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IV. Darwinian Selection and the World of Art

JOHN HAY

PLOTTING DEVICES: LITERARY DARWINISM IN THE LABORATORY

Abstract. Critics of literary Darwinism like to point out the weaknesses of its scientific scaffolding, but the real flaw in this research program is its neglect of literary history and stylistic evolution. A full-fledged scientific approach to literary criticism should incorporate the kind of work being done by Franco Moretti at the Stanford Literary Lab—a quantitative analysis of the history of literary form. While Moretti and the literary Darwinists are almost never mentioned together, I contend that their work is not only compatible but also necessarily so for a more consilient literary criticism. The Darwinian aesthetics promoted by Denis Dutton can help to unite these two approaches.

“**W**HY IS GEORGE WICKHAM such a jerk?” This is usually considered the wrong kind of question to ask in a literature class. The professor might respond with a reminder that Wickham is not a real person but rather a fictional character in *Pride and Prejudice*, his actions thus governed, not by underlying psychological properties, but by their function in a novel’s plot. Yet critics have begun to approach such questions with fresh minds, treating literary characters as case studies in the effort to understand the science of human nature. Evolutionary literary criticism—or literary Darwinism, as it has most popularly become

known—is a field of inquiry led by Joseph Carroll, Brian Boyd, and Jonathan Gottschall that allows critics to analyze stories in terms of evolved human characteristics.¹ Wickham’s caddish behavior can be understood not only as part of Jane Austen’s narrative construction but also in terms of a biologically evolved mating strategy.

Literary Darwinism has rapidly grown in popularity and branched into the arts more generally; the most widely read and reviewed publication associated with the movement is *The Art Instinct* by Denis Dutton, who also played an important editorial role in developing this new criticism.² Nevertheless, literary Darwinism has faced both severe skepticism and outright condemnation. The loudest complaint voiced against this new avenue of criticism challenges its scientific accuracy. Jonathan Kramnick, for example, insists that the psychological theories upon which literary Darwinism rests are heavily suspect and by no means matters of consensus within the scientific community.³

I argue that such a critique is misguided; literary Darwinism’s greatest flaw is its faulty approach to stylistic evolution and literary history due to a heavy reliance on psychological principles. *Pride and Prejudice* can teach us about universal traits of human social behavior, but it can also teach us about cultural norms and literary expression in early nineteenth-century England. Rather than reject Darwinian literary criticism for its shortcomings, this essay advocates its union with a separate scientific approach to literature taken from the work of Franco Moretti. While Moretti is rarely linked with the literary Darwinists, I contend that his focus on the history and migration of literary genres and devices expands and improves an evolutionary view of characters, plots, and settings. Taken together, these critical methodologies form a more comprehensive, empirical mode of inquiry that could appeal to a wide array of scholars.

I

Literary Darwinists have a focused set of concerns and a clear agenda. The movement owes its origins largely to the “science wars” of the 1990s. Disconcerted by the prevalence of postmodern declarations that challenged the validity of modern science, some literary critics began insisting that contemporary research in biology and psychology could provide an accurate understanding of an essentially universal “human nature.” John Tooby and Leda Cosmides, building on Edward Wilson’s groundbreaking work in sociobiology, laid the foundations for such knowledge with their program of evolutionary psychology.⁴ Led by Joseph Carroll,

a small but vocal minority of literature professors banded together to form a literature-and-science research project that rejects much of the work dominant in literary scholarship for the past thirty years and favors a more scientific approach for literary study (incorporating quantifiable analyses, data charts, falsifiable theories, etc.). Reacting to scholarship that focuses on gender, racial, and ethnic differences, literary Darwinists argue that evolutionary psychology offers models of human nature equally and universally applicable to all cultures and literatures.

The movement began with polemical attacks against the widespread approval of Marx and Freud, whose ideas have remained far more current in the humanities than in the sciences. In a very basic sense, as Gottschall has pointed out, literary Darwinists seek to replace literary criticism based on Freudian psychoanalytic principles with criticism based on the more recent (and likely more accurate) theories of evolutionary psychology.⁵ For those who feel that literature departments have become too dependent on recognizably outdated and falsified theories from the social sciences, evolutionary literary theory may seem to offer a fresh sense of theoretical progress. Yet literary Darwinists claim to provide more than incremental improvement. Carroll rejects the idea that literary Darwinism will become simply another accepted paradigm for literary scholarship (alongside Marxism, Freudian psychoanalysis, and deconstruction), instead insisting that a revolution is required in the humanities—a revolution that will feature Darwinism at the center of intellectual pursuits.⁶ Carroll claims that evolutionary literary theory is essentially totalizing in scope and thus neither compatible nor commensurable with other understandings of humanity and human production.

In one sense, Carroll is right: literary Darwinism cannot be “merged” with other totalizing outlooks on humanity in the same way that a Marxian explanation of history can complement a Lacanian description of desire. Carroll rejects these other paradigms of literary scholarship specifically because they present, whether implicitly or explicitly, views of humanity in conflict with the Darwinian perspective; but there is no reason to presume that literary Darwinism would be incompatible with critical paradigms in the humanities that do not entail a specific view on humanity itself. So, for example, a literary scholar advocating a Darwinian account of human and cultural origins could very well prefer a linguistic analysis of a novel to an examination of that novel’s historical reception (or vice versa).

The call for greater consilience with the natural sciences may be

attractive to many scholars, but potential adherents could be discouraged by the radically new professional aims of evolutionary literary theory. With the important exception of Brian Boyd's recent book *Why Lyrics Last*, which offers readings of Shakespeare's sonnets, Carroll, Boyd, and Gottschall have primarily addressed narrative rather than poetic aspects of literature. Carroll has argued that the key objects of interest for evolutionary literary study are the "dramatic" elements of character, plot, and setting—a view reinforced by Boyd, who aims to isolate "story" from any overall text.⁷ (Boyd is thus equally comfortable working with the *Odyssey* and Dr. Seuss's *Horton Hears a Who!* since, regardless of form, each tells a story.) While the focus on story rather than style potentially constitutes a severe limitation, its major benefit is its global applicability in the domain of world literature. Just as human nature is universal, the argument goes, so too are aspects of human stories.

The focus on storytelling leads to some interesting new questions: Why do we like stories? What use do they have? Why are some stories more popular than others? But in seeking answers to these questions by appealing to evolutionary psychology, literary Darwinists sometimes take human nature, rather than the literary text itself, as their ultimate object of inquiry. The result can feel bizarre; for example, Boyd remarks that Joyce's *Ulysses* is indebted to the multidimensional character created by Homer, but he fails to mention anything about the formal aspects of Joyce's modernist novel.⁸ History and language (often expressed as changes in form and style) have been tremendously important to the professional study of literature over the past hundred years, and the evolutionary critics give them short shrift. Human nature, they argue, has changed little in the past *ten thousand* years. In the works of literary Darwinists, historical and cultural developments are not nearly as significant as the shared, universal traits of human nature formed in the Pleistocene epoch—traits like aggression, mating strategy, and social behavior, which can be revealed by psychological readings of popular stories.

The neglect of human history is an extreme step for literary professionals (even for those nostalgic for the preeminence of the New Criticism). The humanities have distinguished themselves from the sciences by paying attention to the particular rather than the general and by retaining a sense of academic tradition rather than relying exclusively on current theories. The literary Darwinists' rejection of cultural history is so extreme, in fact, that it fails to find support even from some

of the scientists who provided the foundation for the movement. Both Edward Wilson and Richard Dawkins (often cited in evolutionary literary criticism) have advocated the documentation of small, rapid changes in cultural developments in addition to the genetic and behavioral elements of universal human nature. Yet literary Darwinists have largely refused to consider this avenue of research.

This line of cultural-historical inquiry commonly centers on the “meme,” a term coined by Dawkins.⁹ Analogous to genes, memes are fundamental units of culture that spread through a population and persist through time and, occasionally, across cultures. Examples include melodies, clothing styles, and theological beliefs. Wilson also promoted a term for a similar unit: the “culturgen.” While “meme” refers to cultural elements themselves, “culturgen” signifies the neural arrangement that indicates the phenomena in the mind.¹⁰ Thus the meme is purely cultural (i.e., nongenetic), while the culturgen allows for gene-culture coevolution. Wilson has since conceded the greater popularity of Dawkins’s term while suggesting that we should understand “meme” as denoting simultaneously the abstract cultural idea and its respective node of semantic memory in the brain.¹¹ In this modified form that forges a stronger link between neuroscience and semiotics, Wilson recognized the legitimacy of the meme in his foreword to the literary Darwinist anthology *The Literary Animal*.¹²

The main criticism lobbied against the meme has been the difficulty of establishing its existence “in nature.” Its ontological status has been subject to uncertainty as it cannot be reduced to physical components; thus both Carroll and Boyd dismiss the meme as a troublesome metaphor.¹³ But Wilson’s intervention grounds the concept and retains its use for the humanities. Memes allow scholars to move beyond individual artists and texts in order to identify trends, patterns, and—most important—historical developments. Unlike genes, memes are not autonomous self-replicators and thus are not subject to the process of natural selection. However, literary genres and devices do evolve over time, if not in a Darwinian fashion. Literary Darwinists have too hastily dismissed memes as nongenetic metaphors clouding a deeper genetic reality. I am insisting that attention to cultural units can enhance rather than hinder the study of the arts under a rational, scientific worldview that treats human culture as biological product.

While Dawkins’s “memetics” generated a fair deal of controversy and attention, the concept of an evolutionary cultural unit is by no means a recent suggestion. Arthur Lovejoy, for instance, almost a hundred

years ago began encouraging scholars to consider the history of ideas, claiming that, due to the persistence of specific “unit-ideas,” philosophical systems were best studied as stable patterns of basic components rather than as original ideas in themselves. Furthermore, Lovejoy, like the literary Darwinists, maintained that literature could be studied as an activity that is global and universal in scope: “As soon as the historical study of literature is conceived as a thorough investigation of any causal process—even the comparatively trivial one of the migration of stories—it must inevitably disregard national and linguistic boundary lines.”¹⁴ Attention to cultural units thus, for Lovejoy, led to a clearer vision of the history of a universal humanity.

One of the most prominent advocates of the cultural unit today is Franco Moretti, whose work has explored the migration of literary devices and genres across languages and historical eras. Moretti has embraced an evolutionary outlook on literature, claiming that evolutionary “trees” can be used to trace phenomena such as the development of the detective novel.¹⁵ Like the literary Darwinists, Moretti not only appeals to an evolutionary explanatory system but also urges scholars in literature departments to adopt an empirical methodology, arguing that professional work should include collecting quantifiable data, proposing falsifiable theories, and testing those theories experimentally. At the Stanford Literary Lab, Moretti encourages collaborative work on projects that address issues such as whether literary genres might be recognizable on a linguistic level by computer-generated algorithms.¹⁶ Such work embraces the literary Darwinists’ call for greater scientific respectability, albeit in a separate dimension of scholarship.

II

Moretti has suggested that we need to acknowledge two entirely different perspectives in the study of literature, one on plot and one on style. He notes that in the arena of world literature plots “travel” incredibly well, maintaining recognizable identities when reproduced across languages, cultures, and times. Style, however, is inherently a local property; it often translates poorly between languages, and stylistic conventions are historically variable. (Thus Shakespeare’s plots, themselves borrowed, are continually adapted into new movies, while his dialogue often frustrates high school students.) Despite their potential for complementarity, plot and style, argues Moretti, are essentially independent of each other.¹⁷ We can therefore speak of an ahistorical, fundamental human nature

when analyzing plots (and characters and settings), but we should pay attention to the vagaries of history and language when analyzing how plot is expressed through style and form.

Moretti's approach to the study of literature differs greatly from that of the literary Darwinists. While both advocate the professional adoption of scientific standards for research, the similarities cease there. Moretti's attention to genres and devices often comes at the expense of attention to particular works. His "distant readings" take under their purview the literature of multiple nations and eras—tracking, for example, how the form of the bildungsroman evolves as it moves from eighteenth-century Germany to nineteenth-century France to twentieth-century China—while single-author studies and close readings of individual works fade into the background.¹⁸ Human psychology, the foundation of literary Darwinism, barely factors into Moretti's investigations.

However, I contend that Moretti's scientific approach to literary history is a necessary complement to the scientific study of stories promoted by literary Darwinists—necessary, because the main flaw with evolutionary literary criticism is its restriction to the evaluation of human behavior. Such criticism is usually confined to an analysis of characters within narratives, and when it expands beyond narrative it usually addresses the actions and motives of authors and readers; it rarely attends to text as an entity in itself with a history of its own. Attacks upon literary Darwinism thus often consist chiefly of refutations of the tenets of evolutionary psychology on which literary Darwinism is based. Yet such attacks are ultimately fruitless, for two main reasons.

First, the attempt to expose literary Darwinism as an inaccurate theory nevertheless recognizes its belonging to scientific discourse. The evolutionary literary critics have been candid in their admission that their claims are not uttered as hard truths but rather as hypotheses and theories subject to refutation and falsification. They expect that their theories will not persist as authoritative statements but will rather be replaced by more accurate accounts. (Indeed, they sometimes invite critiques of their theories as an important part of the scientific activity they are promoting.) Second, evolutionary psychology and the literary Darwinism developed from it are not particular scientific theories in themselves. They are instead what philosopher Imre Lakatos termed "research programs," a term Boyd has embraced.¹⁹ A research program is more premise than conclusion; it is a postulated perspective on the world that guides the path of future research. The evolutionary psychology promoted by literary Darwinists is just such a program. Gottschall,

for one, insists that the premise on which evolutionary literary criticism is based is not a detailed theory regarding neural functioning but the simple idea that “psychology evolved.”²⁰ Speculative accounts of species development in the Pleistocene are easy to challenge, but it is difficult to maintain that the human mind does not result (at least indirectly) from natural selection.

As a research program for an academic field in the humanities, however, literary Darwinism offers very limited prospects. The questions it poses (such as, “Why do we like stories about powerful characters?”) are interesting but primarily psychological in nature; literature is here often a tool for studying the mind rather than the object of inquiry itself. To the extent that literary Darwinism generates new perspectives on the literary, they are usually constrained either to narrative (i.e., characters, plots, and settings) or to author-reader relationships. In this fashion, evolutionary literary criticism fits into an older tradition of exclusive attention to narrative, a tradition that has featured critics like Vladimir Propp and Joseph Campbell. This tradition cannot stand alone. A fuller evolutionary approach to literature, one that eclipses postmodern trends in order to gain scientific respectability for literature departments, will include a more historically attuned (rather than purely universal) focus on the evolution of literary form, the kind of focus being championed by Franco Moretti and the Stanford Literary Lab.

It is perhaps not surprising that Carroll, Boyd, and other evolutionary literary critics have not embraced Moretti’s work. In fact, neither Carroll nor Boyd has discussed his work at all (and Gottschall mentions it only in passing). The professional attitudes of the literary Darwinists are decidedly anti-Marxist, and Moretti’s intellectual trajectory aligns with Marxist criticism. But these two Darwinian approaches to literary study are compatible. While an understanding of human nature helps us to explain aspects of literature as human artifact, we can also profit from viewing literature itself as an entity with its own history and evolution. Moretti’s approach allows us to appreciate the subtle changes literature undergoes in its own development, changes too small to be attributable to genetic modifications of human nature itself.

Most professors in the humanities understand their work in some relation to either historical periodization or genre study (or both), aspects largely undervalued within the literary Darwinist research program. Moretti’s emphases on distant reading and quantitative analysis are unusual for the profession, but his work maintains a foundation in history and form. In fact, by tracing genres and devices historically, his

model is an attempt to combine both historicism and formalism. He achieves this combination by claiming for literary research an empirical methodology, which must certainly be attractive to literary Darwinists. If Moretti's work can be reconciled with theirs, then we can understand literary Darwinism as changing the *direction* of literary research rather than simply adding another critical option or, on the other hand, effecting a gestalt change within the profession. A greater emphasis on Moretti's aims can still satisfy most of the aims of the evolutionary literary critics (the need for theories, data, falsification, comparisons across world literature, etc.). Moreover, this conciliation could make a more scientific approach to the study of literature more attractive to more scholars.

III

We can judge the benefit of augmenting literary Darwinism with Moretti's approach by examining some proposed models for an explanation of the literary stylistic phenomenon known as free indirect discourse, a strange blend of impersonal narration and a character's speech or thoughts.

Joseph Carroll and Brian Boyd tend to focus far more on story than on style; reference to free indirect discourse in their works is fleeting. This paucity of discussion is surprising because they devote so much attention to the novels of Jane Austen, arguably the first Western author to really develop this stylistic device. (Carroll and Boyd's interest primarily lies in courtship rather than style in Austen's work.) In an essay on Austen, Boyd limits his discussion of free indirect discourse to a single paragraph, explaining that Austen was the first to use the device extensively, which, he says, functions as part of a "cheater detection" system: characters in her novels (like human beings everywhere) need to closely observe and monitor both themselves and others in order to be able to predict future actions and prepare for future situations.²¹ Free indirect discourse, for Boyd, simply represents a kind of mindreading that gets to the heart of the observational behavior of evolved human sociality.

Blakey Vermeule offers a promising account of free indirect discourse in *Why Do We Care about Literary Characters?*, a book that links the dissemination of literature to socially evolved forms of gossip.²² She initially claims that free indirect discourse operates like a meme in literary history, and she references Moretti's work, but then she refocuses her discussion on human nature. Vermeule skirts around the historical development

of free indirect discourse; she begins with the technique in Chaucer's work, then acknowledges its appearance in works of the seventeenth, eighteenth, and nineteenth centuries, seemingly proposing that it is a universal element. But then she claims that Jane Austen more or less created the technique and that Henry James perfected it, thus characterizing free indirect discourse as a nineteenth-century phenomenon. Vermeule is basically interested in the idea of authors representing "mind-reading" (as is Boyd), but she offers no reason why free indirect discourse develops in the odd way that it did (*WDW*, p. 75). Why does it only become popular in the nineteenth century? Why does it vary so much under the pens of different authors?

Vermeule's analysis remains limited because she wants to explain free indirect discourse, in its relation to human nature, as a unitary and universal phenomenon. She offers it as "a technique for presenting a character's thoughts from a third-person point of view," which is not an exclusive quality; regular indirect discourse can do the same thing (*WDW*, p. 75). Using Flaubert's *Madame Bovary* as her primary example, she describes free indirect discourse as "a vehicle for bearing an emotional tone . . . a tone of egotistical self-assertion" (p. 78). In this case, the device is a subtle way to register petty complaints. But this is a very idiosyncratic view of the technique—one that applies well to *Madame Bovary*, but not as well to Flaubert's *A Sentimental Education*, or to García Márquez's *The General in His Labyrinth*.

Moretti echoes Vermeule's ideas about gossip and socialization. Also examining the work of Austen and Flaubert, he claims that free indirect discourse is a turn away from the didactic tone that allows for the appearance of a third voice (between narrator and character), the voice of the "well-socialized individual," or of public opinion itself.²³ Rather than grounding free indirect discourse as a natural outgrowth of a single biological impulse, Moretti historicizes the technique by claiming that it works, in the nineteenth century, to convey a tone of optimistic conservatism, a postrevolutionary acceptance of the status quo. However, Moretti also allows us to question why free indirect discourse *changes* when used by different authors. Human nature may be uniform, but free indirect discourse is not. And while Moretti agrees that free indirect discourse is potentially universal in scope—a technique not indigenous to one national literature but instead a part of world literature—he also attends to the ways in which free indirect discourse evolves when presented in different contexts. For example, when literary modernists like Marcel Proust and Virginia Woolf pick up the device, it often blends

into stream-of-consciousness narration. Moretti's historical analysis and his reflections on socialization are indebted to a Marxist strain of literary criticism for which literary Darwinists have clearly expressed their distaste. Yet what matters in this case is not really an argument about human society but rather an argument about the relationship between literary form and literary history. Literary Darwinists could certainly agree with the idea that free indirect discourse takes on different shapes over time—even though they may disagree with Moretti about *why* it changes.

IV

Denis Dutton's work can help bridge the gap between Moretti and the literary Darwinists. While Dutton devoted one chapter of *The Art Instinct* explicitly to literature as storytelling (primarily adopting Carroll's perspective), his broader interest in the arts allowed him to focus on non-narrative types of expression. Moving beyond characters, plots, and settings, Dutton recognized style (i.e., the generic rules governing form and composition) and tradition as universally essential features of art that nevertheless display mutability. Changes in artistic style, he noted, "involve borrowing and sudden alteration, as well as slow evolution" (*AI*, p. 53). Artists generate novelty by negotiating prior influences and formal constraints, always working within historically variable stylistic and cultural frameworks. Originality and creativity, artistic qualities valued cross-culturally, arise from challenges to the stability of these background frameworks. The critical treatment of style, of course, is not completely absent from the works of literary Darwinists, but adherents tend to approach style in terms of universal characteristics and individual idiosyncrasies, diagnosing genre in terms of anatomy rather than analyzing its historical development.

Dutton, noting that the significance of an artwork is partly determined by its place in a tradition, argued that a full aesthetic analysis must consider "lines of historical precedents" (*AI*, p. 58). It simply makes a difference whether an image was painted in the thirteenth century or the nineteenth century; we continue to ascribe greater value to works that were bold in their time, like Picasso's *Les Femmes d'Alger*, even if (and indeed, often because) imitations and reproductions later became commonplace. The historical precedents shaping an artistic tradition may follow global migrations, as artists may choose to enter a tradition foreign to their immediate cultural context (as, for example, British pop musicians of the 1960s playing American rhythm and blues). Because

authors often construct their stories with acknowledged influences from other writers, attention to the translation and adaptability of literary traditions complements any analysis of human nature's influence on narrative content. Dutton's recognition that style itself evolves in a historical context—indeed, his overall attention to non-narrative art forms—can link the work of literary Darwinists to the labor at Moretti's literary lab.

Dutton accounted for the origin and evolution of the arts largely by appealing to sexual rather than natural selection. In this view, the instinct toward artistic creativity is a genetic, species-wide adaptation, but the evolution of different genres and traditions results from competitive environments that reward individual skills (*AI*, p. 226). Formal design is thus subject to local and individual malleability. Within the structure of a genre, individual competition for the greater attention of an audience can also be understood as a kind of "problem solving," which is exactly how Boyd describes the historical evolution of newspaper comics in the United States.²⁴ By tracing the developments of devices like the speech balloon, Boyd calls attention to the trajectory of an artistic tradition, performing the kind of cultural work Dutton found so important for the arts. Boyd has continued to move in this direction with work on verse, particularly Shakespeare's sonnets, which he is willing to analyze in terms of the sonnet form as a formal "tradition."²⁵ This move beyond purely narrative content suggests a promising growth in the critical power of literary Darwinism.

Boyd has also called for a "consilient pluralism" that can approach "literature *as* literature, as art, with all the expertise of human readers, scholarship and traditions *and* where appropriate with all the power of scientific method."²⁶ In other words, evolutionary criticism need not follow a reductionist program that treats literature merely as the product of human psychology; a rich literary history of its own can be retained. As few artistic traditions and stylistic techniques are truly universal throughout human history, being rather the result of cultivation and transplantation, a study focusing on genres and devices demands a certain attention to the particular iterations of literary phenomena within a historical context—an ecological sense of literary form. The union of literary Darwinism and Moretti's methodology produces a scholarly outlook that encompasses both a psychological and a historical approach to story and style.

Literary Darwinism can provide us with an understanding of the human psychological traits that ultimately serve as both a foundation and a shaping force for narratives; for an understanding of how stories

change—over time and across cultures—particularly in the way they are told, we can use quantitative analyses to test theories unique to literary history. Literary Darwinism has done much to uncover the origin of stories; by following Dutton to Moretti, the movement can continue to explore the migration of stories.

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1. See, for example, Joseph Carroll, *Literary Darwinism* (New York: Routledge, 2004) and *Reading Human Nature* (Albany: SUNY Press, 2011); Brian Boyd, *On the Origin of Stories* (Cambridge: Harvard University Press, 2009) and *Why Lyrics Last* (Cambridge: Harvard University Press, 2012); and Jonathan Gottschall, *Literature, Science, and a New Humanities* (New York: Palgrave Macmillan, 2008) and *The Storytelling Animal* (Boston: Houghton Mifflin, 2012). See also *Evolution, Literature, and Film: A Reader*, ed. Brian Boyd, Joseph Carroll, and Jonathan Gottschall (New York: Columbia University Press, 2010).
2. Denis Dutton, *The Art Instinct: Beauty, Pleasure, and Human Evolution* (New York: Bloomsbury Press, 2009); hereafter abbreviated *AI*.
3. Jonathan Kramnick, "Against Literary Darwinism," *Critical Inquiry* 37 (2011): 315–47. Responses to Kramnick's article have been published in the Winter 2012 (vol. 38) issue of *Critical Inquiry*.
4. See John Tooby and Leda Cosmides, "The Psychological Foundations of Culture," in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, ed. Jerome Barkow, Leda Cosmides, and John Tooby (New York: Oxford University Press, 1992), pp. 19–136.
5. Jonathan Gottschall, "The Tree of Knowledge and Darwinian Literary Study," *Philosophy and Literature* 27 (2003): 255–68.
6. Carroll, *Reading Human Nature*, p. 78.
7. Carroll, *Literary Darwinism*, p. 19.
8. Boyd, *On the Origin of Stories*, pp. 222–23.
9. Richard Dawkins, *The Selfish Gene* (New York: Oxford University Press, 1976), pp. 189–201.
10. Charles J. Lumsden and Edward O. Wilson, "Translation of Epigenetic Rules of Individual Behavior into Ethnographic Patterns," *Proceedings of the National Academy of Sciences of the United States of America* 77 (1980): 4382–86.
11. Edward O. Wilson, *Consilience: The Unity of Knowledge* (New York: Vintage, 1999), p. 148.
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- and *the Nature of Narrative*, ed. Jonathan Gottschall and David Sloan Wilson (Evanston: Northwestern University Press, 2005), pp. vii-xi (p. ix).
13. Carroll, *Literary Darwinism*, p. xiv, and *Reading Human Nature*, pp. 45–46. Brian Boyd, “‘Jane, Meet Charles’: Literature, Evolution, and Human Nature,” *Philosophy and Literature* 22 (1998): 1–30 (11).
 14. Arthur O. Lovejoy, *The Great Chain of Being: A Study of the History of an Idea* (1936; repr., New York: Harper, 1960), p. 18.
 15. Franco Moretti, *Graphs, Maps, Trees: Abstract Models for Literary History* (New York: Verso, 2007).
 16. Sarah Allison, Ryan Heuser, Matthew Jockers, Franco Moretti, and Michael Witmore, “Quantitative Formalism: An Experiment,” *Literary Lab*, Pamphlet 1 (January 2011). Reprinted in *n+1* 13 (Winter 2012): 81–108.
 17. Franco Moretti, “Evolution, World-Systems, *Weltliteratur*,” in *Studying Transcultural Literary History*, ed. Gunilla Lindberg-Wada (Berlin: de Gruyter, 2006), pp. 113–21.
 18. For “distant reading,” see Moretti, *Graphs, Maps, Trees*, p. 1.
 19. Imre Lakatos, “Falsification and the Methodology of Scientific Research Programmes,” in *Criticism and the Growth of Knowledge*, ed. Imre Lakatos and Alan Musgrave (Cambridge: Cambridge University Press, 1970), pp. 91–196; Boyd, *On the Origin of Stories*, p. 391.
 20. Gottschall, “Tree of Knowledge,” p. 260.
 21. Boyd, “‘Jane, Meet Charles,’” p. 22.
 22. Blakey Vermeule, *Why Do We Care about Literary Characters?* (Baltimore: Johns Hopkins University Press, 2010); hereafter abbreviated WDW.
 23. Moretti, *Graphs, Maps, Trees*, p. 82.
 24. Brian Boyd, “On the Origin of Comics: New York Double-Take,” *Evolutionary Review* 1 (2010): 97–111.
 25. Boyd, *Why Lyrics Last*, p. 132.
 26. Brian Boyd, “Literature and Science: Doomed Reductionism or Evolutionary Literary Pluralism?” *Evolutionary Psychology* 6 (2008): 80–84 (82).