More than Words:

Metaphor in the Mind, Brain, and Literature

By

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Introduction

Metaphor dwells in language of every kind, poetic or plain. We readily recognize its aesthetic role: metaphor enriches prose, enlivens imagery, and lends depth and texture to narrative. But metaphor is not merely ornamental. Metaphor is encoded in our fundamental mode of thought; it shapes our perceptions of basic realities and informs our approach to everyday interactions. Metaphorical concepts govern our lives, often without our ever recognizing their profound and ubiquitous influence. To examine metaphor is to examine the mind.

Scholars in the school of cognitive linguistics have taken up this project with keen enthusiasm in recent decades. George Lakoff and Mark Johnson of the University of California, Berkeley, provided the seminal manifesto with their 1980 book, Metaphors We Live By. They pioneered the notion that metaphor underlies the conceptual system according to which we think and act. In other words, the nature of human thinking is metaphorical, and metaphor is the lens through which we view the world around us. The powerful implication follows that every facet of our experience is molded by metaphors we are hardly aware of, metaphors lurking inconspicuously in the discourse of all diverse manner of human enterprise.

This is a disarming idea, but at its core it is also a simple one. "The drive toward the formation of metaphor," Nietzsche articulated, "is the fundamental human drive." In 1873 he intuited the essential structure of cognition. Metaphor allows us not merely to describe one thing in terms of another, but to comprehend one thing in terms of another. There is "no real knowing apart from metaphor," Nietzsche wrote (Romano, 2003). We use information pertaining to a more concrete, embodied domain ("the source") to

understand some component of a more abstract domain ("the target"). The infinitude of metaphorical expressions that pervade written and spoken language can be roughly parceled into linguistic categories known as conceptual metaphors, which define a coherent set of correspondences between the elements of the source and target. That is to say, there are general principles governing how patterns of inference about a source are used to reason about a target when metaphorical expressions are used.

The conceptual metaphor ARGUMENT IS WAR is a frequently cited example. This metaphor underlies a variety of expressions wherein entities in the domain of argument correspond systematically to entities in the domain of a war. Lakoff and Johnson note the following cases:

> Your claims are *indefensible.*
> He *attacked every weak point* in my argument. His criticisms were *right on target.*
> I *demolished* his argument.
> I've never *won* an argument with him.
> You disagree? Okay, *shoot!*
> If you use that *strategy,* he'll *wipe you out.*
> He *shot down* all of my arguments.
>
> (Lakoff & Johnson, 1980, 4)

On this view, in a culture where argument was not conceived of – and thus not spoken about – in terms of war, people might experience and perform argument in an entirely different way. If, for instance, arguments were viewed as games of catch or dances, we would understand the participants as collaborators carrying out a balanced, carefully coordinated behavior. Their interaction would look very little like arguing as we have come to recognize it. That's because metaphors are not just groups of words we can point to on a page; metaphorical concepts structure what we do. We don't just talk about

argument using vocabulary borrowed from the language of war, we actually conceptualize argument in terms of war, and this line of thinking affects the way we act.

Thus, the stakes are high where metaphor and the mind are concerned. In a Stanford University study, researchers Paul Thibodeau and Lera Boroditsky (2011) found that exposure to particular metaphors can induce a substantial difference in opinion about how to address social problems. They gave participants a report on crime in a city and the report contained one of two metaphors: CRIME IS A WILD BEAST or CRIME IS A VIRUS. Those for whom crime was metaphorically framed as a virus were more likely to propose investigating the root causes and treating the problem by enacting social reform to inoculate the community, emphasizing the importance of eradicating poverty and improving education. Those who read reports in which crime was metaphorically framed as a beast favored catching and incarcerating criminals and imposing harsher enforcement regulations. Interestingly, participants frequently cited statistical information included in the report to explain their decisions and did not recognize the influence of metaphors; meanwhile, the metaphor alternatives accounted for differences in participants' decisions that were larger than any differences between Democrats and Republicans or between men and women (Thibodeau & Boroditsky, 2011). The study provides a compelling illustration of the way metaphors shape how people think and give rise to attitudes, beliefs and patterns of behavior.

The metaphors covertly present within our culture, in turn, betoken our relationship with specific concepts. In fact, the American intelligence establishment has committed hundreds of millions of dollars to a long-term research program with just this premise in mind. The Intelligence Advanced Research Projects Activity (IARPA), which

conducts research for the agencies including the NSA and CIA that comprise U.S. intelligence-gathering operations, has undertaken a project to develop methods and software for tracking a population's underlying worldview based on its metaphor habits (Madrigal, 2011). In effect, intelligence analysts want to spy on language. Metaphor is a periscope with a view onto the mind.

These researchers and their colleagues in cognitive and linguistic sciences would rightfully insist that metaphor has long outgrown its reputation as a device of artistic embellishment. Nevertheless, metaphor as it occurs in literature has still much to teach us. Fiction lays bare the workings of our brains, it immobilizes our ceaseless rush of thoughts and pins them to the page. Literature offers a vivid index of our conceptual systems and metaphors in literature are fertile sources of evidence and insight on the structure of human cognition. This proposition entails a unique approach to the interpretation of literature, one that provides a privileged window into the depths of the human mind.

* * *

Metaphor is the subject of rigorous scholarship and inquiry in a broad range of disciplines. A rich body of evidence affirms the pervasiveness of metaphor in everyday language and the fundamental role of metaphor in the structure of human thinking. This thesis assembles perspectives from cognitive linguistics, neuroscience, and literary studies to explore how these different disciplines, when considered together, can shed light on shared questions about metaphors and contribute to a cohesive picture of the nature of our conceptual metaphorical system of thought. The first chapter explores the theory first advanced in 1980 by George Lakoff and Mark Johnson that metaphor allows

us not merely to describe one thing in terms of another but to comprehend one thing in terms of another, using information pertaining to a more concrete, embodied domain to understand some component of a more abstract domain. While the first chapter traces metaphor from its origins in the brain to its incarnations in language and culture, the second chapter follows the reverse route, tracking how the metaphors that exist in daily discourse enter comprehension. This second chapter examines the neural mechanisms that underlie metaphor processing and weighs in on a debate concerning hemispheric lateralization. The final chapter investigates literary metaphor as it reflects these cognitive and neurological operations, raising challenging questions about creativity and artistic imagination. Ultimately, looking across the mind, the brain and the written page, we find that metaphor constitutes one of the most basic yet complex aspects of human expression and reasoning.

Chapter 1 begins by introducing Lakoff and Johnson's pioneering theory of the conceptual metaphor. According to this model, we use systematic correspondences to make sense of an abstract target domain in terms of a more concrete source domain. The chapter tracks the evolution and elaboration of this theory as it implicates principles of embodied cognition, conflation and associative learning, conceptual blending, and synaesthesia. Particular focus falls on attempts to construct a computational neural account of language, an enterprise, as chapter 2 further illuminates, fraught with controversy and disagreement. The first chapter ends by delving into some of the cultural, political, and psychological implications of metaphor theory.

While chapter 1 concerns how we develop metaphorical concepts and the way these concepts structure our thinking, chapter 2 looks at the neural substrates that are

active when we encounter and interpret metaphorical expressions in the world around us. Although this body research treats metaphor comprehension as a matter of language processing in the brain, the findings do not contradict the view that metaphor ought to be considered more broadly as a mode of cognition. In fact, identifying the way the Lakoff-Johnson model operates on the neurophysiological level during language tasks has the potential to reinforce the theory that metaphor processing constitutes a basic and foundational cognitive function. The chapter reviews the current status of the once robust consensus regarding the right hemisphere's specialized role in accessing meaning for figurative language and suggests that what has been understood as a hemispheric dichotomy between literal and nonliteral language appears actually to reflect the influence of stimulus selection, particularly salient vs. nonsalient metaphors and single-word vs. phrasal metaphors.

The third chapter takes on metaphor in the context in which its role is most familiar: literature. Having studied the cognitive linguistic and neurological bases of our metaphorical conceptual system, we look at the ways literature mirrors these accounts. The chapter follows a series of conceptual metaphors through literary and poetic texts in order to develop a more thorough understanding of the workings of the mind and to begin to uncover how art in the form of metaphor emerges. Examining works by Flannery O'Connor, Herman Melville, and Emily Dickinson, we will see that the infrastructure of "ordinary" conceptual metaphors underlies literary and poetic metaphors. What distinguishes metaphor in literature or poetry is not its essential structure or composition, but rather its function in defamiliarizing the metaphors that inconspicuously inhabit discourse of every kind. Literature and poetry cast a spotlight on metaphors that would

fail to attract our attention in any other context. By highlighting, rejecting or reversing aspects of the metaphor that we otherwise take for granted, an author or poet encourages his reader to examine the appropriateness of that metaphor and its role in shaping cognition and behavior. This concluding chapter demonstrates the potential for literature to provide a window into the mind and vice-versa, for knowledge about the workings of the mind to lend insight into literature.

Chapter I: The Conceptual Metaphor

Metaphor exists in language because it originates in thought. Before Lakoff and Johnson introduced this groundbreaking notion in *Metaphors We Live By,* the conventional view of metaphor held quite the reverse. It had been assumed that metaphor is primarily a linguistic artifact, a matter of words rather than concepts. The theory of the conceptual nature of metaphor is now supported by a robust body of empirical evidence and is broadly accepted in the cognitive sciences. On this model, we use systematic correspondences called metaphorical mappings to reason about an abstract target domain in terms of a more concrete source domain. These mappings apply not just to novel poetic expressions but also to ordinary, everyday language.

A conceptual metaphor assumes the concise form A IS B, or TARGET IS SOURCE. Consider, for instance, the conceptual metaphor IDEAS ARE FOOD. This metaphor underlies an array of linguistic expressions. We conceptualize thinking as preparing food ("the idea was half-baked"; "I'll chew on that for a while"), understanding as digestion ("It will take time for him to digest the news"), believing as swallowing ("they'll swallow any story"), communication as feeding ("we had to spoon-feed him all the information"; "he was known for sugar-coating his remarks"; "the conference was broadcast over a live satellite feed"), and remembering as regurgitating ("the test required us to regurgitate everything we had learned"; "he asked me to spit back what he had just told me") (Madrigal, 2011). Nonphysical reality, in this case pertaining to the domain of ideas, is conceptualized according to the logic of a structured, sharply defined category of knowledge, in this case food. Such cognitive operations are unconscious and automatic (Lakoff and Johnson, 1980, 28).

The validity of this claim depends on demonstrating that general principles govern how patterns of inference about a target are used to make sense of a source when metaphorical expressions are used, so that what constitutes a conceptual metaphor is not the words nor any grammatical component of a given phrase, but the set of ontological mappings across domains. The conceptual metaphor LOVE IS A JOURNEY expresses a metaphorical scenario in which the lovers are travelers on a journey together, their relationship the vehicle and their shared life goals a destination. The journey may be fraught with obstacles and the journeyers may encounter a crossroads when confronted with choices about the direction of future travel. Elements in the target domain of love (including the lovers, their goals, their challenges, and their relationship) correspond systematically to elements in the source domain of a journey (including the travelers, the destination, the forks or crossroads, and the vehicle). This unified way of conceptualizing love is realized in many different linguistic expressions: "we'll have to go our separate ways," "the relationship isn't going anywhere," "the marriage is on the rocks," etc. Because the ontological correspondences are fixed and systematic for the metaphor LOVE IS A JOURNEY, novel extensions can be understood instantly. In all instantiations of a conceptual metaphor, whether familiar or new, non-entities are expressed as entities, which can in turn be cited, categorized, quantified, disputed, and otherwise rationally assessed (Lakoff, 1992, 206).

In 1997, Joseph Grady made a critical contribution to Lakoff and Johnson's work by demonstrating that the metaphorical system they depicted is embodied, that abstract meaning is derived through sensorimotor experience. "Primary metaphors," he proposed, are grounded in the experiences that bridge physical, bodily sensations and subjective

judgments. For example, as young children we correlate the close embrace of our parents with the physical warmth that it produces and the primary metaphor AFFECTION IS WARMTH arises. We can speak of being greeted warmly or having a warm relationship with a partner (Kövecses, 2005, 9). Every variety of complex metaphor, Grady argues, consists of a collection of primary metaphors. It is not immediately obvious how the complex metaphor LOVE IS A JOURNEY might be physically grounded; upon closer examination, however, we notice that it can be broken down into constituent primary metaphors. For example, we can see the metaphor RELATIONSHIP IS A VEHICLE as composed of the primary metaphors RELATIONSHIP IS AN ENCLOSURE, INTIMACY IS CLOSENESS, and DIFFICULTIES ARE IMPEDIMENTS TO MOTION. Because basic sensorimotor experiences are common to most all individuals, primary metaphors tend to be universal, while complex metaphors, which add layers of cultural flesh to skeletal, primary correlations, vary in significant ways between speakers of different languages, adherents to different ethnic traditions and members of different social spheres (Lakoff, 1992, 206).

The "Event Structure" metaphor—in which aspect of events including state, change, cause, action and purpose are understood in terms of location, motion, and—provides a useful example of the universality of primary metaphors. Zoltán Kövecses suggests that the Event Structure metaphor has arisen independently all over the word, citing its consistent use in language across English, Chinese and Hungarian. The source domain of space maps onto the target domain of events, producing a set of "entailments" (the word given for the characteristics of the source that are imparted to the target) evidenced in all three languages:

STATES ARE LOCATIONS: They are *in* love
CHANGES ARE MOVEMENTS: He *went* crazy
CAUSES ARE FORCES: The hit *sent* the crowd into a frenzy
ACTION IS SELF-PROPELLED MOTION: We've taken the first *step*
PURPOSES ARE DESTINATIONS: He finally *reached* his goals
MEANS ARE PATHS: She went from fat to thin *through* an intensive exercise program
DIFFICULTIES ARE IMPEDIMENTS: Let's try to *get around* this problem
EXTERMNAL EVENTS ARE LARGE, MOVING OBJECTS: The *flow* of history fascinates him
EXPECTED PROGRESS IS A TRAVEL SCHEDULE: We're *behind schedule* on the project
LONG-TERM, PURPOSEFUL ACTIVITIES ARE JOURNEYS: You should *move on* with your life

(Kövecses, 2005, 43)

Studies of polysemy, the condition of words that have multiple meanings, also lends support to the theory that embodied metaphorical concepts guide cognition. Systematic polysemy refers to the state in which words have a set of meanings that are related in systematic and predictable ways. Metaphor, it is argued, motivates how these multiple word senses are related (Gibbs, 1994, 161). The conceptual metaphor MORE IS UP, for example, can explain why the polysemous word *rise* is used to connote both an increase in elevation and quantity.

The cognitive psychologist Ray Gibbs was among the first and most influential researchers to attempt to substantiate claims about the existence of conceptual metaphors through experiment rather than on the basis of linguistic analysis alone. In one such experiment, subjects read brief stories involving anger (for example, someone borrowed John's new car and returned it with dents in it). These stories ended with an expression based on the conceptual metaphor ANGER IS A HOT FLUID IN A CONTAINER. The mappings that define this metaphor include: the physical container as the angry person's body, the hot fluid as the anger, the degree of heat as the intensity of anger, and the cause

of increase in heat as the cause of anger. Phrases such as "*blow one's stack,"* "*boil with anger*," "*flip your lid*," "*get a rise out of*," "*simmer down*," and "*seethe with anger*" are all instantiations of the conceptual metaphor ANGER IS A HOT FLUID IN A CONTAINER and reflect these correspondences. Subjects primed with story endings containing a metaphorical expression like those mentioned above then performed a lexical decision task—they had to quickly determine whether a string of letters presented visually was an English word. The letter string was either a word related (e.g. "heat") or unrelated ("lead") to the conceptual metaphor underlying the expression at the end of the story, or a nonword. The subjects made faster lexical decisions for related letter strings, hinting that they interpreted metaphorical expressions according to the mappings of the conceptual metaphors from which those expressions are derived (Gibbs, Bogdonovich, Sykes, & Barr, 1997) (Kövecses, 2005, 29). The metaphorical phrases such as "*he blew his stack"* evoke the mapping from anger to heat and, as a result, make it easier or quicker for subjects to identify the letter string "heat" as an English word.

The gestures people use when speaking represent another variety of evidence of the metaphorical quality of human thought. Gestural CONDUIT metaphors present a particularly elegant collection of examples. In 1979, Michael Reddy found that much of the language we use to talk about communication makes use of the CONDUIT metaphor, according to which people insert mental content (ideas, thoughts, meanings etc.) into "containers" (words, phrases, sentences) and send those filled containers to the listener or reader, who extracts the content from the container. A few among many hundreds of expressions that follow this formula include: "*it's hard to get the idea across," "she gave away all her best ideas," "your feelings are getting through to me," "your concepts*

come across beautifully," "it is difficult to put the idea into words," "every line of his poetry is packed with lovely feelings"(Gibbs, 1994, 152). David McNeil's 1992 book on metaphoric gesture dissects the patterns of hand motions that accompany specific topics of speech; he devoted significant space within this text to describing the CONDUIT metaphoric gestures. It is common, he showed, to form a cupped hand when saying, "I have a question." The hands create an image of a bounded object or container to depict an abstract idea (McNeil, 1992, 149). The image of the channel for conveying an abstract idea, the conduit itself, is created in the gesture of the speaker's palm-up hand moving toward the hearer when saying, "I've got to tell you something" (Gibbs, 2005, 166).

The metaphor theory established in 1980 by Lakoff and Johnson, elaborated by Grady, and supported by Kövesces, Gibbs, McNeil and others, represents nothing short of an intellectual revolution in the field of cognitive linguistics. Although, with the help of their colleagues, Lakoff and Johnson offered an immensely compelling and influential model of the human conceptual system as metaphorical in nature, this model proves rather vague about the way such a conceptual system operates in the brain. Of course, the publication of *Metaphors We Live By* preceded advancements in brain science technology that rocketed neural research to the forefront of scholarly inquiry and popular interest. Lakoff and Johnson have nevertheless remained closely engaged with the subject of metaphor theory. They have embraced these developments and, integrating the research of fellow scholars and investigators, have strengthened and expanded their original hypotheses.

There now exist well-articulated answers to some of the most pressing questions left open by Lakoff and Johnson's original findings. One such question harkens back to

the essential mechanisms with which the brain computes the mind: from a neural perspective, how do correlations in experience give rise to primary metaphors? Christopher Johnson, through studies of child language acquisition, has shown that primary metaphors result from associative learning. He examined how the KNOWING IS SEEING metaphor comes about over the course of early development and showed that children first learn the literal sense of *see*, as in *see the bird* and *see Daddy.* They later incorporate simultaneous occasions of *seeing* and *knowing* in "conflations," cases such as *see Daddy come in* or *see what I spilled.* Eventually, the two domains (seeing and knowing) that have been linked together are separated out, but the cross-domain associations persist and form metaphorical mappings. At this point, children are able to formulate purely metaphorical statements such as "*see what I mean"* (Feldman, 2006, 202).

Srini Narayanan put forward a Neural Theory of Metaphor to suggest that the associations established during the phase of conflation constitute physical neural connections between source- and target-involved brain regions. These regions are coactive during conflation and, as the neuroscientific mantra states, "neurons that fire together wire together" (Hebb, 1949). The more frequently clusters of neurons respond concurrently, the stronger the connections among them become.

This empirical principle is at the heart of a related theory, which likens metaphor to a sort of conceptual synesthesia. Synesthesia is the ability to perceive a stimulus presented to one sense organ through a different sensory system. Many metaphors make use of visceral, experience-based sensations such as touch, taste and smell, to refer to less immediate, object-based targets in the domains of sight and sound. For example, *silence*

can be *sweet* and a day at the *office* might be *rough.* Metaphor, it has been suggested, evolved from synesthesia. Over time, for example, visual neurons branched out into the anatomically neighboring auditory regions. When neurons encoding sounds were activated, neurons encoding visual signals also responded. As we evolved to process ever more abstract thoughts, existing circuits were recruited to the task. Thus, we are left not only with cross-sensory metaphors (*facial expressions* are *sour*) but, more generally, with metaphors in which the abstract is understood in the context of the concrete (Geary, 2011, 79).

Whether we owe the nature of our metaphorical thinking to the neural networks formed during the conflation phase of childhood language development or to those forged over the course of a long evolutionary process (consisting of, we might say, extended and gradually shifting conflations occurring in the brain over the course of human evolutionary history), both explanations entail a common and crucial assumption. Namely, conceptual metaphors are ensembles of neurons, where the source and target domains occupy different brain regions connected by physical neural mappings. Along this neuroscientific view of the Lakoff-Johnson model, the source domain is located in the sensorimotor area and the target in higher cortical systems (Kövecses, 2005, 24). With this premise in mind, we may begin to see that conceptual metaphors have a remarkably profound impact on matters of political, psychological, philosophical, technological and artistic importance.

"The people who get to impose their metaphors on the culture," Lakoff and Johnson proposed, "get to define what we consider to be true" (1980, 157). Culture Logic, a public interest research and consulting firm co-founded by Joe Grady (of

primary metaphor fame), conducted a study in which participants read one of two short passages about the economy. One of the passages explicitly likened economic development to auto-racing (e.g. *"China and India have turbocharged ahead economically"*) while the other did not make any such comparison (e.g. "*China and India have pulled ahead economically")*. Even several days later, participants who read the passage with auto-racing metaphors continued to use auto-racing metaphors to speak about the economy. Once associated with an idea, a metaphor becomes an organizing principle, framing all things related to that idea. The trick, then, as Grady notes, "is to find metaphors that do some good" (Geary, 2011, 125).

Effective politicians often turn out to be shrewd crafters of metaphor. In 2010, President Obama was apparently convinced of the effectiveness of one metaphor in particular, which he proudly trumpeted in stump speeches across the country during the midterm campaign season. Obama repeatedly compared the economy to a car stuck in a ditch. The Republicans, as he told it, had been at the wheel for eight years, and after steering the car (the nation's financial system) into a ditch (the recession), stood on the side of the road while Democrats got to work digging it out (implementing economic recovery policies). Now that his administration has gotten the car back on the road, Obama explained, the Republicans want the keys (legislative power) back. "We put on our boots and walked into the ditch. It's muddy and hot and dusty and bugs everywhere, and we're pushing," Obama pronounced at on fundraiser in September of 2010. "And we're slipping and sliding and sweating" (Lee, 2010).

One benefit of a metaphor constructed of clear, systematic correspondences and vivid entailments, Obama demonstrated, is the ease with which embellishments can be

devised and understood. Even seemingly obscure ones. At one point, Obama imagined the roadside Republicans sipping Slurpees while Democrats worked away in the ditch. The implication, of course, is that his political opponents idled leisurely during the first two years of his presidency, making no substantive contribution to the recovery effort. On other occasions, Obama added characters to the scene in the form of extra passengers. "If we give [the Republicans] the keys to this economy, they are going to drive it right back into the ditch," he said, "And riding shotgun will be the big banks and the insurance companies and the oil companies and every special interest under the sun." He even went so far as to draw a metaphorical correlation between Republican candidates and his daughter. "I don't have a teenager yet, but in a couple years, Malia is going to be able to drive, right?" He continued, "If your teenager drives into a ditch, your car, bangs it up, you've got to pay a lot of money to get it out, what do you do? You take the keys away" (Lee, 2010). Republicans ought to answer for their irresponsible behavior, he suggests. Obama's initial metaphor of the economy as a car defined an open-ended assemblage of potential correspondences; having established a fixed mapping pattern (THE ECONOMY IS A CAR, FINANCIAL STABILITY IS A JOURNEY), Obama was able to characterize target domain elements (Republicans, for example) using novel source domain knowledge structures (Slurpee-drinkers, for example) (Lakoff, 1992).

Among the most widespread and deeply entrenched political metaphors is A NATION IS A BODY. Thomas Hobbes is probably owed credit for spreading it; a rather haunting image of "the body politic," pictured as a giant king whose flesh is made up of the smaller bodies of his subjects, appears in *Leviathan* (1651). Health for a nation is economic vigor and strength is military might. Today, the metaphor is especially

prominent in dialogue about immigration. The metaphorical entailments characterize immigration as infection, immigrants as contaminants (Geary, 2011, 127).

A recent study explored the priming effects of the NATION IS A BODY conceptual metaphor on opinions about immigration. Participants were divided into two groups; the first read an article about an airborne bacteria that is ubiquitous and harmful to humans and the second read an article about an airborne bacteria described as ubiquitous but not harmful. Next, both groups read one of two articles about the history of U.S. domestic concerns (apart from immigration). These articles differed in only in that one made use of the NATION IS A BODY metaphor (e.g. "After the Civil War, the U.S. experienced an unprecedented *growth spurt,* and is *scurrying* to create new laws that will give it a chance to *digest* millions of innovations") and the other did not (e.g. "After the Civil War, the U.S. experienced an unprecedented period of innovation, and efforts are now under way to create new laws to control the millions of innovation"). Lastly, all subjects answered a questionnaire about their views on immigration and minimum wage and a separate questionnaire about their views on contamination. Those who had read articles describing the harmful bacteria unsurprisingly expressed greater worry about contamination. More notably, if they also read article containing the NATION IS A BODY metaphor, they were more likely to have a negative opinion about immigration than those who read the harmful bacteria article followed by the neutral historical article. Attitudes about minimum wage, meanwhile, remained consistent across groups, as the NATION IS A BODY metaphor does not bear on the subject. The researchers demonstrated that it is possible, indeed quite simple, to manipulate beliefs using

metaphor. Literal descriptions did not show the same effect. What's more, the subjects were not aware of the effect at all (Geary, 2011, 129).

It is no wonder that advertisers use metaphor to sell products. It is tempting to sneer at this branding tactic, to see advertising as insidious or coercive. But in truth, advertising is starkly honest. We think in terms of metaphors, and advertisements stamp these metaphors right on the surface of things; billboards, taglines, commercials appeal directly, forcefully and overtly to our metaphorical cognitive system. Successful advertisements tap into or conjure visceral, emotional associations and make us see products as experiences. Apple's three-year long campaign, running from 2006 to 2009, known as "Get a Mac," became one of the most iconic and memorable advertising series of all time. *Adweek* declared the collection of 66 TV spots the best campaign of the first decade of the new century (Nudd, 2011). The commercials feature actors John Hodgman and Jason Long. Hodgman appears as an awkward, bespectacled middle-aged man in an ill-fitting suit alongside a young, self-assured and casually stylish Long. Each spot opens with the now-famous introductions: "Hello, I'm a Mac," says Long, "and I'm a PC," follows Hodgman. Against a minimalist visual aesthetic, with a few brief words, a rich metaphor emerges. It is worth noting that this metaphor is not entirely linguistic, that it works primarily through the visual representation of the characters. A Mac product is personified as a hip twenty-something-year-old and a PC product as a bumbling, unattractive forty-something. Because we are so adept at interpreting the abstract by way of the concrete, we easily attribute human characteristics to brands and consumer goods. In other words, no matter what we are doing, we are always thinking like advertisers.

Thus, as long as we are able to recognize them, we are in a position to seize control of the metaphorical associations according to which we see the world. In an op-ed in *The New York Times,* Daniel Menaker, author of *"A Good Talk: The Story and Skill of Conversation,"* writes about the metaphors we use to talk about cancer and how they affect a person's response to the disease. A patient's experience with cancer is frequently framed as a battle, a violent war against a malevolent enemy. Indeed, barring intervention, cancer will spread to occupy ever-greater territory in the human body. Drugs and treatments are weapons against this bodily invasion, and recovery is victory. But where does that leave death? Militarized cancer metaphors define those who die as losers, as lacking in strength or courage, or as having given up. Might it not be more appropriate to understand cancer as a problem or puzzle, necessitating reasoned, rational solutions, rather than a foe to be conquered by sheer force? Menaker, himself a recurrent cancer patient, suggests that it is up to each individual to strike a balance with which he or she feels comfortable. For some, war metaphors are empowering; they sharpen resolve, make pain more manageable. For others, a problem-solving approach makes more prudent sense. In either case, metaphor has the remarkable capacity to bring abstract matters, matters of overwhelming emotional gravity, into the realm of the familiar, the tangible, the immediate.

This phenomenon transcends thought; metaphors can create new correspondences in experience and thereby influence the way we live our daily lives. The metaphor TIME IS MONEY, now fully integrated into common discourse (*he's wasting time, I have to budget my time, it will save time, I've invested a lot of time in it, he doesn't use his time profitably* etc.), only came into common English around the age of the American

Industrial Revolution (Lakoff, 1992). During this moment in history, a new form of compensation gained popularity: workers began to earn wages according to the hours they spent on the job. The metaphor TIME IS MONEY first legitimized the practice of awarding hourly wages, and this new social custom in turn added to the experiential basis of the metaphor in subsequent generations. Factory culture helped formalize an understanding of time as a limited, valuable commodity that can be spent, squandered, budgeted, invested, or saved (Lakoff, 1992). Metaphor actively shapes our understanding of experience and how we act as a result.

In this chapter, we have looked at metaphor from the inside out, so to speak—from its origins in thought to its instantiation in language and its realization in experience. In the next chapter, we will work in the opposite direction, investigating how the metaphors that exist all around us get processed in the brain and enter comprehension. In other words, we will trace metaphor from the outside in. A new type of evidence will be invoked with this transition. While the subject matter of the first chapter lends itself to a multidisciplinary exploration, the second chapter takes a strictly cognitive neuroscientific approach. Although the discussions laid out in each chapter rely on very different means of support and methods of argument, they have much to say in common about the role of metaphor in language and thought.

Chapter II: The Neural Systems Underlying Metaphor Processing

Spoken on average four times every minute (Pollio et. al., 1977), metaphors are as common as they are complex. The use of metaphor places unique demands on systems of language comprehension. Extensive research has been dedicated to the topic of metaphor processing in the brain but findings are widely inconsistent.

The principle aim of these studies has been to characterize the lateralization of the processing of metaphor. Although the left hemisphere is commonly considered dominant for language, research has demonstrated the right hemisphere's involvement in a diverse range of functions that include the interpretation of humor, lexical ambiguity and figurative language (Burgess and Chiarello, 1996). Beeman et. al., 1994 provided a model of bottom-up semantic activation that offers an account of how the right hemisphere might be tuned to comprehend metaphor as an aspect of figurative language. According to this theoretical framework, right hemisphere functioning gives rise to weak but broad activation of semantic fields resulting in overlap in connections among the conceptual spheres, while left hemisphere functioning activates small, finely coded information networks. A metaphorical word meaning is likely to be more distantly related to other words in a sentence than its literal meaning, and metaphor comprehension might therefore be assumed to take advantage of the disperse activation of loosely associated semantic features.

Despite the logical appeal of this conceptual scheme, many recent studies have failed to provide support. What was at one time a rather robust consensus regarding the right hemisphere's role in accessing meaning for figurative language (Mashal, 2005) has been undermined by a range of studies disputing the strict lateralization of metaphor

processing. Evidence from imaging of neurologically intact subjects (Rapp et al., 2007) and studies of brain-lesioned participants (Gagnon et al., 2003) have challenged the evidence for selective right hemisphere involvement in understanding metaphors. Other studies, meanwhile, provide apparently contradictory data. An event-related potential (ERP) based paradigm that presented normal subjects with novel metaphoric phrases (*"Furious ground hump")* followed by a word that could (*"volcano")* or could not (*"camel")* be associated with the sentence's metaphorical meaning found a larger N400 from the right but not the left superior/middle temporal gyrus for metaphorically related words than for non-related words (Sotillo et al., 2005). These results are in line with the seminal positron emission tomography (PET) investigation conducted by Bottini et al. in 1994 that identified increased cerebral blood flow in the right hemisphere for tasks implicating metaphor appreciation.

The variety of methodological strategies and conceptual frameworks that have been brought to bear on this subject has contributed to a polarizing debate regarding the right hemisphere's specialized role in the processing of metaphor. The dispute, however, misrepresents the question of metaphor comprehension as a choice between left or right hemisphere localization. A comprehensive review of the literature raises the possibility that both hemispheres are capable of processing metaphor but do so by way of different mechanisms and under different conditions. Disagreement in the field, therefore, derives from variation in methodological approaches that favor or highlight the processing functions particular to one hemisphere and fail to tap the mechanisms available in the other.

More specifically, the left hemisphere appears to be sensitive to contextual constraints, and selects and integrates only sententially appropriate aspects of meaning. This top-down system is successful at employing linguistic and real world knowledge to process literal as well as metaphoric sentences (Kacinik and Chiarello, 2007). The right hemisphere, by contrast, maintains the activation of sententially inappropriate meanings in metaphor comprehension. The processing of single metaphoric words, therefore, constitutes a distinct cognitive task from processing phrasal metaphors (Gagnon et al., 2003) and disadvantages the left hemisphere's context-sensitive metaphor integration mechanism.

Similarly, the degree of stimulus salience may disproportionately privilege the contribution of one hemisphere over the other. For instance, one study showed the right hemisphere's preferential involvement in the processing of nonsalient, unfamiliar metaphors and the left hemisphere's preferential involvement for familiar, salient metaphors (Schmidt et al., 2007). Most investigations, however, have not directly distinguished or manipulated familiar versus unfamiliar metaphor stimuli.

What has been understood as a hemispheric dichotomy between literal and nonliteral language appears actually to reflect the influence of stimuli selection, particularly single-word vs. phrasal metaphors and salient vs. nonsalient metaphors. On this account, metaphor processing is carried out in both cerebral hemispheres according to distinct mechanisms that respond to unique sets of conditions.

Foundations of the Right Hemisphere Metaphor Theory:

Following the pioneering study by Winner and Gardner in 1977, a prevailing assumption in the field of cognitive science considers metaphor comprehension separate from literal language skills in selectively recruiting the right hemisphere. Their work, in which patients with right hemisphere damage had greater trouble matching metaphorical sentences ("*a heavy heart can really make a difference")* to pictures than left hemisphere damaged patients, inaugurated a tradition of focal lesion research aimed at identifying the differential effects of right and left hemisphere brain damage on a patient's ability to comprehend metaphorical language (Brownell et al., 1984, Brownell et al., 1990). Interestingly, several recent studies of brain-lesioned participants have failed to replicate these influential earlier findings (Giora et al., 2000, Gagnon et al., 2003).

There remain, nonetheless, pertinent and persuasive theoretical reasons why the right hemisphere may be better suited for figurative language comprehension. Metaphoric language entails reference to a *target* domain using vocabulary usually employed in relation to another domain, known as the *source.* Shakespeare's Richard III begins, "Now is the winter of our discontent." The word "winter" serves an analogy between the *source* domain of seasons of the year, in which winter connotes finality, and the *target* domain of a period in the life of Richard III. In mapping the *source* concept to the *target,* Shakespeare's readers infer that Richard's unhappiness is soon to reach an end. (Coulson & Van Petten, 2007). Metaphor provides a means of extending word meaning and the right hemisphere is typically ascribed semantic processing capabilities responsible for activating and exploring a broad range of semantic features toward this end. (Anaki et al., 1998).

The course coding model (Beeman, 1994) describes this bottom-up process and predicts the right hemisphere's role in resolving the meaning of metaphorical words by activating their distantly related semantic properties. This broad activation facilitates overlap of *target* and *source* semantic fields, allowing relations between the words to surface. Metaphoric meaning depends on linking words with remote semantic relationships (for example, "a *camel* is a desert *taxi,*" compared to "a *camel* is a desert *animal"*) (Schmidt et al., 2009). Beeman and colleagues suggest that information activated by the left hemisphere, while sufficient to support connections between literal units of discourse, consists of only the closest and most central aspects of meaning, to the exclusion of connotative aspects.

An alternative theoretical approach proposes right hemisphere involvement in top-down sentence integration processes thought to take place during metaphor comprehension (Coulson & Van Petten, 2002). Along this view, the right hemisphere is implicated in various higher-level functions including generating inferences, joke and proverb comprehension, and producing and interpreting indirect requests (Burgess & Chiarello, 1996). Collectively subsumed under the category of pragmatics, these operations pertain to the physical, social or cultural context of an utterance (Coulson & Van Petten, 2007). Observed deficits in metaphor comprehension among right hemisphere damaged patients would represent one component of a pervasive impairment in appreciating alternative interpretations (Brownell, 1990). Despite well-developed theories of the neural basis of metaphor comprehension, discrepant research findings suggest the need to move beyond models of simple laterality.

Study Types: A Summary of Common Research Methods:

Initial hypotheses for right lateralized metaphor processing were based on clinical observations that right hemisphere damaged patients exhibited decreased proficiency in abstract language tasks (Eisenson, 1962). Early neuropsychological investigations with brain injured patients, however, often failed to differentiate lesion sites within the right hemisphere and control for time post-onset or age-related cognitive impairment acquired independently of the injury (Schmidt et al., 2009). More recent studies found this very same pattern of metaphor processing deficits in left hemisphere damaged patients (Zaidel et al., 2002). Additionally, Giora and colleagues, 2003, documented preserved metaphor comprehension in right hemisphere damaged patients when they were asked to provide verbal explanations of conventional metaphors (e.g., "*broken heart"*). Of course, as is the case with all brain injury research, these studies can reveal anatomical sites necessary to task performance but cannot establish their sufficiency (Price et al., 1999).

Functional brain imaging studies, like neuropsychological studies, have yielded inconsistent results with regard to the question of differential hemispheric contributions to metaphor processing. In the first study on the topic to use positron emission tomography (PET) in 1994, Bottini et al. asked six subjects to perform a comprehension task for metaphoric ("*Their cross mother was an elastic band"*) and literal sentences (*"The busy secretary used string as a bookmark").* Metaphoric processing produced greater activation in right prefrontal regions, the right hemisphere homologue of Wernicke's area, and the right temporal lobe when compared to literal sentences.

A similar fMRI study, by contrast, elicited greater left hemisphere activity for metaphoric (*"the lovers words are harp sounds"*) sentences than for literal sentences

(*"the lovers words are lies"*) when subjects rated the phrase's positive or negative connotations (Rapp et al., 2004). Interestingly, despite claiming to use original sentence formulations, novelty was not explicitly monitored and it is possible that the left lateralized activation marked the participants' familiarity with the stimuli. The authors attributed the right hemisphere involvement for metaphor processing observed in Bottini et al. to the semantic complexity of their phrases. It has also been noted that Bottini et al.'s study tested only six subjects, which casts further doubt on the reliability of their findings.

Like fMRI, the hemifield priming technique has furnished a large body of observations on the role of right and left hemisphere processes in metaphor comprehension for neurologically intact individuals. Presenting information outside the fovea allows for the selective stimulation of the right or left visual cortex, so that the immediately ensuing computation is hemisphere-specific (Coulson & Van Petten, 2007). Anaki et al., 1998 were the first to make use of this method in studying metaphor. They had subjects read centrally presented words (e.g., *"stinging"*) and then make lexical decisions on peripherally presented targets (e.g., *"bee" or "insult"*) related to either the literal or metaphoric meaning of that word. At short stimulus onset asynchronies, (SOAs), there was metaphorical priming for both right and left visual field presentations, while longer SOAs resulted in priming only for the left visual field presentation (i.e. right hemisphere computation). Anaki et al. proposed that metaphoric meanings are initially activated bilaterally but decay rapidly in the left hemisphere and remain active in the right. A more recent hemifield study, however, demonstrated equivalent priming for

literal and metaphoric meanings with presentation to both visual fields using sentential stimuli (Kacinik & Chiarello, 2007).

Although the stimulus onset asynchrony between the prime and target in hemifield paradigms is between 200 and 800 ms (Coulson & Van Petten, 2007), and should therefore be sensitive to the very critical initial responses to linguistic material, event-related potentials (ERP) are even more temporally agile. ERP are capable of measuring quick and brief neural changes, making them useful for detecting the activity specific to isolated phases of metaphor comprehension (Sotillo et al., 2005). Sotillo and colleagues asked healthy subjects to decide whether a word (e.g., *"park"* or *"semaphore"*) was appropriately defined by a previously presented phrasal metaphor (e.g. *"Green lung of the city"*). Results showed a larger right hemisphere N400 component for metaphorically related words than nonrelated words. According to the authors, the N400 is a reflection of a neural mechanism associated with metaphor comprehension. The authors argue in favor of a special right hemisphere contribution in at least one stage of metaphor processing.

In contrast, a study conducted two years later by Coulson and Van Petten, which combined the hemifield priming paradigm with ERP, found similar ERP effects across hemifields. The researchers, under the assumption that hemifield presentation accentuates the impact of semantic processing in the hemisphere contralateral to the presentation side, recorded ERPs as subjects read centrally presented sentences that promoted either a literal or metaphoric meaning of a laterally displayed sentence-ending word. They found that hemifield presentation did not modulate the amplitude of the N4000 for metaphor

conditions, indicating that both hemispheres are similarly taxed in integrating metaphoric nouns in sentence contexts.

Needless to say, research on this topic has been fraught with disagreement and inconsistencies both within and across methodological approaches. Despite a complex and convoluted profile of hemispheric differences in metaphor processing, attention to the nature and quality of stimuli can help illuminate a coherent model. Particularly influential in eliciting right or left lateralized activity are stimulus novelty vs. conventionality and word–level vs. phrasal stimuli.

The Effects of Metaphor Familiarity:

Giora's "graded salience hypothesis" (GSH) provides a means of reconciling discrepant findings in metaphor processing research. It specifies that the degree of meaning salience, rather than literality, affects hemispheric processing. Accordingly, both the left and right hemispheres are involved in metaphor comprehension, with a left lateralized advantage for conventional, salient metaphors and a right lateralized advantage for novel, nonsalient metaphors. Salience, the GSH suggests, determines the order in which meanings are retrieved, such that salient meanings are accessed first irrespective of their literality or non-literality. Traditional theorists, by contrast, contend that literal meaning is obligatorily activated before metaphoric, nonliteral meaning, which is only sought after the literal meaning is found to be inappropriate (Giora et al., 2000).

In 2000, Giora and colleagues tested the GSH on salient instances of metaphor in a large sample of brain-damaged and control participants. The study, conducted in Hebrew, included three metaphors with implausible literal interpretations—*"broken*

heart," "warm heart," "a hard man" —and one metaphor with a plausible literal interpretation (in Hebrew)—*"lend a hand*." The participants were asked to provide verbal explanations of the four phrases. For the metaphor with a plausible literal interpretation there was no difference in the bias toward the literal meaning between left and right hemisphere patients. For the other three metaphors, they found no difference between right hemisphere brain damaged patients and healthy participants in metaphor comprehension, but left hemisphere brain damaged individuals experienced a significant disadvantage relative to both right hemisphere patients and normal subjects after controlling for the effects of aphasia. Overall, the results support the authors' predictions that, due to salience sensitivity, the left hemisphere should have a more prominent role in processing coded meanings (i.e. conventional metaphors).

Another study, published by Mashal and colleagues in 2007, supports the claim that hemispheric involvement in the processing of metaphoric expressions is related to the salience of the stimuli. Specifically, the authors investigated the hypothesis that comprehension of novel metaphors relies on unique right hemisphere mechanisms. Neurologically intact subjects read literal expressions (e.g., *"water drops")*, familiar metaphorical expressions (e.g., *"bright student")*, novel metaphorical expressions taken from poetry (e.g., *"pearl tears")*, and unrelated word pairs (e.g., *"road shift")* and judged the semantic relation between the words as literal, metaphorical, or unrelated. The meanings of the literal expressions and the conventional metaphors are both coded in the mental lexicon and represent salient interpretations, whereas the meaning of the novel metaphors is not and therefore represents a nonsalient interpretation. fMRI data for the processing of novel metaphors as compared with conventional metaphors indicated

stronger activity in the right posterior superior temporal sulcus, the right inferior frontal gyrus and the left middle frontal gyrus. Processing of the conventional metaphors resulted in higher activation in the left classical language areas and the right postcentral parietal lobe relative to the processing of the novel metaphors. Broadly, the study suggests that the comprehension of conventional and novel metaphors elicits different patterns of brain activity and that stimuli salience modulates the degree of right or left hemisphere processing.

In the same year, Schmidt et al., published a study similarly aimed at dispelling the assumption that the right hemisphere is uniquely implicated in metaphor processing. As in Giora et al., 2000 and Mashal et al., 2007, Schmidt and colleagues proposed that this assumption is the result of the confounding effects of literality and salience. Three hemifield experiments varied familiarity for both literal and metaphorical sentences. The results demonstrated a left hemisphere processing time advantage for familiar sentences, whether metaphorical or literal, containing close semantic relationships. The right hemisphere experienced a processing time advantage for unfamiliar metaphorical and literal sentences. Notably, the left hemisphere advantage for familiar metaphors and right hemisphere advantage for unfamiliar literal sentences speak forcefully against the traditional literal-metaphoric processing dichotomy commonly upheld in laterality studies.

Recent research provides strong evidence that the observed involvement of the right hemisphere in metaphor comprehension is a result of the degree of stimuli salience, as indexed by familiarity, rather than metaphoricity or literality. The left hemisphere is not incapable of interpreting metaphor or otherwise deficient compared to the right

hemisphere, but rather employs a distinct mechanism that is less likely to be recruited for processing of the nonsalient stimuli frequently utilized in metaphor studies. This view helps to explain the expansive inventory of contradictory results on the subject, but also points to the need to be aware of the impact of other stimulus features. The varying use of salient and nonsalient metaphors across studies has a similar confounding effect as the varying use of word-level and sentential metaphors. Of course, studies with word-level metaphors are restricted to familiar, salient material because meaning must be derived without contextual support. Moreover, given the hemispheric differences in semantic processing strategies outlined in the coarse coding theory (Beeman et al., 2007), understanding metaphor should rely on separate operations when it is embedded in a sentence than when it appears without sentential constraints.

The Effects of Single Word Versus Sentential Metaphors:

A large portion of the work on laterality in metaphor processing has used tasks that involve integrating metaphorical relationships between single words (Brownell et. al., 1984, Brownell et. al., 1989, Anaki et al., 1998). Brownell and colleagues, for example, presented left and right brain damaged patients with word triads consisting of a polysemous target (e.g., *"warm"*), a synonym of its secondary meaning (e.g., *"loving"*) and a foil that was closely associated but not synonymous (e.g., *"blanket"*). Patients were asked to choose the two words most similar in meaning. Relative to right hemisphere damaged individuals, left hemisphere damaged participants demonstrated a preserved appreciation of metaphoric alternative meanings (Brownell, 1989). These left hemisphere damaged participants demonstrated a preference for the metaphoric synonymous

relationship (*"warm"* and *"loving"*) over the literal association relationship (*"warm"* and *"blanket"*). Single word paradigms, however, do not reflect the way that metaphor is typically encountered in natural language.

More importantly, they bias processing in favor of the right hemisphere. Kacinik and Chiarello (2007) performed two hemifield experiments to investigate the impact of sentence constraints on cerebral asymmetries for metaphor comprehension. The authors suggest that the left hemisphere is equipped for understanding sentences while the right hemisphere is suited to processing word-level semantic relations. This view is in keeping with the fine coarse coding theory, according to which the right hemisphere diffusely activates broad semantic fields that include all literal and figurative aspects of meaning while the left hemisphere finely codes information based on sentence context (Beeman et al., 1994). Sentence priming experiments with non-metaphoric ambiguous words (e.g., *"spade"*) have shown that where the context is sufficiently constraining, left hemisphere processing activates the contextually appropriate word meaning even if that meaning is much less frequent (Faust & Chiarello, 1998).

In the first of two experiments, Kacinik and Chiarello set out to study hemisphere differences in processing ambiguous words with literal and metaphoric meanings (e.g., "*bright*,") when they completed ambiguous (e.g., "*we all really admired the bright COLORS/STUDENTS")* or unambiguous (e.g., "*it's the building with the bright COLORS" vs. "the teacher praised the bright STUDENTS"*) sentences. As expected, they found similar literal and metaphor priming effects in the right hemisphere with both ambiguous and unambiguous sentences. Literal and metaphoric priming in the left hemisphere after unambiguous sentences (in addition to after as ambiguous sentences)

also supported the hypothesis that the left hemisphere would respond to sentence constraints in activating contextually consistent meaning, whether literal or figurative.

In their second experiment, they explored sentential consistency and meaning selection using sentence primes of the form *X is a Y* paired with targets tied to either the literal or metaphoric meaning. Literal and metaphoric meanings were activated bilaterally if they were sententially consistent. The right hemisphere, however, maintained the activation of sententially inappropriate literal aspects of meaning after metaphoric sentences. For example, the target *wilted* is related to the literal meaning of *petals* but is sententially inconsistent with the meaning of *petals* in the metaphoric sentence, "*Henry thought her eyes were petals."* The results of this study shed light on the divergent mechanisms with which the left and right hemisphere process metaphor; most notably, they indicate the left hemisphere's ability to use sentence context toward metaphor comprehension.

Rapp et al., 2007 come to the same conclusion in an fMRI study conducted as a follow-up to their 2004 investigation, in which left lateralized activation was demonstrated for German metaphoric sentences. Like Kacinik and Chiarello, Rapp and colleagues tested participants using simple sentences (*X is a Y*) to exclude syntactic confounds. In a "metaphoricity" task, subjects judged whether the sentence had metaphoric or literal content and in a separate "connotative" task, they determined whether the sentence had a positive or negative connotation. The imaging data revealed a left lateralized network of activation for both tasks, with no significant differences in laterality across literal and metaphoric stimuli. It is worthwhile to note that these are the opposite results to those of Bottini et al., 1994 despite similar imaging paradigms. Bottini

et al., unlike Rapp and colleagues, however, used more complex stimuli not balanced for syntax and difficulty and presented them in a block design.

The findings of Rapp et al., 2007 reflect a shift in processing bias in favor of the left hemisphere for sentential metaphors. In much the same way, metaphor salience draws on the functional capacities specific to the left hemisphere. Tasks involving single-word and nonsalient metaphor comprehension, on the other hand, take advantage of the right hemisphere's role in activating broad-ranging interpretations to access meaning without necessary recourse to sentence level semantic relations (Beeman et al., 1994, Kacinik & Chiarello, 2007).

* * *

Although the body of research on metaphor processing appears replete with contradictions, monitoring differences in methodological approaches goes a great distance toward resolving these inconsistencies and framing a cohesive understanding of the differential contributions of left and right brain areas. The neural resources recruited for metaphor comprehension vary as a function of stimulus type and, more specifically, the salience and sentential context (or lack thereof) of those stimuli. The integration of metaphor meanings occurs in both the left and right hemisphere, contrary to the classical claim of selective right hemisphere involvement. Results in support of a strictly lateralized model are not fundamentally incompatible with the view that metaphor processing occurs in both hemispheres; rather, they reflect the influence of hemispheric biasing effects of salience and sententiality.

The graded salience hypothesis in conjunction with the coarse coding theory might provide a unified account of the manner in which the sentential context and

familiarity of a metaphor modulate the degree of right and left hemisphere involvement: for a given metaphoric utterance, the left hemisphere activates only a few salient meanings while the right hemisphere activates many nonsalient meanings (Schmidt et al., 2007). Thus, single-word metaphor comprehension is disadvantaged for the left hemisphere, which in the absence of sentential support retrieves only that individual word's limited and closely related semantic associates, but facilitated in right hemisphere due to the disperse activation and resultant overlap of conceptual domains loosely linked to that word in a process not otherwise mediated by sentence level constraints. Likewise, integrating nonsalient metaphors skews processing to the right hemisphere because it requires drawing novel semantic connections between remotely associated words, whereas conventional, salient metaphors are cataloged in the mental lexicon and their meanings are successfully selected through the left hemisphere's narrow, fine-grained system of activation (Mashal et al., 2007).

The right and left hemispheres process semantic information in a characteristically different manner and, consequently, employ divergent means of interpreting metaphor. Increasingly, researchers are recognizing metaphor as an ordinary and essential tool of language and not merely a devise of gratuitous rhetorical ornamentation. Our conceptual system, in fact, is thought to be metaphorical in quality, such that metaphor does not simply describe our perceptions but actively shapes our view of everyday reality (Lakoff & Johnson, 1980). This perspective not only highlights the relevance of rigorous investigation into the neural systems underlying metaphor comprehension, but also suggests that, far from an obscure or highly specialized aspect of language, metaphor processing constitutes a basic and foundational cognitive operation.

We may, therefore, have further reason to prefer theoretical models that implicate diverse, bilateral mechanisms dedicated to this pervasive and highly varied task.

Chapter III: Metaphor in Literature and Poetry

Data gathered from cognitive neuroscientific investigations has helped dissolve a distinction between literal and metaphorical language processing. This evidence is compatible with Lakoff and Johnson's theory that our entire conceptual system, which drives the formation of our thoughts and behaviors, relies on a mechanism of metaphorical extrapolation from concrete to abstract knowledge according to systematic cross-domain mappings. Language, including an infinitely vast catalog of metaphorical expressions, is a product of this general structure of human reasoning. The pervasiveness of metaphor in all varieties of written and oral discourse has been firmly established. How, then, are we to account for the seemingly unique role of literary metaphor? It would appear that there can be nothing intrinsically special about metaphor in literature. Perhaps what we stand to discover is not that all literary minds are essentially ordinary, but rather that all ordinary minds are literary. In other words, everyday language springs from a creative apparatus that relies on the mental operations we traditionally associate with artistic invention.

Can we hope to do justice to the intricacy and splendor of a work of literature by employing a theory of cognition to explain the patterns and effects of metaphor in the text? Can literary studies and cognitive science contribute to a unified and mutually informative view of the nature of metaphor within and beyond the written page? It is an exciting and promising, if overwhelmingly challenging, intellectual undertaking. To achieve a firm and nuanced grasp of a literary work, we benefit from an understanding of the way humans think. Likewise, an understanding of the way humans think opens the door to deep and textured literary analysis. Metaphor can be a beautiful, complex and

evocative rhetorical device, but it enjoys this function in language because of the way it is embedded in our fundamental mode of thought.

Literary metaphors stand out – they strike us as distinctly moving or aesthetically pleasing – not because they differ in essential form or function from metaphors in other areas of language; on the contrary, metaphors in literature make use of the rudimentary architecture of common, automatic and deeply engrained conceptual metaphors. Authors and poets do, however, frequently set about extending, elaborating or combining ordinary, non-literary metaphors in deliberate and unusual ways (Lakoff & Turner, 1989, 67-72). By exploiting the basic metaphorical tools we use in everyday speech and writing, these artists guide us toward new and nonautomatic modes of thought, which remain all the while meaningful and readily understandable. Thus, metaphor enables authors and poets to exercise creativity and readers to access their meanings. Literary metaphors can transport a reader into exotic, uncharted conceptual realms while retaining a firm tether to familiar territory. A literary metaphor may be entirely novel but it will resonate with us because it maintains the structure of underlying, conventional conceptual metaphors.

The fact that we are capable of comprehending original, imaginative metaphors in literature with relative ease and that we will likely interpret them in a similar way as another reader reinforces the broad hypothesis that all metaphorical instantiations can be traced back to a set of conceptual metaphors grounded in experience. It is not arbitrary or coincidental that authors across literary genres and traditions repeatedly exploit certain conceptual metaphors. Some conceptual metaphors are more effective than others in translating knowledge schema and patterns of inference from source to target domains.

Consider, for example, LIFE IS A JOURNEY, which constitutes one of the most basic and pervasive systems of metaphorical mappings. The journey schema involves a consistent set of components, including travelers, paths, starting points, and ending points, as well as a set of variables, such as vehicles, guides, and whether the journey involves aimless wandering or purposeful, destination-driven travel. Thus, the source knowledge is organized with sufficient structure to distinguish journeys from other varieties of activities as it is being mapped onto a target, while remaining flexible enough to permit endless options for metaphorical elaborations.

The broad entailments of the "event structure" metaphor (see chapter 1)—that states are locations, changes are movements, causes are forces, actions are self-propelled movements, purposes are destinations etc.—scaffold the mappings of the conceptual metaphor LIFE IS A JOURNEY. (Gibbs, 1994, 153). In other words, the conceptual metaphor LIFE IS A JOURNEY "inherits" the mappings of the "event structure" metaphor. Conceptual metaphors can build off of one another, as Grady proposed with his theory of primary metaphor. Events in life, of course, are special cases of events in general; hence, the source domain (journey) maps onto the target domain (life) using the same rubric that maps space onto events in the "event structure" metaphor. To point to only a few expressions by way of example: "*he's without direction in life," "he's at a crossroads in life," "she got a head start in life"* (Ibid). These expressions rely on an implicit recognition of the correspondences, or mappings, between the source domain (journeys) and the target domain (life), such as:

- The person leading a life is a traveler.
- His purposes are destinations.
- The means for achieving purposes are routes.
- Difficulties in life are impediments to travel.

- Counselors are guides.
- Progress is the distance traveled.
- Things you guage your progress by are landmarks.
- Choices in life are crossroads.
- Material resources and talents are provisions.

(Lakoff &Turner, 1989, 3-4)

The metaphorical mappings confer a coherent, systematic structure on the concept of life (and death). When we identify a "dead end," for instance, we recognize a static stage in life as a negative situation demanding renewed focus or a change of direction rather than a desirable period of stable conditions (Lakoff & Turner, 1989, 65).

The metaphorical expressions that rely on these mappings are so common within our everyday linguistic repertoire that they blend in discreetly with non-metaphorical language. Metaphor is such a natural component of ordinary communication that it is effectively invisible. In literature, however, we can't help but take notice of metaphor; ordinary, conventional metaphors emerge from their quiescence and come into spectacular view. Literature defamiliarizes the metaphors that inconspicuously inhabit discourse of every kind. It casts a spotlight on metaphors that would fail to attract our attention in any other context.

There are several ways that literature can cause us to become aware of metaphor. A literary metaphor may make use of a conceptual element in the source domain that the conventional mappings do not typically or frequently tap, it may introduce to the source domain an entirely new but conceptually consistent element, or it may manipulate an existing one in some novel fashion (Kövecses, 2009, 48). Perhaps what chiefly distinguishes a literary metaphor is its function in probing, questioning and challenging the common uses of the metaphor itself. By highlighting, rejecting or reversing aspects of the metaphor that we otherwise take for granted, an author or poet encourages his

reader to examine the appropriateness of that metaphor and its role in shaping cognition and behavior.

Wise Blood, the first novel written by Flannery O'Connor, published in 1952, vividly manifests the conceptual metaphor LIFE IS A JOURNEY throughout the course of its narrative. O'Connor's story applies the basic, accepted mappings that characterize the metaphor, but it explores and interrogates them in doing so. Implicit in the image-schemata of the LIFE IS A JOURNEY metaphor is the notion that a traveler moves in one direction toward a distinct destination. The author asks us to consider whether life is best understood via a metaphorical scenario in which individuals appear in control of their destinies and aware of the goals toward which they continuously advance nearer. Haze Motes, O'Connor's beleaguered protagonist, does not experience linear forward progress in his journey. Rather than maintaining command of his motion, he seems controlled by his own car's unpredictable mechanical paroxysms. Rather than maintaining a steady, purposeful course on the road to some fixed end, he is often thrust backward or sent in circles. O'Connor preserves the metaphor LIFE IS A JOURNEY while probing the boundaries of its entailments and challenging its soundness.

> The Essex had a tendency to develop a tic by nightfall. It would go forward about six inches and then back about four; it did that now a succession of times rapidly; otherwise Haze would have shot off in it and been gone. He had to grip the steering wheel with both hands to keep from being thrown either out the windshield or into the back.
>
> (O'Connor, 1952, 154)

A bitter irony attends Haze Motes' every move; O'Connor's agitated protagonist appears never to slow his frenetic pace and still never to get anywhere. Haze Motes is effectively paralyzed even as he seems perpetually in motion. The reader cringes to watch him struggle in vain to gain ground as he travels on his confused spiritual journey. Haze preserves a fantasy of "shooting off" in the Essex, his dilapidated van, but it is quite clear that the vehicle will only provide him with the illusion of movement. Like a laboratory rodent peddling on a revolving wheel, the "rat-colored machine" takes Haze in circles. The car's halting "tics" send Haze lurching backward with each forward jolt, mirroring his own erratic, directionless motion. The Essex parodies his hopeless efforts at progress and becomes a salient symbol of his futile search for spiritual satisfaction.

The car – in American iconography the quintessential emblem of freedom – becomes something of a prison in Wise Blood. Almost immediately after purchasing the Essex, Haze is trapped behind a slow-moving truck transporting a crate of chickens. He honks his empty horn in vain. As the truck pulls ahead, Haze also slows to read the sign that had caught the attention of the truck driver and incurs the angry honks of the car behind him. This sequence finds Haze's Essex occupying the exact position that had moments earlier been taken up by the truck and draws an explicit parallel between Haze and the chickens in the crate "stuffed so full…that the ones facing him had their heads outside the bars" (O'Connor, 1952, 71). The "glum barred-rock chickens," like Haze, are powerless and immobile even as they speed away down the road and out of sight.

Like a caged animal, Haze is helpless to control his own direction. His car's motion is so unpredictable that "he had to grip the steering wheel with both hands to keep from being thrown either out the windshield or into the back" (O'Connor, 1952, 154).

This amusing description inverts the conventional relationship between driver and vehicle; while Haze is propelled object-like by the Essex's anthropomorphic "tics," the car appears to drive *him.* Instead of facilitating his travel, as might reasonably be expected of a car, the Essex directly inhibits his movement; without its persistent mechanical spasms "Haze would have shot off in it and been gone" (O'Connor, 1952, 154). Further likening his car to a cage, Haze's dream finds him in its back seat while "various eyes looked through the back oval window at his situation" as if he were on display at the zoo (O'Connor, 1952, 160). Haze, it seems, has some implicit awareness of his figurative imprisonment within the dilapidated car.

Needless to say, it is not ultimately the car's mechanical deficiencies that prevent Haze from arriving at his ambiguous destination. When the police officer rolls the Essex off a roadside embankment he is gripped by a sudden remorse and asks Haze "in an anxious voice, 'Was you going anywheres?'" (O'Connor, 1952, 212). Haze responds "no" with a sullen shake of his head. Still, his car allows him the pleasant delusion of purpose. The lurching, reeling vehicle abandoned, Haze no longer demonstrates his own "tendency to develop a tic" and his manic impulses are subdued (O'Connor, 1952, 154). O'Connor mocks Haze's false impression of progress in reporting an instance in which "he drove very fast out onto the highway, but once he had gone a few miles, he had the sense that he was not gaining ground" (O'Connor, 1952, 209). Even at high speeds, he can't seem to move forward. With the car as his de facto pulpit (he preaches from the van on occasion) Haze's "sense that the road was really slipping back under him" suggests the futility of his quest for religious understanding.

With comic inelegance, the faulty Essex acts out Haze's frantic, circular maneuvers and signals the aimlessness and futility of his incessant travels. When the police officer destroys his car, Haze instinctively replaces it with even more explicit symbols of his spiritual uncertainty. In blinding himself, wrapping his body in barbed wire, and filling his shoes with pebbles, Haze is once again caged. In language that recalls his transaction at the used car lot, Haze explains to his landlady that he performs rituals of self-injury in order "to pay." This final chapter, however, also represents a reversal, a paradigm shift. While Haze had previously been seen in futile and ceaseless motion, he has now stopped moving in earnest. Perhaps O'Connor means to suggest he has finally found the spiritual fulfillment he had been desperately running circles around in his rat-colored machine. Narrating from the landlady's perspective, O'Connor withholds confirmation of his spiritual satisfaction. The reader is nevertheless permitted to entertain the possibility that the hapless hero has found peace.

LIFE IS A JOURNEY frames the plot of Wise Blood and guides the reader's understanding of its significance. The text demonstrates the capacity of literature to bring the metaphors we use automatically and intuitively throughout the normal course of daily life to the prominent foreground of consciousness, where they become subject to our critical scrutiny. Although we tend not to consider the value of literature with recourse to its utilitarian function, it is not irrational to suggest that literature performs an indispensible service to society. It awakens us to the metaphors that pattern our thoughts, allowing us to reclaim control of the metaphorical associations that shape our experience of the world. Every author inspires this introspective enterprise in some different way.

Moby Dick, Herman Melville's masterpiece published in 1851, invites us to witness the destructive power of a metaphor. LIFE IS A JOURNEY, although widespread and highly productive, is not the only conceptual metaphor that underlies understandings of life and death. LIFE IS A CONTEST, and its corollary, DYING IS A LOSING BATTLE AGAINST AN ADVERSARY, is also a common model for shaping thoughts and narratives about human existence. In Moby Dick, Ahab's obsessive quest to confront the White Whale is motivated by his desire to defy the logic of this metaphor, to kill the beast and transcend mortality. To triumph over Moby Dick requires denying Moby Dick's status as a supernatural entity. Were he to fall to mortal Ahab, Starbuck's account of the "brute" would be confirmed and Moby Dick would be reduced to "a dumb thing." Ahab's ascendance comes inevitably at the price of his defeat.

Melville's captain tortures himself in an effort to deny the limitations of his strength and morality, finding relief only in death. The pursuit of transcendence, Melville suggests, is an essential, if inevitably disappointing, human instinct. If the conceptual metaphor LIFE IS A CONTEST patterns our views, it is no wonder that we should think of ourselves in a position to compete against the foe of death. Ahab struggles to imagine "what cozening, hidden lord and master, and cruel, remorseless emperor commands me; that against all natural lovings and longings, I so keep pushing, and crowding, and jamming myself on all the time; recklessly making me ready to do what in my own proper, natural heart, I durst not so much as dare?" (Melville, 1851, 591). Perhaps that "remorseless emperor," the self-destructive impulse that beckons him toward an empty fantasy of spiritual transcendence, is the conceptual metaphor that has shaped his understanding of the nature of life and death.

In meeting Moby Dick, Ahab achieves a long-awaited interface with God. He is not alone in attributing supernatural power to the White Whale. Ishmael identifies the haunting quality of Moby Dick's whiteness as "the most meaning symbol of spiritual things, nay, nay the very veil of the Christian's Deity" (Melville, 1851, 212). Whalemen in ports the world over, Ishmael explains, curate the myth that "Moby Dick [is] not only ubiquitous, but immortal (for immortality is ubiquity in time)" (Melville, 1851, 198). For Ahab, these superstitions are heightened; losing his leg to the animal infects him with a hunger for vengeance, an urge to interact with God and test his mortality against the infinite, immortal strength of Moby Dick. Imprisoned by his human condition, Ahab resolves to kill the whale in order to transcend the tormenting limitations of his power. "How can the prisoner reach outside," Ahab poses, "except by thrusting through the wall?" (Melville, 1851, 178). Investing a supernatural quality in the whale, Ahab's "spiritual exasperations" become "visibly personified, and made practically assailable" (Melville, 1851, 200).

To conquer Moby Dick, however, is to reject the whale's divine standing. Ahab's death preserves the possibility that Moby Dick is more than "a dumb brute." (Melville, 1851, 178). According to this scheme, the end of the novel at once grants and withholds Ahab's redemption. The whale's supernatural relevance depends on his remaining indomitable, that "though groves of spears should be planted in his flanks, he would still swim away unharmed" (Melville, 1851, 198). Ahab's defeat validates his purpose in seeking out Moby Dick, even as the opportunity to interact with God runs the steep cost of his life. "Thy right worship is defiance," Ahab says of the whale. So long as Moby Dick belongs to the realm of the divine—that is, so long as Moby Dick can be considered

an appropriate object of worship—Ahab's defiance can only result in his downfall. He cannot experience religious transcendence without giving up the goal that has occupied his every waking thought and fitful dream, that has given meaning and direction to years in his life.

The metaphor LIFE IS A CONTEST, Melville warns us, can so pervert the mind that an individual becomes convinced that the contest may be won, that immortality may be attained if the adversary of death – the white whale, to Ahab – can be conquered. Of course, the novel does not permit Ahab to do so. As long as Moby Dick remains a symbol of divine immortality, Ahab is powerless to conquer him. "How can the prisoner reach outside except by thrusting through the wall?" Ahab asks, in rhetorical reference to his plan to break free of his mortal constraints. But so long as "the white whale is that wall," (Melville, 1851, 178) Ahab's ascendance is impossible. As he prepares to meet Moby Dick, Ahab experiences a sudden, belated bout of regret and urges Starbuck not to follow him in his foolish undertaking. He laments having spent "forty years on the pitiless sea…and how for forty years I have fed on dry salted fare—fit emblem of the dry nourishment of my soul!" (Melville, 1851, 591). Seeing in his first mate's eye the image of his own wife and child, he is overcome with remorse for his long absence from home. To look into a human eye, Ahab discovers, "is better than to gaze into sea or sky; better than to gaze upon God" (Melville, 1851, 591). The value of spiritual transcendence, he realizes, is not so great as the value of temporal existence. If LIFE IS A CONTEST, one should never to enter it at all. The price to play is steep and the odds in favor of winning are naught.

Bringing into view the metaphor that underlies Ahab's quest, Melville actively explores the power and danger of conceptual metaphor to frame an individual's outlook and influence decision-making. From the reader's privileged vantage point, we experience the rare opportunity to observe a cognitive tool that otherwise operates without our conscious intention or knowledge. Thus, our attention to the role of conceptual metaphor in works of literature not only enables us to better know and understand characters, but also to better know and understand ourselves. Perhaps what distinguishes a truly innovative artistic sensibility is the skill for recognizing, exposing, and challenging the automatic metaphorical associations that govern our lives.

This artistic project—the task of uncovering and interrogating the metaphors that shape human experience—is at the very core of Emily Dickinson's poetry. Margaret Freeman, an Emily Dickinson scholar and director of the Myrifield Institute for Cognition and the Arts, was able to track Dickinson's treatment of metaphor and apply the information she gathered about the poet's stylistic approach to expose a forgery. It is Dickinson's habit, Freeman found, to introduce, question, and eventually overturn a standard conceptual metaphor within a poem, thereby "disrupting our commonsensical folk theory ways of thinking" (Freeman, 2000, 263). Dickinson's poetry on the topic of time presents a particularly cogent case study.

Expressions about time are uniformly metaphoric, sketched from the experience and language of space. Recall that Melville described Moby Dick as "not only ubiquitous, but immortal (for immortality is but ubiquity in time)." Time is typically conceived of according to one of two metaphors depending on the figure-ground orientation: TIME IS LOCATION (as the Melville quote takes up) or TIME IS AN

OBJECT. According the latter model, time is referred to as a figure with respect to some ground (*"the time flew by," "where did the time go?" etc.*) while according to the former, time is the ground for a type of figure (*"the plane landed on time," "we're almost out of time" etc.*). Dickinson frequently inverted figure and ground to destabilize entrenched conceptual metaphors. TIME IS A HEALER derives from TIME IS AN OBJECT and imagines time as a figure acting with agency against the ground of illness, pain or distress. Dickinson undercuts this notion by presenting time as a stable ground that may serve as an index of healing but not a cause:

> They say that "Time
> Assuages" –
> Time never did assuage-
> An actual suffering
> strengthens
> As sinews do – with Age –
>
> Time is a Test of
> Trouble-
> But not a Remedy –
> If such it prove, it
> prove too,
> There was no Malady –
> (Dickinson, 1924)

Dickinson forces her reader to question the consoling idea that time actively eases anguish. Similarly, in "Forever – is composed of Nows –" she encourages us to examine our perception of time as a discrete entity or region. Because we comprehend time as LOCATION or OBJECT, we are programmed to assign to it superficial boundaries. We are also coerced by our cognizing minds into imagining that there exists an eternity beyond these boundaries, a "Forever" to follow all our "Nows." Dickinson is determined to expose the fallacy of this vision by making us aware – and skeptical – of the metaphors that structure our thinking without our even noticing.

Forever – is composed of Nows –
'Tis not a different time –
Except for Infiniteness –
And Latitude of Home –

From this – experienced Here –
Remove the Dates – to These –
Let Months dissolve in further Months –
And Years – exhale in Years –

Without Debate – or Pause –
Or Celebrated Days –
No different Our Years would be
From Anno Dominies –

Noting that it diverts from her customary agenda, Freeman is able to identify a poem attributed to Dickinson as an imitation by the notorious forger Mark Hofmann. The forgery reads:

That God cannot
Be understood
Everyone Agrees
We cannot know
His motives nor
Comprehend his
Deeds -

Then why should I
Seek solace in
What I cannot know?
Better to play
In winter's sun
Than to fear the snow.
(Freeman, 2000, 265).

Unlike a genuine Dickinson poem, Hoffman's forgery takes no stylistic or thematic risks, attempts no bold figure-ground reversals and, on whole, reinforces rather than disrupts stereotypical connotations and constructions of metaphor. Humans are cast as meek subjects of a distant and mighty God. Dickinson would not have been likely to put forward an assertion of universal conformity ("Everyone Agrees"), especially on the

topic of man's relationship with a supreme being. Moreover, the poem concludes by affirming the conventional metaphorical scenario of taking pleasure in sunny ignorance while shunning bitter, wintry truth. The forged poem is not only simplistic and unadventurous, an observation which, incidentally, failed to register serious suspicion among traditional Dickinson scholars. More importantly, it evinces no effort to undermine the conceptual metaphors that readers take for granted, and as a result, it lacks the subtle irreverence characteristic of Dickinson's poems.

Literary and poetic brilliance exhibited by luminaries the likes of O'Connor, Melville, and Dickinson derives not from any exceptional proficiency in creating new metaphors, but rather from a talent for illuminating and exploring the metaphors that we regularly hear and utter without even realizing we have done so. This creative process is one of reinvention, not invention. Authors and poets use the basic materials of everyday language to shed bright new light on the conceptual metaphors that drive reasoning. They enable us to view and evaluate this automatic, unconscious cognitive mechanism by disorienting us, making familiar patterns of thought surprising and accepted patterns of thought subject to suspicion.

O'Connor introduces us to a protagonist who finds it impossible to conform to the conceptual metaphor LIFE IS A JOURNEY, a protagonist whose unpredictable, directionless movement signals our error in conceiving of human existence as a matter of orderly, deliberate progress. Melville illustrates the dangerous consequences of allowing such sorts of flawed, inadequate, or unsuitable metaphors to go unexamined; Ahab, possessed by the metaphor DYING IS A LOSING BATTLE AGAINST AN ADVERSARY, seeks out certain peril on the belief that he can achieve immortality by

conquering his rival. Like O'Connor and Melville, Dickinson insists that her readers banish their complacency towards metaphor, disposing of simplistic, trite, worn-out modes of thought along with it. Literature and poetry ask us to challenge, and ultimately assert control over, the metaphors that live all around us.

Conclusion

Metaphor inheres in language. It populates every variety, whether prosaic or polished, banal or beautiful. Metaphor owes its pervasive presence in language to its essential origins in thought. It is a tool of cognition before it becomes a tool of art. We are confined to an existence inside of our bodies and within a concrete world; with metaphor, we reach outside of this claustrophobic reality, using information derived from embodied, concrete experience to reason about and develop abstract concepts. Metaphor does not merely enable us to describe intangible aspects of emotions, ideas and human activities, but also to think about them, to comprehend them on the most fundamental level.

Cognitive linguistics, cognitive neuroscience, and literary studies rely on diametrically different scholarly methods and diverse sources of evidence to contribute to a remarkably stable view of the role of conceptual metaphor in structuring cognition and shaping our lives. A critical assessment of research on the differential contributions of the left and right hemispheres in metaphor comprehension suggests that broad, bilateral mechanisms are recruited to perform this particular task of language processing. Rather than relying on a selective or highly specialized right hemisphere substrate, integrating metaphorical meaning implicates varied cognitive operations as a condition of the salience and sentential context of the given stimuli. This rough neural model discourages our drawing a decisive boundary between literal and metaphorical language processing. It also establishes a compelling framework for the observations of cognitive linguists—including Lakoff and Johnson and their disciples—that the use of metaphor to think and talk about abstract topics is both natural and unavoidable.

Just as brain imaging and lesion studies expose aspects of the nature and function of a cognitive process that otherwise takes place outside of our conscious awareness, poetic and literary texts likewise lay bare the workings of the mind and direct our attention to the metaphors that ordinarily pass unseen through the discourse of our daily lives. Literary art affords readers the opportunity to detect, examine and question the metaphors we use effortlessly and unreflectively. Because we have demonstrated that metaphor is central to reasoning and to our social and perceptual interface with the world around us, we can also see that poetry and literature ought not to be dismissed as the stuff of escapist diversion, superfluous ornamentation, or even, as it was at a time commonly suggested, deviance and deception. John Locke, in *An Essay Concerning Human Understanding,* cautioned that all the "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" (Geary, 2011, 18). George Berkeley shared Locke's suspicions regarding the misleading and imprecise nature of metaphor, arguing, "A philosopher should abstain from metaphor" altogether (Geary, 2011, 18). We are now in a position to recognize that metaphor is not the enemy of reason, but the very foundation of it. Likewise, poetry and literature are essential tools and subjects of inquiry within the intellectual tradition of Western philosophy.

This is undoubtedly a heartening revelation, as we should find it quite impossible to eradicate metaphor in the manner Berkeley advocated in the early decades of the eighteenth century. Nevertheless, the theory of metaphor that has grown out of Lakoff and Johnson's work remains controversial, hotly contested, and inevitably incomplete. Resistance is not unwarranted; Lakoff and Johnson initiated an academic program that

threatens to destabilize assumptions about truth and meaning which have long comprised the basic underpinnings of the scientific enterprise and the study of knowledge. Objectivist thinkers, more specifically termed "literalists" in the context of this debate, believe that any thing or concept can be defined in terms of its inherent properties without recourse to metaphor. If thought is intrinsically metaphorical, it should seem, we have no access to objective truth; we can only obtain truth relative to a conceptual system that is based on, and constantly adjusting according to our social, cultural and physical experiences (O'Brien, 2006, 114). Literalists will continue to oppose the notion that metaphor constitutes an irreducible cognitive process. Meanwhile, a wholly subjectivist perspective, which views meaning as arbitrary and ungrounded, cannot be reconciled with the fact that metaphor formation is systematically constrained by the structure of our world, our bodies, and our experiences within the two (Lakoff & Johnson, 2003, 273). Recognizing the role of metaphor in thought demands a thorough reexamination of some of the most basic ideas in the study of mind.

Cherished and entrenched notions about the status of metaphor in the field of literary studies also face challenging questions. If everyone is equipped with the same mechanisms of metaphorical thinking that give rise to poetic and literary metaphor, what makes great poets and authors different? How do critics, or even common readers, go about identifying exceptionally crafted metaphors, and what makes them so? Why do some simply take our breath away? It falls comfortably within the scope of cognitive linguistics to determine that metaphors in poetry and literature are built of the same raw materials as everyday conceptual metaphors. It is decidedly beyond the bounds of any existing theory of metaphor, however, to explain the source of a metaphor's ineffable

artistic quality. Whether it is the proper place of cognitive linguistics, cognitive neuroscience, or any discipline grounded in empirical investigation to attempt any project oriented toward that enduring enigma always proves a provocative subject.

To date, cognitive neuroscience has produced highly promising, if limited, contributions to our understanding of the nature of metaphor and metaphor comprehension. Embodied cognition represents one of the most exciting topics in current research. While cognitive linguists including Lakoff and Johnson and Joseph Grady have long held that our metaphorical system is embodied (that abstract meaning is accessed by way of sensorimotor experience), neuroscientific explorations are only just beginning to provide evidence from brain imaging to corroborate this essential tenet of conceptual metaphor theory. Embodied cognition has strong foundations in studies of language processing outside of metaphor-related tasks. Imaging data indicates that specific kinds of information are localized to different areas of the cerebral cortex, so that accessing an object's lexical entry activates the same network of specialized regions that store the sensory and motor systems associated with that object (Martin and Chao, 2001). According this model, the lexicon is organized so as to allow semantic information to be efficiently retrieved, selected, and acted upon. Pulvermuller et al. (2005) investigated the effects of TMS to cortical motor areas on action word processing and found that TMS applied to arm areas contributed to faster arm word responses than leg word responses and TMS to leg areas led to faster lexical decisions on leg words than on arm words. In this context, embodied cognition describes the phenomenon whereby movements and action words for those movements activate the same neural structures.

Recently, investigators have extended this neural model of lexical-semantic

representation to inform the conceptual metaphor hypothesis. If it is the case that we reason about an abstract concept via embodied experience, metaphor processing should activate brain areas associated with the source domain sensorimotor operation from which inferences about the target domain are derived. An fMRI study conducted by Tim Rohrer (2005) demonstrates that both literal and metaphorical sentences that contain hand terms activate hand regions in the premotor cortext and the sensorimotor areas along the central sulcus. The metaphorical sentences (for example, "He handed me the theory," "the ideas slipped through my fingers," or "I found Lobachevskian geometry hard to grasp") were all instances of the conceptual metaphor IDEAS ARE OBJECTS, in which the source domain of object manipulation is mapped onto the target domain of mental activity. In showing activation for both literal and metaphorical hand sentences in the brain regions that respond to tactile stimulation of the hand, Rohrer has provided the strongest evidence on record in the field of cognitive neuroscience for the embodied metaphoric basis of abstract reasoning (Johnson, 2008, 168). His work can only be considered preliminary, however, and has yet to inspire a significant number of studies by his peers aimed at confirming or elaborating its findings (Schmicking & Gallagher, 2010, 411).

While developments in our knowledge of metaphor and cognition will no doubt depend on pursuing this line of exploration further, it will also require that researchers set out in a different direction. Studies of the embodied nature of metaphor processing such as Rohrer's may be quite new to the field, but the neural mechanisms of metaphor comprehension more generally have been the subject of extensive investigation (see Chapter Two). Metaphor production, however, has received shockingly little attention.

What is taking place in the brain when we employ metaphor unconsciously in spontaneous speech? Are the patterns of neural activity distinct in any way from those exhibited in the course of producing speech that does not contain metaphorical expressions or during deliberate, nonautomatic metaphor formation? Answers to these questions have the potential to reinforce or refute the core principles of conceptual metaphor theory.

The spectacular rise of cognitive neuroscience, abetted by astonishing advances in imaging technology, has furnished progress in the study of metaphor processing that would have seemed utterly inconceivable at the time Lakoff and Johnson published their volume only thirty-two years ago. There is every indication that this progress will only quicken in the coming years. In embracing developments in cognitive neuroscientific methods, we must not be tempted to forget or forfeit the input of other disciplines. As this text has attempted to demonstrate, an exploration of metaphor in cognition benefits from an integrative account, drawing on the variety of scholarly approaches that converge on the subject. Cognitive linguistics and literary analysis, like cognitive neuroscience, have unique, constructive, and instructive things to say about metaphor and they speak louder together than they would on their own. We would suffer a grave loss if we allowed the promise of technology to eclipse the value of either or both of these perspectives. At present, perhaps as much remains open to doubt than appears certain regarding the function of metaphor in human thinking. Taken together, however, the distinct varieties of insight to be found in literature, poetry, the language of ordinary communication, and the findings of neuroscientific investigations contribute to a stunningly comprehensive and compelling model of the metaphorical structure of cognition.

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