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Animal Metaphors and Metaphorizing Animals: An Integrated Literary, Cognitive, and Evolutionary Analysis of Making and Partaking of Stories

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Abstract Humans use metaphors to explore their relationship with nature. Our ability to make and understand metaphors appears to be an automatic cognitive process, one that likely evolved along with our ability to create and understand language. Because metaphors are processed automatically, without conscious appraisal, they can be used to rapidly communicate, or manipulate. Applying theories of evolutionary psychology and cognitive science to literary texts, we explored the role of animal metaphors in the making and partaking of stories in the context of a course in environmental studies. We investigated how humans are animals and yet use culture to shield themselves from this reality. We read and analyzed literature in which animal metaphors are central, such as Honoré de Balzac's short story *Passion in the Desert* and Langdon Smith's poem "Evolution." Throughout the course, the overarching theme is that animal metaphors are powerful tools for framing our relationship with the environment and that they can be best understood in the context of humans as evolved animals.

Keywords Metaphor · Narrative · Literature · Blended space · Human universals · Theory of mind · Animate monitoring system

How do we distinguish humans from animals? This question, meant to provoke discussion, was put to students on the first day of "Animal Metaphors," an intermediate-level course designed for the multidisciplinary environmental studies major at Vassar College. Team-taught by a specialist of French literature and a scientist whose dual specialization is biology and cognitive science, the course draws on concepts from cognitive science and evolutionary psychology to reframe questions of human–animal identity encountered in imaginative literature as well as everyday life. To permit the exchange of information and ideas between students of varied backgrounds in the humanities or natural sciences, we developed a conceptual bridge using analytic approaches from cognitive science and literary studies. That bridge is "animal metaphors."

In this paper, we discuss the structure of the course, metaphor and the evolved process of understanding metaphors, the conceptual tools needed to analyze metaphors critically in their textual and evolutionary contexts, and examples of how those conceptual tools were applied to the analysis of texts.

Overview of the Course

Though a common term in literary studies, we intend *animal metaphors* to represent our particular approach to evolutionary studies. We begin with the premise that humans are animals, primates that share physical, behavioral, and neural machinery with other primate species. Humans have the cognitive ability to make and understand metaphors, and they create animal metaphors in order to cognitively model and represent other agents, including other humans, in our ongoing struggle for existence in a rapidly changing environment. Paradoxically, the evolved use of animal metaphors to fashion a relationship with the environment allows humans to conceptualize themselves as non-animals. As metaphorically construed non-animals—specially created, for example humans—are then more likely to harm that to which they supposedly don't belong: the environment. This is the grand theme of the course, and one that requires the explanatory

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power of evolution for understanding both how and why humans so often represent themselves in opposition to animals. As we examine imaginative literature and film, we keep in mind that environmental problems can require an evolutionary understanding of ourselves. Human beings are "literary animals" with an evolved tendency to make and partake in storytelling, and we rely on metaphors to tell one another stories about animals in relation to ourselves.

Structure

Divided into modules that introduce works of literature and film in tandem with various theories of evolutionary psychology and cognitive science, the course is structured to begin and end with the problem of defining and representing humans in relation to animals.

The first module focuses on the role of metaphor in our conceptualizations of the world and ourselves. After introducing metaphor in relation to selected evolutionary theories of mind, emotion, and behavior, we examine a study that seems to provide initial empirical support for the following hypothesis (Goldenberg et al. 2001): "…being an animal is threatening because it reminds people of their vulnerability to death" (427).

The second module develops more thoroughly the idea of human universals. Evolution can explain the mechanisms by which we are affectively drawn to or repelled by animals and is behind the cognitive architecture allowing us to represent animals according to the different roles or purposes we assign to them. Students learn to analyze ways in which such universals participate in the production and reception of narrative literature and film, whose metaphors can mediate the anxiety we may have about being animals.

The third module turns to the use of animal metaphors in a broad range of discourses and representations that address environmental issues. Ultimately, metaphors that deny or distance us from natural realities can participate in the decisions we make—or fail to make—concerning the environment. By the course's conclusion, students have acquired new knowledge and tools for exploring the problem of human–animal identity by learning to understand and analyze the very representational practices we engage in from an evolutionary perspective.

Metaphor as Categorical Assertion

Seen as a central feature of human cognition that has evolved with the development of language (Pinker 1993), the ability to conceptualize one entity in terms of another allows us to communicate through metaphor. *Oxford English Dictionary* defines metaphor as "the figure of speech in which a name or descriptive term is transferred to some object different from, but analogous to, that to which it is properly applicable." Though often understood as a device employed by poets, metaphor is part of everyday speech. We use constructions for motion in physical space to express changes in state-space (Lakoff and Johnson 1980), as when we say "Humans have risen above animals." In poetics, metaphor is often distinguished from simile in that it asserts properties of one entity in terms of another entity without the use of "like" or "as" ("My boss is a dragon" vs. "My boss is like a dragon"). The link between the two entities may be established explicitly using a linking verb, or, in the case of implied metaphor, a different verb or part of speech functions to establish the connection ("My boss is spitting fire"; "I'd like to punch his snout in").

Though our course embraces definitions of metaphor that include non-verbal as well as verbal analogies between different entities, we begin with Glucksberg's (2003) more restrictive definition of metaphor as categorical assertion. Informed by reaction time experiments, Glucksberg permits us to explore empirically the impact of metaphors that categorize human beings. Comparing the statement "My lawyer is a shark" with "My lawyer is like a shark," Glucksberg argues that in the simile form, "the word 'shark' refers to the literal predatory fish. In metaphor form, 'shark' refers to the superordinate category of predatory creatures that is exemplified by the literal shark" (95). Glucksberg's experiments indicate that people do not need to derive an initial, literal interpretation from metaphorical assertions: "Metaphors are not understood via a property-matching comparison process. Instead, they are generally understood directly as categorical assertions" (92).

The idea of metaphor as categorical assertion has been expanded by research in linguistics, philosophy, and cognitive science. In these fields, metaphor is not just a figure of speech. It is a process of "conceptual blending" that results in "the creation of new meaning" (Fauconnier and Turner 2003, 39). Drawing upon Black's (1962) interactionist view of metaphor and Lakoff and Johnson's (1980) work on conceptual metaphor, Fauconnier and Turner (1995) propose that "Structure from two or more input mental spaces is projected onto a separate 'blended' space, which inherits partial structure from the inputs, and has emergent structure of its own" (183). Thus, the statement *My lawyer is a shark* creates an imaginary space in which *shark* and *lawyer* no longer mean what they each meant separately; instead, they interact and emerge as a new concept: "It's only within the blend that the intended structure emerges" (Fauconnier and Turner 2003, 23).

Metaphors are central to cognition, though we are usually unaware of how much our conceptualizations engage them (Hogan 2003). To quote Lakoff and Johnson

(1980): "Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature." (3). Lakoff proposes that becoming aware of how we metaphorically conceptualize or "frame" problems, including environmental crises (Lakoff 2009), is crucial to our ability to find appropriate solutions, particularly if the "frames" promote attitudes of indifference to or autonomy from nature. Pinker (2007) objects to what he considers Lakoff's extremism: "People can not only ignore metaphors, but can question and discount them, and analyze which aspects are applicable and which should be ignored" (249).

Glucksberg's experiments suggest that humans immediately process metaphors. The initial processing of metaphors appears to be done by a mental module of the kind described by Fodor (1983): an obligatory, rapid, domain-specific (language) set of fixed neural architecture. Pinker is correct that after the automatic modular processing of the metaphor, metaphors can be analyzed. This secondary analysis is the process we teach throughout the course. Our analytic process parallels that of Lakoff (2008) which is based on the neural theory of language. Without invoking Lakoff's notational formalisms, we examine the factors that may discourage people from recognizing their automatic processing of metaphors, primary processes which are as much a part of our evolved psychological features as our ability to analyze metaphors.

Metaphors can serve as analogies, mapping from the known source to the conceptually new target (Lakoff, 2008; Gentner and Bowdle, 2008), enabling us to understand something new in terms of something more familiar, as when a doctor tells a patient "Your thyroid is a furnace and your pituitary gland is the thermostat." Metaphors in science serve an explanatory role. The value of a particular scientific metaphor, whether it is a verbal or visual representation (such as a molecule depicted as globes with connecting sticks), is determined from whether or not it is consistent with experimental results (Brown 2003). In non-scientific contexts especially, however, metaphor can be used to persuade and manipulate, tapping into positive or negative emotions and networks of associated ideas in the listener, as when a public figure is accused of being "a snake in the grass," or the BP oil spill in the Gulf of Mexico is dubbed "Obama's Katrina."

Non-scientists, and sometimes scientists themselves, can mistake a scientific metaphor for the literal reality, which is why some people have called for the term "global heat trap" to replace "greenhouse effect" (Brown, 2003). This reification of metaphor is not surprising given the purported neural basis of the largely unconscious mechanisms for treating metaphors from different kinds of sensory sources, or modalities, as equivalent in the multimodal space of cognitive simulation (Barsalou, 2008). Observing that "greenhouse" evokes notions of pleasant warmth and flourishing life, Brown suggests it is no coincidence that a *Wall Street Journal* editorial hailed the new "lush plant growth" generated by warmer climates as a gift from the industrial revolution. Though one may intend, or claim one's intention is merely to explain something using metaphor, the metaphors we use can get misinterpreted or stir strong emotion that interferes with rational analysis and policy decisions congruent with the laws of nature. This affective power of metaphors is consistent with the module model that we automatically process metaphors and that their initial processing is not open to willful alteration. Moreover, in the initial processing stages, metaphors created in different sensory modalities appear to use different neural pathways; for example, non-verbal metaphors, compared to verbal ones, are more implicit, more universal, and more emotive (Forceville 2008).

Creating Fictions

An understanding of the manipulative power of metaphor is not new to rhetoricians; as John Locke (2004) observed in 1698, "…all the artificial and figurative application of words eloquence hath invented, are for nothing else but to insinuate wrong ideas, move the passions, and thereby mislead the judgment and so, indeed, are perfect cheats." Research in evolutionary psychology and cognitive science elucidates the part metaphor plays in misleading our judgment (Gibbs 2008; Hogan 2003). We humans, and other animals, have a remarkable capacity for denial (Wright 1994). Although our ability to discern is adaptive, so too is our ability to embrace falsehoods or distortions of reality in many ways and circumstances. For instance, we may have evolved to copy the behavior of others in a group and to adopt the group's majority viewpoint even if it runs counter to our own because of a risk that asserting independent judgment could result in loss of status or, worse, complete exclusion from the group. Functional magnetic resonance imaging has shown that this tendency, called "conformity bias," can affect even our perception of the world when we are in a social setting (Berns et al. 2005).

Related to conformity bias is "confirmation bias," or the tendency to believe information that matches our preconceptions. We have an innate capacity to notice the evidence that most supports what we already want to believe (Nickerson 1998). Like conformity bias, confirmation bias can work in conjunction with other apparently evolved tendencies, such as prejudice against individuals identified as members of an outgroup. Sometimes, we just don't want to be found in the wrong, and that, too, may be part of our evolved psychology (Haidt 2006).

Other factors can create fictions that impair our discernment, such as the strong affect and networks of meaning associated with particular metaphors. Whenever we activate one lexical entry, other linked lexical entries are

partially activated, becoming "more readily accessible, more easily activated, than entries that are simply latent in long-term memory" (Hogan 2003, 47). This lexical process is called "priming." If the word arouses emotion, "activation will spread out along its connections, thus priming and bringing into readiness…associated ideas and memories" (Hogan 2003, 111). Often, such meaning networks and emotions work in concert with the various other innate human tendencies to deny or distort that which one might otherwise discern as the truth. For instance, some metaphors can tap into the fear of being dominated. In a society that demonizes female ambition, stereotypes of women as cunning predators can be activated when reporters say a female politician was engaged in a "catfight" or "cackled" when she laughed. To quote Lakoff (2009): "We think, mostly unconsciously, in terms of systems of structures called 'frames.' Each frame is a neural circuit, physically in our brains. We use our systems of frame-circuitry to understand everything, and we reason using frame-internal logics. Frame systems are organized in terms of values, and how we reason reflects our values, and our values determine our sense of identity. In short, framing is a big deal." Lakoff's frames are not unlike Fodor's modules, neurally based and capable of rapid, automatic processing. Because both frames and modules are thought to be neural circuits, and circuits are heritable (Cosmides and Tooby 1997), any frame or module may be adaptive. As putative adaptations, it is likely that many frames and modules evolved in the common ancestor of humans and other mammals; our ability to understand the emotional disposition of dogs and vice versa (Bekoff 2007), for example, suggests that we share affective frames.

Broadening Definitions of Metaphor

Thus far, we have adduced examples that conform to Glucksberg's strict definition of metaphor as a categorical assertion. We propose, based on the burgeoning evidence of the fundamental role of metaphor in thought (for review, see Gibbs, 2008), that any sort of figurative language, including simile, may potentially produce or approximate the effects of a categorical assertion in the minds of people whose "frame systems" are activated. By the same token, a frequently used metaphor can have the weaker impact of a simile. Much may depend upon the biases and frame systems of the listener, and the power of the context to engender strong emotion, as in the case of a political contest.

During the 2008 presidential race, Caroline Kennedy used simile in the title of her pro-Obama editorial: "A President Like My Father." The impact of her message on readers may easily have been: "Obama is another John. F. Kennedy." On the other hand, many reporters used simile to characterize a statement Obama made that used the formal structure of metaphor. Comparing the McCain–Palin policies to those of the outgoing president's, Obama had said: "You can put lipstick on a pig, but it's still a pig." One headline the following day read: "Obama said McCain–Palin proposals are like putting lipstick on a pig." In contrast, another headline announced "Obama: Palin is a pig with lipstick," not only rejecting simile but also dispensing with Obama's stated object of comparison (his opponents' policies).

The evocation of lipstick by both sides calls attention to the power of visual metaphor, which pictorially maps features of one thing onto something else. In the 2008 campaign, visual metaphor could reinforce cultural stereotypes of women and African American men. Both groups have historically been defined by their visible physical characteristics. When Republicans accused Obama of calling Palin a pig, they pointed out that in an earlier speech, Palin had said the difference between "hockey moms" (a label she embraced) and pit bulls was "lipstick." Wearing lipstick as she spoke, Palin was seeking a new way to re-frame the stereotype of "beauty without substance," working with visual metaphor. At the same time, the claim that Obama had called Palin a pig may have been reinforced by another sort of frame: that of the crudely aggressive or "uppity" black man insulting a white woman. That frame was reinforced by visual metaphor when a plethora of images representing Obama as ape-like surfaced at anti-Obama rallies and on web sites. "Emotions are far more ancient than cognitive processes" (Wilson 2002, 42), and the perception of racial difference is a strong trigger of in-group/out-group emotional responses in people (Hogan 2009). Regardless of whether or not one makes a categorical assertion, both discursive and non-discursive rhetoric can have an impact that transcends one's conscious motives or stated intentions. Indeed, we regularly discount the precise language others use when the factors of cultural context, framing, image (including auditory image, such as tone of voice), and our evolved capacity for biases combine to make us discern or suspect what an analogy maker "really" meant to say. Because today's culture bombards our students with non-discursive representational forms, it's especially important to teach the analysis of such forms (Murray 2009). For these reasons, our course embraces all figures of speech, including simile, and all metaphorical representations, including visual metaphor, as "fair game" for analysis (to use an animal metaphor of our own).

I Am an Animal

What, then, might be the different metaphorical meanings and consequences of an assertion that humans are, or are not, animals? To address this question, we need to

recognize that to say "Humans are animals" is quite different from saying that rats are rodents or figs are fruits. Any assertion about humans automatically allows for the phrase "I am" to replace "Humans are." Yet when classifying themselves, humans normally use "I am" to assert categorial identity. Categorial identity refers to the symbolic ways in which humans define themselves in relation to a group, ostensibly (though not always in practice) adhering to the group's values and norms, or fulfilling one or more roles within the group (Hogan 2009). Linguistically, the identity can be expressed as a categorical assertion: I am a Baptist; I am an American; I am a Republican. Unlike "Figs are fruit," these statements have a much greater potential to be interpreted differently according to both the specific context and the sociocultural situatedness of the speaker or listener. When former President Ronald Reagan lay on the operating table just prior to having a bullet removed from his lung, he told the surgeon "I hope you're a Republican." The surgeon, a liberal Democrat, replied, "We're all Republicans today." From the context, we can deduce that metaphorically, the surgeon was affirming his identity as a healer and member of a civilized society in which political opponents must never become mortal enemies. Yet even in less dramatic contexts, different people assign different meanings to the assertion "I am a Republican." Statements of categorial identity are inescapably cultural.

I Am Not an Animal

Once we understand the importance of identity as cultural, it becomes clearer why the equation of humans with animals is threatening, for a major function of culture itself may be to enable humans to differentiate themselves from animals. This is proposed by the authors of an article entitled: "I Am Not an Animal: Mortality Salience, Disgust, and the Denial of Human Creatureliness" (Goldenberg et al. 2001). Human beings have the intelligence to be aware of their own inevitable deaths. According to the terror management theory, "a great deal of human behavior can be understood as an attempt to gain psychological equanimity in the face of this awareness" (428). One way humans do this is by engaging in behaviors "that serve, at least in part, to deny or minimize our commonalities with other animals" (427). Many cultural rituals, "rules and dictates" surround the appearance and functions of the body, which is "a particular problem" because it "serves as a reminder of our animal limitations" (428).

The study remains inconclusive, however, with respect to how much or even whether such distancing from animals is an effective solution to the problem of anxiety associated with our awareness of death. The very conceptualization of our loss of corporeal control as our "animal nature," with the latter term given purely negative connotations, is itself an animal metaphor that may be culturally specific. The authors point out: "Some cultures go to extreme lengths to distance themselves from animals, whereas others seem more 'at one with nature'" (Goldenberg et al. 2001, 433). These metaphors of distance and closeness may influence, rather than merely reflect, the attitudes we have about nature and ourselves as part of nature. When humans describe themselves metaphorically as being "above and beyond animals," the word "animal" itself becomes metaphorical. As a noun, it only ever designates all non-human species, in ordinary usage (Derrida 2008), while as an adjective it refers to behaviors, needs, or capacities (cognitive or physical), usually deemed inferior, that are presumably found primarily or much more markedly in non-human beings (Burgat 2006).

To the extent that we metaphorize our corporeal condition as our "animal" nature, we may be denying our fundamental affiliation with (other) animals in ways that actually increase our anxiety and wall us off from life-sustaining attitudes of connectedness: "By clinging to sources of self-esteem or one's cultural (political, social, or religious) worldview, human beings can begin to escape their existential burden. However, one consequence of seeking a higher more meaningful existence is that any reminder of our corporeal condition is threatening" (Goldenberg et al. 2001, 428). Such a consequence seems more likely if one's cultural worldview radically excludes animals and corporality as threats to meaningful existence.

Are we Animals? Literature as a Play-Space for Exploring Human–Animal Identity

Any assertion such as "Humans are animals" is context-specific. In a non-scientific context, the assertion could be construed to mean that human beings are driven by instinct and prone to violence and thus not significantly different from other creatures. Our pretentions to culture and meaning, from that standpoint, would be reducible to a thin veneer and could not change the substance of our being any more than, say, lipstick on a pig. In a scientific context, the statement "Humans are animals" could be construed to mean that humans are members of the Animal Kingdom with traits we share with other animal species because we all evolved from common ancestors. It would not constitute an attempt to deny any and all distinctions between humans and non-human species. Yet even that prospect can be disturbing to humans when we experience new scientific evidence as a challenge to our identities and cultural worldviews. At such times, people may turn to imaginative literature in order to explore in less threatening ways the problem of human–animal identity.

A work of imaginative literature cannot be reduced to a categorical assertion about human beings, scientific or otherwise. Fiction neither affirms nor denies, but operates rather in the realm of "What if?" It is a form of make-believe with rules whose pleasures include thinking, wondering, imagining, and experiencing connectedness with other humans who share the literary experience. Instead of asserting "humans are animals," literature can allow us to experiment with questions such as: Are we animals? What are different ways to interpret that question, and what would be their consequences? What metaphors might best reconcile our need to confront scientific reality with our need to lead a meaningful existence, which may have been framed as a life that is above and beyond animals?

Through the study of specific works of literature, we can develop skills for understanding how animal metaphors mediate our identity and relationship with nature. But unlike a traditional literature course that would do so by referring only to theories of culture and identity that ignore evolutionary theory, or even treat it as counter to such aims, our course integrates literary study with evolutionary psychology and cognitive science.

Literature and Human Universals

One central concept that we use to help understand human behavior in the context of making and partaking of narrative is the universal. A universal is any trait, behavior, or characteristic that is shared by all humans (Brown 1991). The assertion of anything as a human universal is to predict, in evolutionary terms, that the universal is either a shared derived trait for humans alone or for humans and some cluster of the species most closely related to us. The empirical test of a human universal is to show that it occurs in all humans; hence, much of the evidence for universal traits comes from anthropology (Brown 2000). The presence of universals across cultures is often used as proof of the feature being evolved, although, strictly speaking, the trait must ultimately be shown to have a genetic basis in order to be a candidate for evolutionary homology, the special similarity of shared ancestry.

Human universals are not "predictors" of human behavior in particular situations or cultures. Our minds are "loose confederations of parts" (Haidt 2006, 22), and though we have many tendencies, different ones can get activated at the same time or at different times. Environment, including the cultural environment, also exerts a powerful influence on individuals, from the level of gene expression to ways of behaving. In the words of Ellen Dissanayake (1996): "Human nature consists of evolved innate *dispositions* or *tendencies* that cultures then mold, regulate, and elaborate" (231). Nonetheless, artistic activity, once regarded by most people as "purely cultural," and as that which elevates humans above animals (Goldenberg et al. 2001), has its roots in evolution (Tooby and Cosmides 2001).

As an artistic activity, literature, understood in Darwinian terms, is a human universal, as are some specific literary devices. Hernadi (2001) explains that a Darwinian idea of "literature" encompasses a range of transactions that "challenge and thus enhance our brains' vital capacities for expression, communication, representation and signification" (56). Our penchant and skill for such transactions, which include storytelling, dramatic rituals, role-playing, and chanting, probably grew from "protoliterary experiences" which enabled early humans "to outdo their less imaginative rivals" (Hernadi 2001, 56). The requisite cognitive skills "enabling the prehistoric emergence of oral literature" could have been "byproducts of primate adaptations initially serving nonliterary functions" (Hernadi 2001, 62). Our early ancestors enjoyed "imaginative flights of protoliterary experience," which accelerated our evolution as literary animals. These "proto-dramatic, protolyric and protonarrative" (Hernadi 2001, 62–63) activities may in turn have helped strengthen certain skills for non-literary purposes. Thus, alliteration may playfully exercise our evolved ability to discern phonemes and respond to patterns (Boyd 2009).

Literature and Cognitive Universals

As a primate adaptation, cognitive universals are particularly important to the study of literature because they, as a cluster of related features that all humans share, allow us to know how someone else's mind is likely to be operating. Some cognitive universals identified by Brown (1991) include metaphor, jokes, classification, empathy, language, magic, myths, narrative, planning, poetry, pretend play, snakes (wariness of), and symbolism. All of these engage our cognitive abilities. The better one is at knowing cognitive universals, either explicitly or implicitly, then the better one can be at "getting inside other people's heads." Universals, as a suite of cognitive abilities, are thus the biological basis for a theory of mind. Theory of mind is the ability of one individual to guess or attribute the mental states of another, and this ability is thought to be essential in human and interspecies communication (Premack and Woodruff 1978).

Cognitive universals give writers the scaffolding for guessing what a reader will understand and how the reader will do so. Readers, in turn, use cognitive universals implicitly to "get inside the heads" of writers or characters the writer depicts (Zunshine 2006). Thus, the analysis of making and partaking of stories seeks to make explicit the universal cognitive processes and how they undergird not only communication but, specifically, persuasion, manipu-

lation, and the building of "realistic" fantasy. Universals allow humans to interact through make-believe with rules.

Why Literature is So Often about Humans and/or Animals

To emphasize that literary activity probably grew from faculties we share with other primates, the course presents various aspects of human emotional and social life as part of an animal–human evolutionary continuum. We do this even to explain why literary works themselves are so often about humans and/or animals. Gossip, for instance, is a social bonding experience thought to have replaced primate grooming (Dunbar 1996). Gossip serves other important functions, such as helping us to keep track of cheaters or learn of new opportunities (Pinker 1997). Whether in the form of gossip or fiction, stories engage our social monitoring instincts (Boyd 2009). We are inclined to care about the life choices other people make and to compare them with our own; to get emotionally caught up in stories of their conundrums; to want to discuss them and, sometimes, to let our passionate involvement drive on a discussion that has exhausted any other rational purpose. The question as to whether or not we are animals may arise from our inherent curiosity about other members of our species.

We also have an innate tendency to notice and pay attention to animals. This could be another reason why animals so very often figure in works of literature and get noticed on the cinema screen, along with any kind of "animated" figure. As shown so far, our rationale for focusing on animal metaphors has included the fact that we use metaphor to conceptualize ourselves as animals/non-animals in a variety of social, cultural, and political situations. Indeed, our focus on animals may be another automatic and evolved module. New et al. (2007) proposed that "The human attention system evolved to reliably develop certain category-specific selection criteria, including a set designed to differentially monitor animals and humans" (16598). They tested this "animate monitoring" hypothesis by asking human participants to detect changes in visual scenes presented to them on a computer. Depending on the image, an animal or building might disappear. The kind of object determined the speed at which humans could detect the change in the scene: humans and animals were detected faster than a variety of objects, both fixed and movable.

New et al. (2007) interpreted these experimental results as follows: "The results herein implicate a visual monitoring system equipped with ancestrally derived animal-specific selection criteria. This domain-specific subsystem within visual attention appears well designed for solving an ancient adaptive problem: detecting the presence of human and non-human animals and monitoring them for changes in their state and location" (16603). We test this hypothesis in our course in a slightly different way. Students are briefly shown images, only some of which contain animals. They are asked to write down their first impression of each image. For example, they are shown a picture of dramatically counterposed ice floes and open water. A small dark bird, making up less than two percent of the surface of the image, was visible flying over the ice. According to the animate monitoring hypothesis, most humans would automatically detect the bird over non-animate ice or sea. Most, but not all, students write "bird."

Approaches to Analyzing Texts: Thematic Universals and Literary Universals

As students learn to analyze metaphors in literary texts, they continue to learn evolutionary theories of human and non-human animal behavior, emotion and cognition. This helps them recognize literary animal metaphors as particular frames and to speculate on their purposes and effects from an evolutionary perspective. Toward that goal, we devised an approach to analyzing literary texts that distinguishes "thematic universals" from "literary universals." Thematic universals are human universals that are engaged thematically by a literary text. Thus, thematic universals (to name only two) in *Romeo and Juliet* include *attachment* and the formation of an *in-group distinguished from out-groups*.

"Literary universal" designates various story practices, the wide range of social functions they may fulfill, and the cognitive, emotional, or sensory effects these practices may have on the reader. A plot development that draws upon our universal tendency to assume causal connection between two events that occur in succession (the logical fallacy of *post hoc ergo propter hoc*) is a literary universal. Poetic repetition and variation, alliteration, rhythm, and rhyme are just some literary universals that emerged from other adaptations. Poetic meter, for instance, exercises our capacity for synchronization, an adaptation thought to promote cohesion and cooperation in human groups (Boyd 2009). Thus, poetic meter and the practice of singing or reciting aloud in groups are both literary universals.

That thematic and literary universals interact and combine to generate a poem's meaning can be demonstrated with Langdon Smith's 1906 poem, "Evolution" that begins:

When you were a tadpole and I was a fish
In the Paleozoic time,
And side by side on the ebbing tide
We sprawled through the ooze and slime,
Or skittered with many a caudal flip
Through the depths of the Cambrian fen,

My heart was rife with the joy of life,
For I loved you even then.

Subsequent stanzas take the "I" and "You" through a series of metamorphoses as the poem traces human evolution from amphibians to creatures swinging in "jungle trees," to animal-painting cave dwellers, until they reach their present moment dining "at Delmonico's." Thematic universals in the poem include *attachment* (it is a love poem) and *collective identity* since the "I" and "You" figure in an epic tale of all humanity. Since *fear of death* is a human universal and our working assumption is that humans often distance themselves from animals to manage such fear, we propose anxiety about being animals, induced by evolutionary theory, as an underlying preoccupation of the poem. One way the poem grapples with such anxiety is by establishing a notion of progress. Humans may be animals, but "we" were once much less interesting and more disgusting than today. Our ancestors did not make art and lived in "ooze and slime," an image that evokes viscous substances universally considered disgusting because of their potential to contain harmful microorganisms (Haidt et al. 1997; Pinker 1997). Another way is through the use of poetic rhyme and meter, thought to promote positive feelings of social harmony and a sense of group purpose. In his work on religion and group selection, Wilson (2002) has shown that such feelings better enable a group to compete with other groups. We have the students read this stanza aloud to experience group chanting. We then have them watch a YouTube video of "Snowball," a dancing cockatiel, to emphasize that when it comes to the arts, we humans have not left other species entirely behind.

Narrative as Extended Metaphor: Balzac's *Passion in the Desert*

Entire narratives can be metaphorical when they serve the purpose of expressing one story in terms of a different story (Burke 2003). Craib (2004) proposes that when an experience is too disturbing, a preferred "cover story" can keep the full force of trauma at bay. The story constitutes a "multi-layered metaphor" for an experience that is "current but cannot be articulated in any other way" (Craib 2004, 69). This idea of narrative as extended metaphor is consonant with misattribution theory, which Hogan (2003) uses to explain why we respond emotionally to stories.

Hogan proposes that fiction activates emotional memories, but we misattribute these feelings because our attentional focus is on the events of the literary work (Hogan 2003). This misattribution is explained, in part, by simulation theory. Behavioral and neurological evidence indicates that humans mentally simulate—as part of their representational machinery constructing the activities of the narrative—sensations, movements, and feelings (for review, see Barsalou, 2008). Because simulation is a fundamental process in reasoning and thought, each reader automatically infers from a text an initial chain of spatiotemporal "events" that may or may not correspond to the simulation chain of another reader or the "intent" of the author. Thus, misattribution is part of the cognitive process, an inferential system with unavoidable indeterminacy since it depends on individual factors.

Misattribution and simulation theory shed light on why we might speak of a text's "affective content" even though we know quite well that actual emotions are not really "in" the words on the page. Such theories also help explain a reader's emotional identification with a story's protagonist (Hogan 2003). The text's eliciting conditions trigger a simulation process. What makes a particular text "emotionally powerful" may be its ability to mimic the pattern and process by which we automatically simulate. This is why we speak of emotion being "in" a story.

We apply misattribution theory to Balzac's 1830 story, *Passion in the Desert*. Written in the wake of the discoveries and theories of Cuvier, Buffon, Geoffroy, and Lamarck, in which Balzac took a lively interest, *Passion* circumvents direct engagement with the question of animals' commonalities with humans, raised in its first section, by switching in its second section to the story of one man's struggle to survive in a distant land. The first-person narrator and his female companion are just leaving the menagerie of Henri Martin (1793–1882), famous in Balzac's time for performing animal acts, usually with big cats. The narrator claims that an ex-soldier told him a story that will prove it's wrong to think animals are without feelings like ours. The woman is eagerly curious, so he sends her a written account of the soldier's story, which constitutes the second section.

The soldier has gotten stranded alone in the desert during Napoleon's 1798 Egyptian campaign. After escaping from Maghrebi nomads, he seeks refuge in a cave, only to discover that he is sharing his new abode with a leopard. Surprisingly, the leopard responds with affection when he caresses her. He calls her "Mignonne," the name of a former, knife-brandishing mistress who was violently jealous. The two of them form a sustained and intimate bond until one day the soldier admires an eagle soaring overhead, causing the leopard to growl with what the soldier imagines is jealousy. He scratches Mignonne's head, admiring the beauty of her hindquarters. Here, the written account ends in suspension points. We are reminded that it's a story within a story when the human female character demands to know what happened next, thus inaugurating the third and final section of the Balzac tale. Resuming the account verbally, the narrator quotes the soldier's statement

that the leopard very suddenly turned around, perhaps because the soldier had hurt her, and caught his leg in her teeth. Fearing for his life, he killed her with his dagger. When members of his regiment finally located him, he was still weeping.

The embedded narrator and foreign setting remove nineteenth-century readers several times from potentially threatening real-world scientific questions of the day concerning how to classify humans in relation to animals. This is not just because Balzac's story is a work of fiction. Even within the story, the reader is prevented from pretending that the soldier's report is accurate, for the love story itself hinges on the soldier-narrator's tendency to create fictions. He transforms the leopard into a charming and bejeweled human "princess" or "courtesan" wearing "bracelets round her feet" and "black rings" on her tail. The narrative of mutual romantic love may serve as a "cover story" for overwhelming trauma, including, perhaps, the trauma of having sexual feelings for an animal.

Thus, the human universals of misattribution and metaphor function both at the thematic and meta-levels of Balzac's tale. The soldier's narration is just ambiguous enough to suggest that his belief in mutual love may have been delusional, originating in a desperate need for companionship, assuming the story's first narrator did not invent the entire episode. It is riveting for readers of the story who identify with the soldier and are weighing the consequences of the situation in the hope of a positive outcome. Within the play-space of fiction, readers can safely experiment with various conceptual blends, feeling fear and sadness for the soldier. They can ponder the question of what is true and what is imagined, without confronting head-on the possibility that humans and big cats share feelings of attachment because of a shared evolutionary heritage.

The Place of Animal Metaphors

Ecocriticism has been pursued as the study of the relationship between literature or other representational forms and the physical environment; between humans and the natural world in literature; or as literary criticism based on an ecological perspective. Though more recently it has focused on how humans perceive, behave, or respond to nature and environmental issues, Easterlin (2004) observes that ecocriticism lacks a methodology. Animals and animal metaphors, but not humans, most commonly populate our conception of "the environment," according to Easterlin. Thus, for most people, "the environment" becomes another metaphor to reinforce the nature/culture binary, just like the animal/people binary. Under these circumstances, ecocriticism risks becoming little more than an "attitude," free of the theoretical grounding that a coherent field of inquiry would require (Easterlin 2004).

In response to conceptions of the environment as human-less nature, Buell (1999) and others have developed the concept of "place," a word that, Easterlin (2004) explains, "conjoins perception, cultural mediation, and apparent physical location" (11). Unlike Buell, however, Easterlin stresses the importance of recognizing that "humans share prototypical patterns of negotiating the world" (Easterlin 2004, 12). Place is continuously constructed by humans through their evolved perceptual machinery. Place begins for each individual with attachments to their first "other" being, mother, and continues through time with changing social relationships, cultural constructions, and identity. Place depends on cognitively mediated experiences that are tied to our interactions as animals with other beings in the physical world.

Easterlin's "place" strikingly parallels what Cosmides and Tooby (1997) have called the environment of evolutionary adaptedness (EEA): "EEA is not a place or time. It is the statistical composite of selection pressures that caused the design of an adaptation. Thus the EEA for one adaptation may be different from that for another." In the same way, "place" is not a place (in the standard sense) or time. It includes the composite of historical factors that caused the identity of a person. To extend the analogy, personal identity is a kind of individual adaptedness, a narrative created in response to "place".

We use Easterlin's particular concept of place, which incorporates research in emotion and cognition, to analyze animal metaphors in Lavinia Currier's 1998 film adaptation (Currier 1998) of Balzac's *Passion in the Desert*. Currier's film is a sympathetic portrayal of the French protagonist's struggle to create "place" in a new physical environment mediated socially in the only way he finds possible: through his relationship with a leopard companion. Yet the film is critical of the imperialist and anthropocentric attitudes that motivated Napoleon's invasion of Egypt to begin with, and which the soldier displays in the film. These attitudes, the film implies, are environmentally disrespectful.

Whereas the desert is a near-empty "nothingness" in the Balzac story, Currier's film makes viewers aware that the desert is a live ecosystem in which, as Easterlin explains, each organism has a position. We see close-ups of reptiles, insects, and other mammals. The film also shows that the desert constitutes a culturally constructed "place" for its Maghrebi inhabitants. Balzac only depicts the Maghrebi nomads as enemy captors whom the soldier labels "animals." In contrast, the film shows scenes of Arab nomads engaged in the duties and rituals of their everyday life, having mastered the challenges of survival in a barren land. The calm with which they lead their camels is

sharply contrasted with the desperation of French army soldiers unable to control their horses on the dunes, or even to keep themselves and their horses alive as water supplies dwindle. The nomadic culture is, to borrow a phrase from Easterlin (2004, 11), "part and parcel of a specific natural setting."

Early on, the soldier enters one of the nomad's tents uninvited and violates cultural norms by ripping off an Arab woman's veil, after which she scratches his face. One may interpret this as a visual metaphor not only for the French invasion of Egypt but also for the fiction that the French soldier attempts to impose on the female leopard. Currier modifies the ending of the Balzac story. In the film, when the soldier sees his French comrades arriving, he is anxious for the leopard to remain where she is and tries to tie her up. The enraged leopard attacks him so fiercely that he is obliged to stab her. The last shot of the movie is of the grief-stricken solitary soldier carrying the dead leopard in his arms through the desert.

Hence, the film uses new animal metaphors of its own to call attention to the perils of anthropocentrism, ignorance of cultural difference, and lack of respect for all "others": other humans, non-human animals, non-French territory. It does so with scenes that trigger our subcortical emotive arousal and a protagonist whom we can relate to affectively. The most poignant emotion is attachment. To heighten the sense of attachment, the film uses a real leopard, so that we, as watchers, are first frightened as we put ourselves in the soldier's place. When the leopard doesn't strike, we lower our defenses and begin to attach ourselves to the attachment that is forming between the soldier and the leopard.

The film's spectators can empathize with the soldier's need for attachment and watch how the rituals of playing, sleeping, and eating that he shares with the leopard allow for the desert to become, for him, a new humanly meaningful "place," mediated through his relationship with the anthropomorphized leopard. Yet the film never allows the viewer's perception of the leopard or desert to become indistinguishable from the soldier's own constructions. Affective engagement and understanding of our human nature is, according to Easterlin, necessary to promote environmental concern. Yet the film forces us to be conscious of the multitude of "other" natures, "out there," which our fictions are powerless to control. It does not let us stick our heads in the sand.

Wrestling with Metaphors: Assignments

The biggest pedagogic challenge of this course was to find ways to connect with and engage students of many different majors. Even though this was a topics course required for the environmental studies major, it was open to students across the curriculum. Undeclared majors along with majors in English, Italian, biology, cognitive science, drama & film, history, women's studies, and environmental studies were enrolled. With such a wide range of interests and backgrounds, we created assignments that were meant to serve interests both within the larger context of the course and the specific interests of the environmental studies major.

To lay the groundwork for metaphors, the first assignment was "hunting for metaphors." After reading and discussing Glucksberg's (2003) behavior experiments on metaphor recognition, we asked students to seek out metaphors. The hunting grounds were general and scientific journalism. We asked students to predict, and justify, which hunting ground they expected to yield more metaphors and to test their prediction by developing an explicit search methodology. Most students expected the scientific journalism to use fewer metaphors because they assumed that scientific language would be more "objective," i.e., more literal and less figurative. Many were surprised at how hard it was to find obvious metaphors of the categorical assertion type defined by Glucksberg.

The second assignment was to write an essay. We asked students to begin using their scientific readings as a lens through which to view literature:

> Explain how two or more of the assigned non-literary readings inform your reading of either Honoré de Balzac's *Passion in the Desert* (1830) or Guy de Maupassant's *Story of a Farm Girl* (1890). In addition to examining your chosen story's *content* in relation to the non-literary readings, your paper should at some point also address the *experience* or *function* itself of reading and/or inventing and circulating a story, in relation to our cognitive functions, our existence as social primates, or other aspects of our evolutionary heritage.

One student wrote:

> Through this story, Balzac explores the possibility that wild animals traditionally seen as distant can rise to the status of human-like companions in the right circumstances. This assertion can be analyzed using the ideas of evolutionary psychology such as the association of animals with disgust and mortality, the inclination to sympathize closely with familiar animals like pets, the tendency to form in- and out-groups in dire situations and the concept of fair play.

The third assignment asked students to take theory, both scientific and literary, that they had learned and create an experiential understanding of the local environment:

> Drawing upon Easterlin's idea of "place," make observations about one or more animals that are part of this particular place where we all regularly meet and work together: the Vassar campus. Focus on Vassar as a place mediated by culture and people, yet populated with animals, even if you also take into account the Hudson Valley in which Vassar is situated.

Given Easterlin's emphasis on "place" as a cognitively mediated perception of the world, we expected the responses to be as varied as the students, even though they had developed a similar set of analytic tools. What we found most fascinating were experiences that ranged from the anthropocentric to the abstract. All, however, were conscious of the humans-as-animals perspective.

The fourth assignment, a final project, was scaffolded into a proposal, an oral presentation, and a final paper. The overall goal of the project was straightforward: "Use our theories and methods to analyze a narrative system (written, spoken, or performed) that uses or addresses animals in some essential way." Given that a wide-open project like this can be intimidating, we provided a set of non-exhaustive examples:

1. A topic in your own discipline.
2. A topic related to a personal interest.
3. One of the two films we watched: "Grizzly Man" (Herzog 2005) or "Passion in the Desert."
4. Environmental connections or ecological theory.
5. Self-deception and the media→climate change.
6. Create an "animal metaphors" syllabus, complete with readings.
7. Take on a theory that you've encountered (literary, cognitive, evolutionary psychology).
8. Human behavior or humans-as-animals.
9. Feminist theory.
10. Formal critique of any reading.

One of the most inventive projects used evolutionary theories of self-deception in an analysis of commercials warning about global warming and then warning about global warming alarmists. A commercial, produced in the UK, was set as a bedtime story for a little girl. Animals cavorted while humans drove cars that polluted and caused the oceans to rise and the animals to cry. The anti-alarmists used the same scenes but added a different voice-over, one in which the evil alarmists were causing young children to have nightmares and accept a lower standard of living. The analysis pointed out the use of "place" as the bedroom, the setting for the story, and the use of a narrative with expected beginning, tension, and end, that engaged animals as metaphors for nature, innocence, and childhood. The anti-alarmist response used the same animals as metaphors for freedom and independence.

A final exam was also given that asked for written responses to five questions. Returning to the opening theme of the course, one question was this:

> What is meant when we say that some humans are 'animals' or 'like animals?' Use course definitions of metaphor to address this question, but also give one or more examples from one or more course readings that explain why humans find it easy to 'see themselves' in animals, or to see animals in themselves.

Conclusion

Humans use animal metaphors to frame their ongoing relationship with the environment and their place in an evolutionary continuum. Animal metaphors are extremely powerful communication tools because they are automatically processed, focus on entities to which we preferentially attend, and tap into the wealth of thematic and literary universals that drive narratives. Narrative literature and film rely on evolved linguistic reconstruction processes that allow story to be reconstructed from fractured pieces of discourse. Humans are metaphorizing animals. We believe that the concept of "animal metaphors" can facilitate exchange of knowledge and ideas between the humanities and the natural sciences while helping us live productively with nature and our own human nature.

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