because it doesn't pay genetically (because they share half the same genes) for a child to want all of a parent's time or energy, just more than an equal share. Kin selection mediates siblicide, and not all interactions between related offspring are competitive or violent. Siblings therefore team up when faced with an outside threat or when mutual aid can lead to an advantage for both offspring. In the play, Regan and Goneril team up in order to manipulate their father better. Goneril and Regan temporarily create the alliance we expect to periodically occur between siblings. As Cordelia leaves for exile, Goneril turns conspiratorially to Regan and tells her, "Sister, it is not little I have to say of what most nearly appertains to us both. … He hath always loved our sister most, and with what poor judgment he hath now cast her off appears too grossly. … Pray you, let us hit together" (1.1.284-285, 288-289, 301). She reaffirms their relationship with her address, "Sister," to inspire cohesion, and reminds Regan they share a common problem: their father. She then makes a case for teaming up to attack Lear.

From this state of sibling cooperation we move to generational conflict in the parent-child relationship. "You unnatural hags!" King Lear screams at his two older daughters as they strip him of his resources and shunt him out of their lives into a fierce storm (2.4.276). In indignation and bewilderment Lear cries, "I gave you all—" but his defense is not wholly true, for he gave each only half and meant to give thirds less "opulent" than what he meant to give their youngest sister, Cordelia. Lear also threatens to take back his resources and resume the kingship when he says, "I'll resume that shape which thou dost think / I have cast off forever" (1.4.293). Dawkins writes, "Using our metaphor of the individual animal as a survival machine behaving as if it had the 'purpose' of preserving its genes, we can talk about a conflict between parents and young, a battle of the generations" (131). Even as it gives resources, the parent acts selfishly, dividing

resources in a way that raises the chances of having the greatest number of children survive and reproduce again. It is important to remember that competition and natural selection are primarily based on survival *in order to reproduce*, not simply to defeat competitors. Being the wealthiest or strongest or most ruthless does not matter to evolution and will not be passed on in genes unless the trait grants a reproductive advantage.

While bestowing his bounty on his daughters, continuation of the Lear line specifically concerns King Lear. He not only gives his daughters resources, he reminds them of their own future progeny. Lear tells Goneril,

> Of…shadowy forests and with champains riched,
> With plenteous rivers and wide-skirted meads,
> We make thee lady. To thine and Albany's issue
> be this perpetual" (1.1.60).

That they have "issue" is a key part of the deal. He emphasizes descendents again when he gives Regan and her "hereditary ever" an "ample third of our fair kingdom" (1.1.76). In this respect, Lear acts out of an innate concern for reproductive success. Biologist R.L. Trivers defines parental investment "as 'any investment by the parent in an individual offspring that increases the offspring's chance of surviving (and hence reproductive success) at the cost of the parent's ability to invest in other offspring,'" closely linking parental investment with concerns for grandchildren (qtd. in Dawkins 124). Lear's motives seem conscious because he refers to his desires explicitly, but they have also been shaped by millions of years of evolution of which he is unaware.[16] Later in the play, full of outrage, Lear curses his daughters with barrenness. He considers Goneril and Regan failures as daughters and does not want his heredity passed on

[16] I am referring only to ultimate (evolutionary) causes for behavior. Immediate causes such as ego, pride, social reputation, and grandfatherly love may each be proximate mechanisms contributing to Lear's behavior, but for the purpose of this reading I focus on the evolutionary reasons underlying his actions.

through them. This curse seems to contradict his previous concern with grandchildren. However, the combination of his incredible anger with the high value he places on having children make this the worst curse he can utter. This curse is contradictory, but Lear is mad, in the emotional and mental senses.

The usual interpretation of Cordelia's response to the love test is that she refuses to stoop to flattering her father and believes the truth will serve them both better. However, an evocritical reading shows how Cordelia uses what she sees as the truth to actually participate in the competition her father sets up. For example, Cordelia does not refuse her father's gifts. Although she responds, "Nothing," when her father asks, "what can you say to draw / A third more opulent that your sisters'?" her "nothing" is not a rejection of the process at first, but rather a way to turn the tables on her sisters and their sweet words (1.1.82). We can glean Cordelia's intentions from her asides while her sisters speak. For instance, as Cordelia listens to her sisters' flattering speeches, she worries about what to say. After Goneril's speech, she asks herself, "What shall Cordelia speak?" (1.1.59). This question implies she is attempting to come up with a speech of her own, initially. When Regan finishes with even higher flattery, Cordelia responds in an aside, "Then poor Cordelia!" Although "poor" is normally interpreted as "unfortunate" and certainly means refers to Cordelia's self pity, it also can be read in an economic sense. If she is unable to top her sisters, Cordelia worries she will consequently lose the resources her father offers and therefore be poor. She then has an idea and boost of confidence when she thinks, "And yet not so, since I am sure my love's / more ponderous than my tongue" (1.1.73).

When Cordelia's turn to speak comes in the love test, she knows she is in competition with her sisters, but she seems to disregard the conflict inherent in parent-child relationships. She gambles on the strength of her established emotional bond with her father and tries throwing

doubt on her sisters' truthfulness instead of attempting to outdo them. She is confident her loving relationship with her father will outweigh any speech her sisters offer. She bets on Lear's own greater love for her. She has good reason, since Lear says, "I loved her most"; France knows Cordelia was Lear's "best, the dearest"; and Goneril remarks, "He always loved our sister most." Cordelia thinks this previously established favoritism will be enough. Cordelia means to undermine her sisters' flattery with truth and gain that third of the kingdom even more opulent than Goneril's rich, plenteous fraction and Regan's ample part, by letting her past demonstrations of love toward her father speak for themselves. When she rhetorically asks, "Why have my sisters husbands if they say / They love you all?" she hopes Lear will see Regan and Goneril as hypocritical.

However, Lear feels melancholy, contrary, old and vulnerable. By allotting at once all his power and lands, he no longer has resources to give but becomes dependent on his children. Now his interests not only compete with his children's in that they disagree on how he should allocate his wealth, but he becomes a rival competing for a share of their bounty. From this unstable position Lear strikes preemptively, with obviously poor judgment, but also understandably. Lear had thought Cordelia would nurse him in his dotage from kindness and love, but Cordelia tells him she will only "return those duties back as are right fit," which her father takes to mean an unsatisfactory, bare minimum. Lear panics, decides she is not a safe investment, and brashly says, "Here I disclaim all my paternal care, / Propinquity, and property of blood" (1.1.110). Cordelia's strategy of focusing on her rivalry with her sisters fails because she counts too much on paternal love, overlooking generational conflict.

Unfortunately for Cordelia, the conflict in *Lear* is multidirectional: not only are the siblings rivals, but the fathers, Lear and Gloucester, also compete with their own children. The selfish

choices fathers and children make are motivated by what Leon Shaskolsky Sheleff calls "universal structural variables" and what I call universal, evolved human nature. Sheleff writes,

> No full understanding of the conflict between the generations can be gained without taking cognizance of the universal structural variables inherent in the nature of generational contacts that lead invariably to conflict. While the cultural influences of any society clearly have an impact on the manner, the intensity and the dimensions, of the struggle between the generations, they do not, in and of themselves, cause generational tensions. (37)

When Lear mistakes Cordelia's words for cold-hearted defiance instead of a truthful assessment of their relationship meant to expose her sisters' hypocrisy (and thereby gain an advantage as well) he makes the fatal decision to cut his losses by disowning the daughter he suddenly sees as a threat. The generational conflict, sibling rivalry, and selfish behaviors in the play reflect universal human nature and a long history of evolution through natural selection. As Meredith Skura points out, "For this darker vision of human relationships, Shakespeare ... borrows from Montaigne's unsentimental account of the nature of fathers and children, who have good reason to hate each other as they compete for scarce resources. Generations always threaten to eat each other like creatures of the deep. They must, if they try to preserve themselves" (122). The characters take their conflicting goals and competition to such an extreme they do devour each other, starting with Lear's command at the beginning to "digest" Cordelia's territory and ending with Albany's observation of justice being served: "All friends shall taste / The wages of their virtue, and all foes / The cup of their deserving" (5.3.302).

ii. Other critical interpretations

In "Impossible Worlds: What Happens in *King Lear*, Act 1, Scene 1?" William Dodd blames Lear for the fatal outcome of the play:

> Lear constructs a situation in which a royal parent blesses his daughters by offering them shares of his kingdom in return for an act of loving obeisance. The youngest daughter inverts the order of nature by implicitly passing judgment on her father's request. But the play shows that it is the father's curse rather than the daughter's judgment that is tragically misplaced and that disobedience may have a higher authorization than obedience. The one breaching natural law turns out to be the cursing father, not the judging daughter. (486)

Dodd takes for granted several assumptions here. First, he says Cordelia "inverts the order of nature" by judging her father negatively for setting up a love test. For Dodd, the order of nature is for daughters to obey fathers. But this "natural law" is not found in nature. It is invented by custom and imbued with greater weight by claiming to come from outside culture. Cordelia's actions do not violate any laws of nature and actually follow a natural pattern of competition between kin. Dodd then once again appeals to another fictitious force outside culture to justify Cordelia's disobedience by mentioning a vague "higher authority." Although he wants to resist textual analysis that might "diminish the subject to a mere effect of super-personal forces," Dodd still ends up appealing to something outside and above the human level to find meaning. And despite claiming to not "exalt the individual subject as a unique source of decision and action," he still wants to identify the guilty party and lay blame. If we discover who is responsible we can decide where justice lies and learn a moral lesson, and if that morality is based in an external

(and so unbiased, unchanging) system it may seem stronger. However, a careful look at the text makes placing blame and deriving a moral lesson more difficult.

Although nature causes the generational tensions and sibling rivalries, culture is the actual source of value judgments. While we often associate "natural" with "good" and "inevitable," the scientific use of the term does not imply these judgments. A book review in the *Nation* says evolutionary psychology "marshals two of the most powerful ideas in contemporary culture: science, out most authoritative way of knowing, and nature, our highest ground of moral appeal," but as Dawkins insists in *The Selfish Gene,* we cannot derive our morality by looking at nature. Natural selection does not work by what is right, or just, or good, but by what succeeds best in current conditions. Good and evil are human values. Dawkins responds to this concept when he writes, "My own feeling is that a human society based simply on the gene's law of universal ruthless selfishness would be a very nasty society in which to live. But unfortunately, however much we may deplore something it does not stop it being true."

For Jonathon Dollimore, an instance in the play that upholds this understanding of good and evil is when Gloucester, seemingly callously but really uncomprehendingly, tells "Poor Tom" to return to the hovel if he is cold. "That this comes from one of the 'kindest' people in the play prevents us from dismissing the remark as individual unkindness: judging is less important than seeing how unkindness is built into social consciousness" (74). Though Dollimore says unkindness is built into *social* consciousness rather than biological nature, I agree with his reading. Social consciousness is informed by nature and so unkindness may stem from both, just as cooperation has a genetic and cultural basis. Dollimore also goes on to say we cannot derive our morals from nature:

> Here, as throughout the play, we see the cherished norms of human kindness

> shown to have no "natural" sanction at all. A catastrophic redistribution of power and property—and, eventually, a civil war—disclose the awful truth that these two things are somehow prior to the laws of human kindness rather than vice versa (likewise, as we have just seen, with power in relation to justice). Human values are not antecedent to these material realities but are, on the contrary, informed by them. (78)

Dollimore, Dawkins, and Shakespeare agree we cannot complacently rely on nature for kindness or morality because our nature is heavily guided by competition and selfishness.

If *Lear* does not offer a satisfactory ending with a neat moral lesson, as even Edgar's final admonishment to "speak what we feel, not what we ought to say" remains unsupported by the rest of the text, it does give the audience a clear vision of human capacities both altruistic and absolutely selfish. Knowledge can give us leverage for change. Despite Gloucester's lament that "Though the wisdom of nature can reason it thus and thus, yet nature finds itself scourged by the sequent effects"[17] it is also true that understanding the effects of nature that scourge the human species is an important first step (1.2.97). The relationship between evolutionary genetics and Shakespeare's play is their common concern with exposing the shape of shared human nature and contemplating the implications of what we find.

While a close look at the actions of characters in *Lear* shows how they are motivated by common, evolutionary strategies we have all inherited in our genes, the story sticks with us because the violent, jealous murders of family members upsets our expectations of familial love and kin selection. In "An Evolutionary Paradigm for Literary Study" Joseph Carroll writes, "[Family] relations often work smoothly enough for practical purposes, but they not infrequently

[17] The 2004 Longman edition of *Lear* glosses "wisdom of nature" as "natural science." So, to paraphrase Gloucester, although science can explain the world, the world still finds itself plagued by whatever problems it started with. An explanation is not a solution.

break down in rejection, separation, abandonment, violent struggle, abuse, and even murder." This breakdown pulls us into the play. But we also know parent-child relationships are often loving and kind. Cordelia does seem to truly love her father and resist the staged test of her love partly out of deep feeling that cannot be put in words. Behavior between daughters and fathers is not motivated solely by selfish interests on the individuals' part: greed and calculated desire for resources or mathematic probability that current investment of time, energy and goods will pay off in the continuation of one's genes. Human relationships are complex. People are molded by different impulses, various genetic pressures, changing environments, social constructs, and learning. To reduce specific people (or characters) to the evolutionary adaptations of conflicting parent-child interests and the related sibling rivalry only gives a picture of the ultimate, evolutionary reasons why they behave as they do, and does not deal with the immediate, proximate causes for behaviors.

Still, it seems the action in Shakespeare's play is primarily motivated by these relationships. Marcus Nordlund writes, "Shakespeare deliberately violates a familiar aspect of human nature as a means of involving the audience emotionally and inviting us to reflect critically on the nature of love" (5). We helplessly watch Lear reject Cordelia, the separation between Cordelia and her sisters and the brothers Edgar and Edmund, Gloucester's abandonment of his son Edgar and Lear's abandonment of his loyal adviser Kent, the abuse of Gloucester and Lear by their children, the violent struggle bubbling through the whole play, and finally the murders that end with the fathers dead and four fifths of the children killed.

"Meantime we shall express our darker purpose," King Lear tells the gathered audience. He wants to end the tasks of doling out his resources to his offspring and struggling to control his position in the social hierarchy. He also, somewhat contradictorily, wants to retain some of his

power and his title. Lear's desires conflict, both internally and with the desires of the other people in his environment. Lear and some critics fail to see the conflict because they assume the king's (or anyone's) power comes from a natural order of things, or a higher authority, rather than seeing the hierarchy as a result of material resources or of the evolutionary history emphasized here. Lear believes his daughters should care for him "naturally" because he is their father and king, but, as we have seen, the first law of nature in biology is selfishness and even cooperation and kindness are reinforced by real benefits. The play does not offer a clear, moral answer to the problems invoked by human selfishness. Characters cannot be completely relegated to good and evil camps, and their general goodness or evilness does not make a difference in their survival in the end. Instead, the play makes the darker, selfish purpose of human nature visible and questions some of our ideological assumptions about the meaning of natural and unnatural behavior.

Conclusion

In this thesis, I have reiterated a common statement in academia: the humanities are suffering a decline. The student body and budget for humanities departments at most universities has shrunk. After examining some of the reasons for the loss of numbers in university humanities departments, such as a weakened economy and consequent shift to career track majors that offer more security, I focused on common problems with literary theory within English. The main problems with literary theory are incompatibility with other bodies of knowledge, lack of discourse between literary theory and current discoveries in human sciences, and adherence to the outdated model of human nature based on the blank-slate theory. I then suggested a solution to these problems is a new method for literary study that incorporates scientific research and evolution into literary theory and criticism. This new method is a burgeoning movement that goes by several names, such as literary Darwinism, neurolit, and evolutionary literary criticism, or evocriticism.

In his poem "Identity," A.R. Ammons captures the essence of the philosophy behind evocriticism. He relates the joy of discovering the incredible, complex, beautiful, and elegant world around us, and sharing that knowledge:

> it is
> wonderful
> how things work: I will tell you
> about it
> because
>
> it is interesting
> and because whatever it is
> moves in weeds
> and stars and spider webs

and known

is loved:

To me, it conveys respect for the world and autonomy of nature, not tethered to human perceptions for value, but valuable to humans nonetheless. In another part of the poem, he talks about the balance between the general and specific:

if the web were perfectly pre-set,
the spider could
never find
a perfect place to set it in: and

if the web were
perfectly adaptable,
if freedom and possibility were without limit,
the web would
lose its special identity:

Literary studies must find this balance again.

Looking at the world from a new vantage point and upsetting our habits and preconceived notions, Lyn Hejinian tells us, "alter illusions, which is all-to-the-good" (95). She looks for objective information; like a naturalist collecting beetles she collects her memories and tries to truthfully mark them down. In her nineteenth chapter, Hejinian says, "It was at this time, I think, that I became interested in science. Is that a basis for descriptive sincerity?" (71). She points out, "Aesthetic discoveries are socially different from scientific discoveries, and this difference is political." Not quantitative or qualitative, the difference lies in social reception related to power. Hejinian remembers, "In those days I had the mistaken notion that science was hostile to the imagination. That kept me from a body of knowledge" (87). Later she realizes the idea was false, just as the idea that art is hostile to science need not be true. Rather they are both bodies of

knowledge engaging the imagination in ways that can be mutually beneficial. "So I rebelled against the worlds of my own construction and withdrew into the empirical world surrounding me" (91). It is time for literary critics to withdraw into the world around us.

Literary criticism should negotiate between scientific evidence and literary imagination to explore what it means to be human. From scientific studies we can begin to understand human nature and our biological drives. But we cannot derive our morality from nature. The adaptiveness of a trait says nothing about whether it is right or wrong. E.O. Wilson asks, "Which of the censors and motivators should be obeyed and which ones might better be curtailed or sublimated? These guides are the very core of our humanity. … Although human progress can be achieved by intuition and force of will, only hard won empirical knowledge of our biological nature will allow is to make optimum choices among the competing criteria of progress" (7). Literature provides a useful tool for examining human behaviors, including behaviors with negative effects like racism, sexism, and other forms of prejudice. Done well, evocriticism can give us a clearer picture of ourselves by uniting all the areas of human knowledge and enable us to make the ethical changes to society we desire.

We have separated science and the humanities. But what is more human than the desire to understand our surroundings and ourselves? Astronomer and popular scientist Carl Sagan explains, "Curiosity and the urge to solve problems are the emotional hallmarks of our species; and the most characteristically human activities are mathematics, science, technology, music and the arts—a somewhat broader range of subjects than is usually included under the "humanities" (82). But literature often sees science as a reductive, individualistic pursuit divorced from social considerations in both the act and consequence of building its body of knowledge. Sagan writes, "A typical example of the occasional resistance mustered by intuitive thinking against the clear

conclusions of analytical thinking is D. H. Lawrence's opinion of the nature of the moon: 'It's no use telling me it's a dead rock in the sky! I *know* it's not.'" To which Sagan counters, "Indeed the moon *is* more than a dead rock in the sky. It is beautiful, it has romantic associations, it raises tides, it may even be the ultimate reason for the timing of the human menstrual cycle. But certainly one of its attributes is that it is a dead rock in the sky" (192). Sagan compromises, seeing value in both intuitive and rational thinking as survival tools in the human brain. He states, "Intuitive thinking does quite well in areas where we have had previous personal or evolutionary experience. But in new areas—such as the nature of celestial objects close up—intuitive reasoning must be diffident in its claims" (192). In our quest to know ourselves, we need a balanced approach utilizing all the tools available to us, including both intuitive and rational thinking, literary imagination and scientific support.

For instance, gender studies could learn something from a strict biological definition of the sexes, which is based solely on the size of the species' gametes: the female has larger gametes. Any further traits are descriptive, not definitive. Even chromosomal definitions do not always hold true, especially between species (not all species' sex is determined by X and Y chromosomes). While patterns in behavior and body plan exist for males and females across species, each pattern has exceptions. Even the most basic physical characteristics we think of as defining sex do not always hold constant: female hyenas have a pseudo penis; male seahorses give birth. Marxist readings could look at dominance hierarchies in other species to perhaps understand why hierarchies persist in human societies despite the Marxist expectation that the proletariat would rise up. Structuralism, poststructuralism and deconstruction could benefit from research in linguistic psychology that actually looks at how language works in the brain, how perception is created, what happens to thought when certain types of communication are no

longer possible, and many more relevant aspects of neurobiology and cognitive science. Postcolonialism could use research on certain human universals like in-group out-group divisions, in-group preferences, and group identities when studying texts concerning clashes and mixing between nations, races, and ethnicities. The possibilities for evocriticism are vast.

In part, the range of evocriticism is so wide because it is not a closed theory with a basic preconceived notion or agenda that is applied to all texts. Rather, it encompasses all biology and human sciences and utilizes whatever best illuminates a text. It can be adapted to the already established modes of literary criticism and give a stronger basis for their claims because it uses the most up-to-date research available and involves a bigger spectrum of knowledge by crossing disciplines. As I have shown with the previous chapter, it can use general or specific concepts to explain literature of widely varied types. It is also a mode of thinking that explores the nature of literature itself, and how and why literature could have evolved as a human behavior. Although there are many unanswered questions in evocriticism, there is great hope and excitement in the understanding that we can work together to begin to answer why we tell stories and what those stories tell us about ourselves.

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