

# UC Berkeley

## UC Berkeley Previously Published Works

### Title

Neural Social Science

### Permalink

<https://escholarship.org/uc/item/8c68f8pw>

### Author

Lakoff, George

### Publication Date

2013

Peer reviewed

## Chapter 2

# Neural Social Science

George Lakoff

It is obvious: Reason is central to the social sciences. It is so obvious that it is not discussed. And it is not discussed because it is assumed that all social scientists, being human, are endowed with the capacity for reason. We can take reason for granted and go on.

Or can we? The past three decades in the brain and cognitive sciences have vastly changed our understanding of the nature of reason. What has emerged is the empirical study of “real reason”—how people really think, whether they are people studied by social scientists or social scientists themselves.

The social sciences, of course, study the material causes of social and political effects: poverty, hunger, illness, homelessness, lack of education, joblessness, disparity of wealth, and so on. But how people think also has social effects: How do people understand morality, markets, the proper role of government, the nature of institutions, and so on?

How social scientists understand reason will affect their theories, both their theories of material causes and cognitive causes of social effects. It is therefore vital that social scientists get reason right. The Brain and Cognitive Sciences have shown that Real Reason—the way we really reason—is a matter of neural circuitry and has effects that are far from obvious. The way the brain shapes real reason therefore makes all social science into neural social science.

### Reason Is Neural

Because we think with our brains, all reason is neural in character. That’s not a surprise. What is a surprise is the effect this simple truth has on how the social sciences are studied.

Neural systems work to structure ideas physically in such a way as to produce rich, largely unconscious thought, with elements like conceptual image-schemas, frames, metaphors and narratives, and categories defined by many kinds of prototypes, not necessary and sufficient conditions. What this means is that critical social thought must go beyond logic and Enlightenment Reason to look at Real Reason, as revealed by the Brain and Cognitive Sciences. Real critical thinking requires an understanding of Real Reason.

---

G. Lakoff (✉)  
Department of Linguistics, University of California,  
Berkeley, CA 94720, USA  
e-mail: lakoff@berkeley.edu

## Back to the Future

There is a long history in Sociology of studying how the ideas of individuals shape social life, from Max Weber's *Ideal Types* to Erving Goffman's *Frames*, which are structural configurations of mind that shape everyday understanding.

Weber recognized that the Protestant ethic—a system of ideas—had everything to do with the social and material causes of capitalism and the shape that capitalism took in the Northern Europe of his day. Goffman recognized that social institutions—from asylums to casinos—have their causal roots in “frames” that structure the mind and determine how institutions are cognitively structured in many ways: in the roles that people in institutions play (e.g., nurse, croupier), and in their understanding of what does and does not happen in social institutions within the given frames.

What's in a frame? Look, Goffman told us, for where the conventional frame “breaks.” In the Surgery Frame, surgeons operate on patients not patients on surgeons. The powerful oppress the powerless, not the reverse. Casinos, not customers, set house rules. Judges use gavels, not ping pong paddles. It is through structured frames that social life operates, exerting very real forms of power through systems of frames. As Goffman was fond of repeating, “Social life is no joke!”

We now know from neuroscience that ideas are physical, that they are neural circuits. Fixed ideas are fixed brain circuits, with synapses strong enough to make them permanent. The causal effects of ideas are neural effects.

But neurons are meaningless in themselves. How do hundreds of billions of neural connections forming trillions of circuits become meaningful—and meaningful in ways that have social effects?

## How Brain Circuits Become Meaningful

Social scientists are usually trained on Weber's favorite metaphors:

- Time is Money (from Benjamin Franklin)
- Devotion to a Useful Craft is Devotion to God
- In Calvinism and related forms of Protestantism: Prosperity is a Sign of Righteousness and God's approval.

Metaphors, we now know, are conceptual and hence neural in nature. Just as frames are neural structures allowing us to understand the structure of the material world and social life—the roles we play, the norms of actions, the expectations we form—so, metaphors are neural circuits that map frames to frames, preserving social values, emotions, inferences, and hence normal expectations.

How does this work? Via the differentiation between associative circuitry and body circuitry—and the way they are connected. Body circuitry includes motor neurons, perceptual neurons, emotional neurons, temperature neurons, pain neurons, etc. Associative circuitry consists of complex “cascades” DeHaene (2009) made up of simple neural circuitry that “bottoms out” at the body circuitry, the circuitry that extends throughout the body. The cascades of associative circuitry link together a myriad of forms of inherently meaningful embodied experiences, like experiences of moving, seeing, grasping, etc.

As a result, phenomena that appear to be objective and material—matters of the external world in itself—are not. They could not be, because all out understanding comes via embodied neural circuitry for frames, metaphors, and narratives. We take common framing to be “objective.” Because we do not notice our unconscious neural understanding, we take the material world-as-neurally-understood to be objectively material. Even the external, material sociology of how many racial hirings, sex education courses, college admissions, etc. are frame-dependent and often metaphor-dependent. These are studied because the social sciences are essentially moral in nature: they are the study of the right things to do. But morality itself is anything but objective and material. The ideas characterizing morality arise from

framing and metaphor, that is, frame-circuits and metaphor-circuits, circuitry that determines what we consider the right thing to do. In short, embodied frame-circuits and metaphor-circuits determine the very goals of the social sciences. Social science can benefit from an understanding of how this works.

## Reason and Social Science

By *Neural Social Science*, I mean the approach to social science research that is based on, and integrates, methods and results from the cognitive and brain sciences—including cognitive linguistics, embodied cognition, experimental social psychology, neural computation, social neuroscience, and neuroeconomics. The line between the social sciences and the cognitive and brain sciences is disappearing—fast. The most fundamental reshaping concerns the concept of reason itself.

### *Reason Itself: Enlightenment Fallacies*

Frankly, I find it scandalous.

The social sciences are supposed to be committed to a rational understanding of social life. Rationality and science are seen as going hand-in-hand. If you believe in reason, you should believe in science—hence social *science!* Materialist social science takes on the trappings of physical science: objectivity of method, facts and figures, classical categories, logic, statistics—as well as the values of science: making the world a better place by eliminating superstition and fallacious, harmful myths. These are the Enlightenment values, and in the Enlightenment context of the seventeenth and eighteenth centuries, they led to marvelous advances.

We are taught in the social sciences that Enlightenment Reason is the hallmark of critical thinking and at the core of liberal democratic thought. If you accept the Enlightenment view of rationality, then the application of rationality and science *will* make the world a better place. And we certainly need to make the world a better place. Unfortunately, right now, America and much of the world are beset with a disastrous form of false “rationality.” We do need to be rational to make the world a better place, but we need to replace Enlightenment rationality with real rationality—with the way that rationality really works.

Rationality is crucial to improving the world, but the cognitive and brain sciences show us that the *Enlightenment theory* of rationality is so flawed that it is helping to create the problems that threaten to destroy us! The brain and cognitive sciences do not just improve marginally on reason—the scientific results change our understanding of reason in a way that is absolutely crucial to saving what is most valuable in our world. Neural social science is absolutely necessary, not just nice.

Where are the fallacies of Enlightenment Reason most in use? In the social science departments of our universities (political science, sociology, classical economics, law, and public policy) and in our public policy institutions, both public and private, both governmental and corporate.

I am not kidding! Our best and most socially committed thinkers are being trained in a flawed system of thought.

## The Enlightenment Fallacies

### *The First Fallacy: Reason Is Conscious*

Consciousness is linear while conceptual thought uses brain circuitry that is massively parallel. For this reason, most conceptual thought could not be conscious—and it isn’t. Andrea Rock, in *The Mind at Night* (New York: Basic Books 2005) quotes neuroscientist Michael Gazzaniga as estimating

that reason is *98% unconscious!* That estimate seems about right to most brain and cognitive scientists. Consider a random chunk of consciously-focused-on text, for example. Imagine writing down everything *not* in that chunk of text that is needed to understand it—every concept and every piece of background information, including every rule of grammar and phonology. The ratio of 50-to-1 nontext-to-text is a reasonable approximation.

Consciousness is only the tiny tip of the iceberg of reason.

### ***The Second Fallacy: One Can Reason Directly About the World***

Because we think with our physical brains, which are connected to our bodies, we can only comprehend what our bodies and brains pick out, structure, conceptualize, and categorize. You can only reason about the understandings of the world that the embodied neural circuitry of your brain permits. The relationship between reason and the world is always mediated by the brain and body.

### ***The Third Fallacy: Thought Is Disembodied***

All thought is physical, a matter of the activation of neural circuitry that is grounded in the body. What makes thought meaningful is the body, and how we function in the world with our bodies. The content of concepts is determined by the way we interact in the world with our bodies. Conceptual thought always has a bodily component.

### ***The Fourth Fallacy: Words Are Defined Directly in Terms of Features of the External World***

All words in all natural languages are defined in terms of embodied conceptual frames, not the external world. There is no direct way in which words can fit the world independent of the framing provided by body and brain.

### ***The Fifth Fallacy: Reason Is Unemotional***

The opposite is true. If you have a stroke or brain injury that makes it impossible to feel emotions, then you don't know what to want because *like* and *not like* mean nothing, and you can't tell whether others will like or not like what you do. For this reason, you couldn't set rational goals. You can't act rationally without emotion. Rationality requires emotion.

### ***The Sixth Fallacy: Reason Is Literal and Logical***

Real reason makes use of frames, image-schemas, mental images, conceptual metaphors, prototype categorizations, mental spaces, blends, emotions, and narratives. These are embodied conceptual structures that have “logics” of their own, which, for the most part, do not fit traditional mathematical logics. This does not make reason “subjective,” since the real world—both physical and social—places

constraints on your experience. The very structure of reason is interactive. It requires both you and the world outside of you.

### ***The Seventh Fallacy: Categories Are Defined by Necessary and Sufficient Conditions***

Categories are structured by prototypes of many kinds: social stereotypes, which have major social effects; ideal, typical, and nightmare cases, which define social standards, norms, and social disasters; and salient exemplars—well-known cases that raise probability judgments significantly and change social behavior and social policy.

### ***The Eighth Fallacy: Reason Exists Primarily to Serve Self-interest***

That is partly true. But we know from mirror-neuron research that empathy is physical, that the capacity to put oneself in someone else's shoes is built into our bodies and brains. That capacity is at the center of social life. Social and interpersonal relationships are mainly served by our capacity for real reason.

### ***The Ninth Fallacy: Conceptual Systems Are Monolithic***

It is commonplace for human beings to have different inconsistent value systems in the same brain. For example, consider the Saturday night and Sunday morning value systems. Saturday night (party) and Sunday morning (church) moral systems are very different, yet most people shift readily between them with barely a notice.

The reason is that each value system is realized in neural circuitry, and two contradictory neural circuits inhibit each other, so that the activation of one inactivates the other. When one is turned on, the other is automatically turned off.

A great many Americans have conservative values on some issues and progressive values on others—shifting back and forth in different contexts without notice, unless a contradiction appears that is both very conscious and very troubling. That is called “cognitive dissonance.” It does occur, but it is rare, and it rarely leads to significant change in itself. Pointing out logical contradictions to those with political positions rarely changes those positions.

### ***The Tenth Fallacy: Words Have Fixed Meanings, and Concepts Have Fixed Logics***

We now know that most important concepts can be essentially contested. Concepts may have limited agreed-on central cases that immediately come to mind, but are relatively unimportant. The important cases of contested concepts arise where there are major value differences across people (or even within the same brain). Then, what seems like a single concept named by a single word can vary widely in its meaning, depending on value systems. The effect of a single word, expressing a single simple idea in uncontroversial cases, can be deadly in the controversial cases when opposite meanings of the word are held by populations with different value systems.

The most detailed study of a single important contested concept is my book *Whose Freedom?*, which surveyed the vast differences of meaning in the word “freedom” under conservative and progressive value systems. It matters what freedom means, and the meaning of the concept has triggered a life-and-death struggle, not just in America, but in many parts of the world.

***The Eleventh Fallacy: The Truth Will Set You Free; If Enough People Know the Truth About Social Issues, They Will Change Their Attitudes, to Society’s Benefit***

Actually, worldviews in the form of frames and metaphors are physically realized in the brain so strongly that, when the facts don’t fit the frames, the frames stay and the facts are ignored or disputed or just plain not seen.

Those are among most basic properties of the Enlightenment theory of Reason. There are more, and we will discuss them before long.

The point is straightforward: the Enlightenment theory of Reason is inadequate for the social sciences. The social sciences need to incorporate what the cognitive and brain sciences have shown us about the nature of Reason. Reason itself, as it has been traditionally taught, is—or should be—a major issue in the social sciences. These results will require a rethinking of certain tools defined by old reason: the rational actor model, cost-benefit analysis, polling, and surveys based on old views of language and reason, and so on.

The inadequacies must be made conscious and replaced with an adequate theory of reason and rationality. That is part of the job of an adequate Neural Social Science.

## **Some Brain Basics**

### ***Color***

There is no color in the world—no green in grass, no red in blood, no blue in the sky.

Color is determined by

1. Wavelength reflectances of objects; but wavelengths are not colors
2. Nearby lighting conditions
3. Color cones in the retina
4. Neural circuitry in the brain connecting to retinal color cones

(1) Wavelength reflectances of objects and (2) surrounding lighting conditions are in the external world. (3) The color cones and (4) the neural circuitry are in you—in your body! Without your body, there is no color—no experience of color no color concepts, and no words for color concepts. Colors and color concepts are embodied; they subsist in the relation between you and the external world, not in the external world alone.

### ***Perception and Action***

Perception and action are not different from the brain’s perspective. Perception and action are determined by mirror-neuron systems. Complex actions (like taking a drink) are coordinated—choreographed—by the

premotor cortex, which connects to the motor cortex, which in turn carries out the combinations of simple motor actions (grasping, lifting, opening the elbow, etc.) needed to carry out the “same” complex action like taking a drink: about 30% of these drink-taking premotor neurons also fire when you see someone else taking a drink. The other 70% perform interesting complex correlations between perception and action. The mirror-neuron system allows us to connect with others via empathy, by putting ourselves in the shoes of others. “Super-mirror neurons” in the forebrain do part of the job of distinguishing our actions from those of others (Iacoboni 2008).

### ***That’s Why There Are Basic-Level Concepts***

Basic-level concepts like *chair* and *car* come with motor programs (like driving a car), mental images (of what a chair looks like), and gestalt perception (the ability to perceive a chair or a car as a whole). The existence of basic-level concepts is a consequence of mirror-neuron circuitry, which is the same for perception and action.

### ***That’s Why Verb Roots Are the Same for First- and Third-Person Experiences***

Action is a first-person experience (I drink). Perception is a third-person experience (I see that he drinks). Yet in language after language, the expression of those experiences via verb roots is the same—because the neural basis of the experiences is the same. Sometimes affixes differ—*drinks* versus *drink*. Sometimes the vowel shifts (*run* versus *ran*) with the consonantal root preserved—as with trilateral roots in Semitic languages. And sometimes, there is a historical explanation for root differences (*be* versus *are*).

### ***Imagining and Doing Use the Same Brain Circuitry***

The brain circuitry used when you *actually see* something in the world overlaps considerably with the brain circuitry used when you *imagine* seeing the same thing. The same is true of actually moving your body and imagining moving your body, as when you kick your foot and imagine kicking your foot. The same is true of remembering and doing, dreaming and doing, and speaking and doing. There is a unique portion of brain circuitry for performing specific actions/imagining them/remembering them/dreaming about them/and speaking about them.

That is why, there is an overlap between gestalt perception and mental imagery, both of which are carried out by brain circuitry.

### ***Neural Computation and Simulation***

In 2005, Vittorio Gallese, of the University of Parma Neuroscience Group, and I published “The Brain’s Concepts,” [http://www.google.com/url?sa=t&source=web&cd=1&sqi=2&ved=0CBoQFjAA&url=http%3A%2F%2Finst.eecs.berkeley.edu%2F~cs182%2Fsp07%2Freadings%2FGallese\\_Lakoff.doc&rct=j&q=the%20brain%27s%20concepts&ei=UkTsTZ7QKYy0sAO2suj4DQ&usg=AFQjC](http://www.google.com/url?sa=t&source=web&cd=1&sqi=2&ved=0CBoQFjAA&url=http%3A%2F%2Finst.eecs.berkeley.edu%2F~cs182%2Fsp07%2Freadings%2FGallese_Lakoff.doc&rct=j&q=the%20brain%27s%20concepts&ei=UkTsTZ7QKYy0sAO2suj4DQ&usg=AFQjC)



[NE1RZagC3j\\_yniSL-kJg8a1M-JqSQ&sig2=QDwFIvg4y99tqdNGLimNeQ](#), in which we reviewed the primary data on mirror neurons by Parma researchers. The data had been gathered via neuron-by-neuron probes of macaque monkeys' brains. The macaques were trained to perform discrete tasks—grasping and releasing, pushing buttons, peeling bananas, eating peanuts, etc. Each task made use of between several dozen and several hundred neurons—called a “cluster” or “node.” Each neuron in the node has between 1,000 and 10,000 connections to other neurons along existing pathways. From the perspective of neural computation, each node can be seen as acting like a single, big, complex neural element, with many neural inputs and outputs. Though each neuron, at any instant, fires or does not fire, the node has many neurons firing or not, and hence appears to fire to some degree, as if the *probability* of the firing of individual neurons was the *degree* of firing of a node. Mathematically, in the theory of neural computation, the calculus of Bayesian probability is used to calculate what happens along a neural circuit made up of nodes. According to the Bayesian calculus, changes in activation in a neural circuit leads, via the Bayesian rules of computation, to other activations and inhibitions along the circuits. This permits Bayesian networks to model the “best fit” of certain changes to other changes, and so to model neural learning. Modeling is a theoretical enterprise, and so it is not known at present how well such modeling fits actual neural learning.

## The Centrality of Metaphor in Social Life

The old Enlightenment Reason saw all meaning as literal, as abstract logical reason fitting the external world directly. Social policy studies have largely been based on this now-discredited view. The fact is that a huge area of reason—especially everyday thought about social concerns—is metaphorical. Social policy is often made on the basis of metaphor, which by itself would not discredit the policy if the metaphor is apt, that is, if its entailments fit the social situation.

Always bear in mind that metaphor is a mode of thought. Linguistic expressions that are metaphorical are surface manifestations of metaphorical reasoning that shapes much of our social life. This is the basis of experimental work by Landau, Mark J.; Meier, Brian P.; Keefer, Lucas A., “A metaphor-enriched social cognition.” *Psychological Bulletin*, Vol 136(6), Nov 2010, 1045–1067. Landau and his colleagues have been producing experimental results that support the centrality of metaphor in social life, for example, “Evidence That Self-Relevant Motives and Metaphoric Framing Interact to Influence Political and Social Attitudes,” *Psychological Science* 1, November 2009: 1421–1427.

### *Neural Metaphor*

We now have a neural theory of how metaphorical thought arises and functions—and it is being confirmed experimentally, often by sociologists and social psychologists. Take the metaphor system of Moral Accounting, in which fairness and justice is defined in terms of the metaphor of Well-Being as Wealth. Receiving a favor is like receiving metaphorical money. You say *I owe you one*, *How can I repay you?*, *I'm in your debt*. Returning the favor is Restitution; it is balancing the moral books.

Consider harm—a decrease of well-being. Justice can either be a matter of Restitution, making up for the harm, or Retribution, harm balanced with harm. Revenge is based on the metaphor of Moral Arithmetic: Just as creating a debit is equivalent to removing a credit, so taking away something of value is a form of harm. These forms of moral accounting are central to our social life.

Just as eating pure food leads to satisfaction and eating rotten food leads to disgust, so, via the metaphor of Morality as Purity, immoral behavior is seen as disgusting. These metaphors characterize our emotional reactions to moral and immoral social behavior. And language follows: We speak of an immoral act as a disgusting, or rotten, thing to do. We speak of moral behavior as moral purity.

We metaphorically think of achieving a purpose as reaching a destination—a goal, and purposeful action as motion toward such a destination. Difficulties are conceptualized as things that get in the way of reaching a destination—encountering a roadblock, getting bogged down, being held back, being weighed down. In many cultures, including ours, people are expected to have life goals, with life seen as a journey toward such goals. In our culture, we even have special documents recording our progress on that journey—CVs, “curriculum vitae” (the “course of life”). To get certain jobs, one is expected to have an impressive CV, showing that one has made better than normal progress toward certain life goals. And married couples are expected to have compatible life goals.

These are just a handful of ways in which embodied conceptual metaphors define central aspects of our social lives.

### *The Narayanan-Johnson-Grady Neural Theory of Metaphor*

One of the deepest results in theoretical neural cognition is the Neural Theory of Metaphor. It was arrived at via three interrelated dissertations at UC Berkeley in the mid-1990s by Srinu Narayanan, Christopher Johnson, and Joseph Grady (Lakoff and Johnson 1999). Here is the basic idea.

Our conceptual systems are structured by hundreds of “primary” metaphors, conceptual mappings from one conceptual domain to another that are learned mostly in childhood just by functioning in the everyday world. We are usually not conscious of these metaphors, though we learn hundreds of them.

### **How Are Neural Circuits Learned?**

By “recruitment.”

At birth, our brains are structured to run our bodies, with existing neural pathways. We have 100 billion neurons and trillions of neural connections between them (between 1,000 and 10,000 connections per neuron). At birth, most of these connections are not yet organized into neural circuits that can perform particular functions. Functional circuits are formed when the right kinds of “strengthening” occur at synapses. Synaptic strengthening occurs when the neurons fire during experiences. As Donald Hebb noticed, “Neurons that fire together wire together.” In Hebbian learning, two-way connections are formed slowly, as strengthening gradually occurs over time. Strengthening occurs as neurons fire and get used. Synapses that are unused die off. Between birth and the age of roughly 5, about half of the neural connections we are born with die off—the unused half. That is why, early childhood education is so important. If you do not hear music till the age of 5, you will not become a musician. A huge number of the ideas we use in later life are learned by recruitment due to early experience. Much of that experience is common—sometimes around the world, where More Is Up for everyone;—and sometimes in a society, where wealth may or may not be taken metaphorically as a sign of God’s approval.

## The Feldman Functional Circuitry Hypothesis

Jerome Feldman founded the International Computer Science Institute at UC Berkeley in 1986. I joined with him in setting up the Neural Theory of Language Project at the Institute. I brought with me fellow researchers and basic results of Cognitive Linguistics: the details of such embodied conceptual structures as image-schemas, frames, and conceptual metaphors, with language as the pairing of linguistic form (sounds, signs, gestures, writing, images) with such embodied structures. Feldman brought detailed computational theories of functional circuitry that gave promise of both describing how the cognitive structures got that way and providing a theoretical scientific account of how it all worked. Between us, we recruited a remarkable team of cross-disciplinary researchers: Charles Fillmore (and his whole FrameNet group), Eve Sweetser, Terry Regier, David Bailey, Lokendra Shastri, Srini Narayanan, Dan Jurafsky, Adele Goldberg, Benjamin Bergen, Vittorio Gallese, Lisa Aziz-Zadeh, Nancy Chang, Christopher Johnson, Joseph Grady, Carter Wendelken, Ellen Dodge, Steve Sinha, Joe Makin, Leon Barrett, Mett Gedigan, Behrang Mohit, John Bryant, Jenny Lederer, and others.

Over more than two decades, computational models of functional circuitry have drawn upon well-known computational techniques of PDP connectionism, localist connectionism, Petri nets, Bayes Nets, accounts of neural binding, models of neural modulation, models of basal ganglia, and so on. What has emerged is a sophisticated account of the theoretical–computational neuroscience of thought and language, based on the idea of functional circuitry unified with cognitive linguistics.

These ideas are surveyed in Feldman’s MIT Press book *From Molecules to Metaphors*. The general point is that the brain functions according to simple computational structures defined over functional brain circuitry—and that is how all of thought and language works!

The details give rise to a theory of Neural Social Science—how meaningful social ideas arise in various cultures, providing a theory of significant cross-social similarities and differences.

### Primary Metaphors

Primary metaphors are learned via synaptic strengthening of synapses in functional circuits. Consider the conceptual metaphor *More Is Up*.

Whenever a child sees a liquid poured into a container or things put in a pile, his or her brain “notices.” Two areas of the brain are activated, one registering an increase in quantity and the other registering an increase in verticality.

Each time these areas are activated together, the neural synapses in both areas are strengthened. Because the neuronal groups are connected, neuron by neuron, each to thousands of other neurons, activation spreads along existing pathways, getting stronger each time the pairing of quantity and verticality occurs.

The spreading of increasingly stronger activation keeps on until a common pathway is found and the activations meet. The synapses along this pathway then get doubly strengthened from activation in both directions, until a permanent circuit is formed. That circuit is the physical realization of the *More Is Up* metaphor.

### Narayanan on Spike-Time-Dependent Plasticity

The Hebbian learning account is a central part of the story, but not enough. Hebbian learning is bidirectional. But conceptual metaphors are unidirectional. We understand Affection as Warmth, not Warmth as Affection. Moreover, the subject matter of a metaphorical idea (e.g., Morality) can

provide some activation of the range of metaphorical understandings of that concept: Morality can be Purity, Uprightness, Light, Obedience, Nurturance, Balancing Moral Books, and so on.

Moreover, primary metaphors—the irreducible ones—are all embodied: they link two brain areas with bodily connections. How can we make sense of this? Why *must* it be true? And why are the primary metaphors most likely to be the ones found all over the world, in culture after culture? Why should children know them early in life? And how can they be learned, in many cases, *even before language!*

Here is the intuitive idea.

Because the brain computes Verticality constantly, more than it computes Quantity, the synapses in the direction spreading from Verticality will be stronger than those spreading from Quantity. Since the neural circuit is formed by spreading in both directions, there will exist, at each point on the pathway, cases where the axon of neuron A forms synapses on neuron B, and conversely, where the axons of neuron B forms synapses on neuron A.

This situation gives rise to a phenomenon called “spike-time-dependent plasticity.” Neurons “fire” in a series of “spikes.” The neuron with the strongest input will spike first, and as a result, there will be synaptic strengthening in its direction and weakening in the opposite direction. This produces directionality in the metaphor. The stronger activation will define the source domain, the weaker will define the target domain. That is why metaphorical mappings are asymmetric. This correctly predicts the directionality of primary metaphors. For example, in *More Is Up*, Verticality is the source domain because the brain is always computing Verticality, even when we are asleep, but not always computing the concept of Quantity. In *Affection is Warmth*, Temperature is the source domain because the brain is always computing Temperature, but not always computing Affection. Thus, there is a neural explanation for the system of primary metaphors—the scaffolding on which our social concepts are built.

## Neuromodulators and “Rewards”

Neuromodulators are chemicals, like dopamine, norepinephrine, acetylcholine, etc. that can powerfully change synaptic strengths, both positively and negatively, in a very short time. These constitute what is called the “reward system” of the brain. They play subtle roles in setting goals, changing attention, and producing emotional satisfaction and dissatisfaction. They are therefore central to decision-making. Decisions in the brain are made on the basis of vast numbers of neural circuits of the sort we have been discussing, for frames, metaphors, and so on.

## Integrating Multiple Neural Systems

Contemporary research on real reason takes all of this, and much more, into account. Everything we understand uses frames, metaphors, and narratives that are characterized by neural circuitry, which in turn gets its meaning via embodiment. The circuits, as we currently understand them, have “gates”—points where they can be inhibited (turned off) or activated (turned on). The brain also has “binding circuitry” which, when turned on in context, can identify a concept in one circuit as being the “same” as that in another circuit. For example, a restaurant frame-circuit is composed of other frame-circuits: business, eating, and hosting. The customer in the business frame-circuit is neurally bound to the eater in the eating frame-circuit and to the guest in the hosting frame-circuit. When the binding circuitry is turned off, the frames for business, eating, and hosting can operate independently. Gating and binding allow for enormous compositionality of frame-circuits. And it allows for imagination and fictional entities, like flying pigs—where wing frame-circuits are neurally bound to the sides of the body of a pig in a pig frame-circuit.

The embodied brain keeps us connected to the world and each other, via all the embodied neural systems that we have. Mirror-neuron systems connect us to each other. Canonical neural systems connect our most normal actions to our perceptions of the world. Emotional systems characterize our goals and avoidances. Speech, hearing, reading, and gesture systems give meaning to communication. Temperature systems regulate the body. And association cortex links all these up in billions of complex ways.

## Embodiment Evidence in Social Psychology

Over the past couple of decades, experimental social psychologists have provided massive evidence not only for the existence of fixed metaphorical brain circuits, but also for their effects on producing and understanding social behavior.

Here are a few examples:

A recent study in *Biological Psychology* showed that that when subjects leaned forward, the body posture activated desire. The metaphor activated is Achieving a Purpose (Desire) Is Reaching a Destination. Leaning forward activates motion to a destination, which is the source domain of the metaphor and which in turn activates the target domain of desire and purpose.

Eddie Harmon-Jones, Philip A. Gable, Tom F. Price. "Leaning embodies desire: Evidence that leaning forward increases relative left frontal cortical activation to appetitive stimuli." *Biological Psychology* 87 (2011) 311–313.

At Yale, researchers found that subjects holding warm coffee in advance were more likely to evaluate an imaginary individual as warm and friendly than those holding cold coffee. This is predicted by the conceptual metaphor that Affection is Warmth, as in *She gave me a warm greeting*.

Williams, L. E., & Bargh, J. A. "Experiencing physical warmth influences interpersonal warmth." *Science*, 322, 2008, 606–607.

At Toronto, subjects were asked to remember a time when they were either socially accepted or socially snubbed. Those with warm memories of acceptance judged the room to be 5° warmer on the average than those who remembered being coldly snubbed. Another effect of Affection Is Warmth.

Zhong, C. B., & Leonardelli, G. J. "Cold and lonely: Does social exclusion feel literally cold?" *Psychological Science*, 19, 2008, 838–842.

Subjects asked to think about a moral transgression like adultery or cheating on a test were more likely to request an antiseptic cloth after the experiment than those who had thought about good deeds. The well-known conceptual metaphor *Morality is Purity* predicts this behavior.

Zhong, C. B., & Liljenquist, K. (2006). Washing away your sins: Threatened morality and physical cleansing. *Science*, 313, 1451–1452.

Students told that that a particular book was important judged it to be physically heavier than a book that they were told was unimportant. The conceptual metaphor is *Important is Heavy*.

In a parallel study with heavy versus light clipboards, those with the heavy clipboards were more likely like to judge currency to be more valuable and their opinions and their leaders more important.

Nils B. Jostmann, Daniel Lakens, and Thomas W. Schubert. "Weight as an Embodiment of Importance," *Psychological Science*, September 1, 2009: 1169–1174.

Why does this happen? Because such conceptual metaphors are permanent physical circuits in the brain. In each case, the metaphor circuit is activated—turned on—by the context of the experiment, which in turn activates circuitry making the given behavior more likely. In short, we really do live by metaphor.

Imagine thinking about problems in your long-term love life. It would be normal for the Love As A Journey Metaphor to be activated, leading to thinking in terms of love-relationship goals in terms of long bumpy roads, going in different directions, things standing in the way, and so on.

Love as a Journey is a special case of a Journey metaphor, with long-term goals as destinations to be reached, say, by working out God's Plan for you. It is also one of many Love metaphors: Love can be conceptualized as a source of Light and Heat ("Juliet is the Sun"), as sacrifice (see Abraham and Isaac with respect to love of God, as well as military sacrifice for love of country), and so on.

Metaphors are not mere linguistic expressions. They are complex modes of thought, with systems of primary metaphors arising naturally just by living in the everyday world, based on systems of frames that also arise naturally just by living in the world.

## Real Social and Political Life

The science behind Neural Social Science is sufficiently well understood to be taken very, very seriously. And that science allows us insights into our social and political life that were not available before (Lakoff 2009).

The individual issues are all too real: assaults on unions, public employees, women's rights, immigrants, the environment, health care, voting rights, food safety, pensions, prenatal care, science, public broadcasting, and on and on.

Budget deficits are a ruse, as we've seen in Wisconsin, where the Governor turned a surplus into a deficit by providing corporate tax breaks, and then used the deficit as a ploy to break the unions, not just in Wisconsin, but seeking to be the first domino in a nationwide conservative movement.

Deficits can be addressed by raising revenue, plugging tax loopholes, putting people to work, and developing the economy long-term in all the ways the President has discussed. But deficits are not what really matters to conservatives.

Conservatives really want to change the basis of American life, to make America run according to the conservative moral worldview in all areas of life.

In the 2008 campaign, candidate Obama accurately described the basis of American democracy: Empathy—citizens caring for each other, both social and personal responsibility—acting on that care, and an ethic of excellence. From these, our freedoms and our way of life follow, as does the role of government: to protect and empower everyone equally. Protection includes safety, health, the environment, pensions, and empowerment starts with education and infrastructure. No one can be free without these, and without a commitment to care and act on that care by one's fellow citizens.

The conservative worldview rejects all of that.

Conservatives believe in *individual* responsibility alone, not social responsibility. They don't think government should help its citizens. That is, they don't think citizens *should* help each other. The part of government they want to cut is not the military (we have 174 bases around the world), not government subsidies to corporations, not the aspect of government that fits their worldview. They want to cut the part that helps people. Why? Because that violates individual responsibility.

But where does that view of individual responsibility alone come from?

The way to understand the conservative moral system is to consider a strict father family. The father is The Decider, the ultimate moral authority in the family. His authority must not be challenged. His job is to protect the family, to support the family (by winning competitions in the marketplace), and to teach his kids right from wrong by disciplining them physically when they do wrong. The use of force is necessary and required. Only then will children develop the internal discipline to become moral beings. And only with such discipline will they be able to prosper. And what of people who are not prosperous? They don't have discipline, and without discipline they

cannot be moral, so they deserve their poverty. The good people are hence the prosperous people. Helping others takes away their discipline, and hence makes them both unable to prosper on their own and function morally.

The market itself is seen in this way. The slogan, “Let the market decide” assumes the market itself is The Decider. The market is seen as both natural (since it is assumed that people naturally seek their self-interest) and moral (if everyone seeks their own profit, the profit of all will be maximized by the invisible hand). As the ultimate moral authority in economics, there should be no power higher than the market that might go against market values. Thus, the government can spend money to protect the market and promote market values, but should not rule over it either through (1) regulation, (2) taxation, (3) unions and worker rights, (4) environmental protection or food safety laws, and (5) tort cases. Moreover, government should not do public service. The market has service industries for that. Thus, it would be wrong for the government to provide health care, education, public broadcasting, public parks, and so on. The very idea of these things is at odds with the strict-father conservative moral system. No one should be paying for anyone else. It is individual responsibility in all arenas. Taxation from this perspective is thus seen as taking money away from those who have earned it and giving it to people who don’t deserve it. Taxation cannot be seen as providing the necessities of life, a civilized society, and as necessary for business to prosper.

In the conservative ideal of family life, the strict father rules. Fathers and husbands should have control over reproduction; hence, parental and spousal notification laws and opposition to abortion. In conservative religion, God is seen as the strict father, the Lord, who rewards and punishes according to individual responsibility in following his Biblical word.

Above all, the authority of conservatism itself must be maintained. The country should be ruled by conservative values, and progressive values are seen as immoral and evil. Science should *not* have authority over the market, and so the science of global warming and evolution must be denied. Facts that are inconsistent with the authority of conservatism must be ignored or denied or explained away. To protect and extend conservative values themselves, the devil’s own means can be used against conservatism’s immoral enemies, whether lies, intimidation, torture, or even death, say, for women’s doctors.

Freedom is defined as being your own strict father—with individual not social responsibility, and without any government authority telling you what you can and cannot do. To defend that freedom as an individual, you will of course need a gun.

This is the America that conservatives really want. Budget deficits are convenient ruses for destroying American democracy and replacing it with conservative rule in all areas of life.

What is saddest of all is to see Democrats helping them. Democrats often help conservatives when they use Enlightenment reason—when they take concepts and words as neutral, and when they ignore the centrality of framing, metaphor, emotion, and narrative. This leads Democrats to use conservative language and the frames and values that come with it.

Democrats help radical conservatives by accepting the deficit frame and arguing about what to cut. Even arguing against specific “cuts” is working within the conservative frame. What is the alternative? Pointing out what conservatives really want. Point out that there is plenty of money in America, and in Wisconsin. It is at the top. The disparity in financial assets is un-American—the top 1% has more financial assets than the bottom 95%. Middle class wages have been flat for 30 years, while the wealth has floated to the top. This fits the conservative way of life, but not the American way of life.

Democrats help conservatives by not shouting out loud over and over that it was conservative values that caused the global economic collapse: lack of regulation and a greed-is-good ethic.

Democrats also help conservatives by what a friend has called Democratic Communication Disorder. Republican conservatives have constructed a vast and effective communication system, with think tanks, framing experts, training institutes, a system of trained speakers, vast holdings of media, and booking agents. Eighty percent of the talking heads on TV are conservatives. Talk matters because

language heard over and over changes brains. Democrats have not built the communication system they need, and many are relatively clueless about how to frame their deepest values and complex truths.

And Democrats help conservatives when they function as policy wonks—talking policy without communicating the moral values behind the policies. They help conservatives when they neglect to remind us that pensions are deferred payments for work done. “Benefits” are pay for work, not a handout. Pensions and benefits are arranged by contract. If there is not enough money for them, it is because the contracted funds have been taken by conservative officials and given to wealthy people and corporations instead of to the people who have earned them.

Democrats help conservatives when they use conservative words like “entitlements” instead of “earnings,” when they speak of government as providing “services” instead of “necessities,” and when they fail to point out how government contributes massively to corporate profits, which is why progressive taxation is justified.

## The Conservative Advantage

Radical Republicans have their act down cold.

- They have a general conservative moral frame with language that fits all issues and that is repeated constantly.
- They have a communication system that operates all day every day in every city.
- The common conservative moral frame, when heard day after day no matter what the issue, activates that frame in listeners’ heads, making the frame stronger. The constant repetition strengthens the conservative moral system in the brains of biconceptual (or so-called “independent”) voters and weakens the progressive system in their brains. Even impoverished conservatives adopt and stick to that frame, because it comes to characterize their identity, and promises that everyone can be their own strict parent in their own domain, no matter how poor. It promises the conservative version of freedom.

The result is that in any contested districts, radical conservatives have an advantage because they can put pressure—linguistic pressure—on their office holders and candidates.

## What Can Progressives and Democrats Do?

First, be rational: adopt real reason. Just stating the facts and arguing logically about policy is not enough. Progressives and Democrats do have a general moral worldview:

Democracy is about empathy (citizens care about each other) and social as well as personal responsibility (to act on that care). Government has the moral mission of protecting and empowering all citizens equally.

These ideas can be applied to any issue. General language can be created for these ideas. They need to be stated positively over and over. And Progressives need to set up a communications network—with training institutes, and lists of volunteer speakers ready to go on every subject.

There is a reason why social scientists tend to be Democrats and Progressives—because the democratic vision of the good society that defines social science is exactly the moral worldview of Progressives and Democrats just discussed.

As important as it is to be positive, it is also important to call radical conservatives what they are—radical—and what their moral philosophy is—greed, for power in politics, for money in business, and for domination in social and religious life.



And remember to point out that government is not just carried out by the state. Corporations govern us just as much—for their profit, not for our benefit. Corporations determine the health care we can get, the news we can hear, the form of energy we are dependent on, the nutritive value of the food available to us, and so much more. Making government “smaller” does not eliminate government. It just moves government to the private sector, enabling corporations to govern us for their profit, not for our benefit.

## Systems Thinking

Progressives and Democrats also need to add a crucial idea: systems thinking. In politics, the environment, and economics, systems prevail. Causation is not limited to a single category. Causation is systemic, not direct.

A well-functioning system is homeostatic, self-correcting.

Systems have feedback, both positive and negative. Feedback can be controllable, but can become uncontrollable and catastrophic, as in global warming and global financial crisis.

Systemic causes are not linear: small causes can have huge effects.

Systemic causes are not local: causes can have effects over very long distances.

Systemic causation is not limited to single categories. The problem of the deficit is not just about the deficit, but about all aspects of the economy.

Conservatism tends to use direct, not systemic, causation, and so it is vital for the public to hear about systemic causation all day, every day.

## The Point

Neural Social Science is not just another approach to social science. Instead, it both gets to the heart of the values that define what the social sciences are about and it allows one to defend those values.

Remember that neural social science comes out of real science—the brain and cognitive sciences. It is a way that science can actually do a huge amount to get us out of the current conservative threat and to heal the world. But it has to be taken seriously by social scientists, despite all current academic institutional arrangements.

## CODA

### *Solving a Social Science Puzzle*

In 2009, when President Barack Obama chose the policy provisions for his health care plan, polls showed that most provisions (e.g., no preconditions, choice of plans) were supported by 60–80% of Americans. Yet, when the whole plan was polled, fewer than 50% supported it. Why? Why the disparity between the parts and the whole, when the whole literally equals the sum of the parts?

The answer is straightforward from the perspective of real reason. When President Obama came out with the provisions of his health care plan in early 2009, the conservatives decided to attack it not on policy grounds but on moral grounds. They chose two areas of morality: Freedom (“government takeover”) and Life (“death panels”). And they repeated over and over that “Obamacare”

(naming matters) was a government takeover that was a threat to individual freedom, with death panels that were a threat to life itself.

Note that the policy provisions were about the everyday details of dealing with one's HMO. They were in the Practical Health Care Details frame. The conservative attack was in the Morality frame, activating freedom and life. The conservatives understood that all politics is moral, that political leaders all say they are doing what is right, not what is wrong.

*The policy details and the moral attack were in different frames, located in different parts of the brain.* From the perspective of real reason, the whole health care act was, for those with a conservative worldview, not equal to the sum of its policy parts. Conservatives and independents (actually biconceptuals, who are progressive in some respects and conservative in others) had their conservative moral worldview activated by the conservative moral attack. This separated the moral whole from the practical parts.

For progressives, their morality and the practical details fit together; for conservatives and biconceptuals (aka "independents"), they were different subject matters.

Such an explanation is natural when you think in terms of the brain and frame-circuitry. It is not possible when you think in terms of the logic of Enlightenment reason, where the whole is necessarily (logically) the sum of the policy parts.

## References

- DeHaene, S. (2009). *Reading in the brain*. New York: Penguin Viking.
- Feldman, J. (2008). *From molecule to metaphor*. Cambridge, MA: MIT Press.
- Iacoboni, M. (2008). *Mirroring people* (p. 202). New York: Farrar, Straus, and Giroux.
- Lakoff, G. (2009). Chapter 4: The Brain's Role in Political Ideologies. In *The Political Mind*. New York: Penguin.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh*. New York: Basic Books.