# Critical Neurophilosophy & Indigenous Wisdom

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SENSE PUBLISHERS
ROTTERDAM/BOSTON/TAIPEI

A C.I.P. record for this book is available from the Library of Congress.

ISBN: 978-94-6091-108-8 (paperback)
ISBN: 978-94-6091-109-5 (hardback)
ISBN: 978-94-6091-110-1 (e-book)

Published by: Sense Publishers,
P.O. Box 21858,
3001 AW Rotterdam
The Netherlands
http://www.sensepublishers.com

*Printed on acid-free paper*

*Cover image: The hoop dancer, juggling the great Lakota virtues, was painted by Richard Red Owl, a member of the Oglgla Sioux Tribe. He was born on the Pine Ridge Indian Reservation in 1940. The painting was commissioned by Four Arrows.*

# CONTENTS

# WHY A BOOK SUCH AS THIS?

*BRAIN, n. An apparatus with which we think that we think.*
*MIND, n. A mysterious form of matter secreted by the brain.*
*Its chief activity consists in the endeavor to ascertain its own nature, the futility of the attempt being due to the fact that it has nothing but itself to know itself with.*

*(From Ambrose B ierce's The Devil's Dictionary)*

## THE CREDIBILITY OF NEUROSCIENCE

In a May 12, 2008 interview on C-Span radio, futurist Paul Saffo predicted that the world is on the cusp of a technological revolution as relates to neuroscience (brain research). He joked that one can tell when a new scientific revolution is underway because people start writing books about how the new ideas can bring about such global improvements as world peace. He added, however, that such ambitions are soon replaced with books about financially profitable industrial applications, such as using functional magnetic resonance imaging machines (fMRI) to verify marketing strategies or to replace conventional lie detectors.

Admittedly, this book is in the "world peace" camp as far as neuroscience textbooks go. However, as Bierce's definitions above imply, the authors are cautious about any grand expectations for the new brain research technologies. This book contends, in fact, that we must utilize these technologies in concert with a more organic grounding. Without such a grounding, Western neuroscientists and the philosophers who attempt to make sense of their "objective" findings may lead us further away from, not closer to, the truth about what humans can do to live in harmony on this planet.

There are about 100 billion neurons in the human brain and each is connected to thousands of others. Most behaviours, beliefs and emotions engage multiple parts of the brain and the variety of possible interactions with memory, culture and DNA is unfathomable. To expect relatively new brain imaging technologies and the interpretations of human beings to explain why we behave as we do and how we can do better is to place too much confidence in technology and Western science. The authors of this text are not the first, however, to express this concern. More than twenty years ago the well known Harvard researcher, Howard Gardner, was among the first to be critical of brain research and its conclusions. In his book, *Art, Mind and the Brain*, he says "The packaging of current research on the human brain threatens to tell us more about academic huckstering than about neurological

function (2004, p. 278).” Although I am personally familiar with Dr. Gardner’s skeptical disposition (See his counter-position against my stand for arts- based dissertations in my book, *The Authentic Dissertation: Alternative ways of knowing, research and representation*), I agree with his early warning about this subject and research supports it as well. A study conducted by neuroethicists at Stanford University in 2005 found that of 132 reports on brain research published in the daily press and in scientific journals, 79 percent were optimistic, 16 percent were balanced and only 5 percent were critical. After reporting on this study in the article, “Of Two Minds” for *Haaretz Magazine*, Illani and Feldman continue:

> Many scientists are taking issue with the rising dominance of brain sciences within the study of the human mind and human behavior. Psychologists, philosophers and even a large number of brain researchers maintain that many of the studies that are attracting public interest are scientifically untenable, rely on as-yet-unproven technologies, or simply show the obvious after appalling financial investments. Others argue that the studies are unethical and subject to commercial manipulation (Ilani & Feldman, 2008).

David McCabe, an assistant professor in the Department of Psychology at Colorado State, and his colleague Alan Castel, an assistant professor at University of California-Los Angeles, found that simply by attaching an image of a brain indicating patterns of activity, they were able to increase the likelihood that research subjects would believe an assertion, regardless of whether the article described a fictitious, implausible finding or realistic research (Colorado State University, 2007). Although this reveals a lack of critical thinking skills perhaps as well as an overconfidence in technology, this kind of response to neuropsychological research provides both a reason for this text as well as a call to consider its message critically.

There are also the technological limitations mentioned earlier. Technologies, such as fMRI and positron emission tomography (PET), that the neurosciences are relying on, are still in their infancy. For example, the best spatial resolution they can achieve is around 1mm, which leaves much of the activity of the brain unexplored. Time-span is also not short enough to “see” all the activity that may be taking place in response to a stimulus. Of course, there is also the possibility that there may be important aspects of consciousness and decision making that cannot be measured because it has nothing to do with physical aspects of the brain. (See, for example, the work relating to “outside agency” in Daniel Wegner’s 2002 book, *The Illusion of Conscious Will*.)

Even with these concerns, however, social neurosciences still have a significant contribution to make if only to stimulate reflection on human behaviour in new ways. For example, in their article for *Science Communication*, “Brain Imaging: A Decade of Coverage in the Print Media,” the authors conclude that “neuroscience provides an ideal model for exploring science communication and ethics in a multicultural context (Racine, Bar-Ilan, Illes, 2006, p. 122).” Similarly, in a special edition of the journal entitled *Current Directions in Psychological Science*, Peter Hagoort provides evidence of (possible) contributions from fMRI measurements to

our understanding of the functional architecture of language processing (2008) and John O'Doherty and Peter Bossaerts provide several examples of how functional neuroimaging data have helped to shape and inform theories of decision making over and above results available from traditional behavioral measures (2008).

In the introduction of their edited text, *Social Neuroscience: Integrating Biological and Psychological Explanations of Social Behavior*, Eddie Harmon-Jones and Piotr Winkielman go so far as to say this kind of research may be indispensable:

> So, to summarize the benefits, good social neuroscience research integrates the theory and methods of neuroscience and social psychology to derive novel psychological hypotheses. It then tests these hypotheses using a multidisciplinary set of methods, including the behavioral measures of social psychology and the "wetter" measures of neuroscience. It goes beyond using new methods to measure existing constructs; it incorporates ideas from other domains to better understand a problem in another domain. In the end, both parent fields are benefited-theoretically, practically and methodologically. Given these benefits, it seems that the potential of social neuroscience for addressing questions about psychological mechanisms will make it indispensable to the field (2007, p. 6–7).

## NEUROPHILOSOPHY

In an effort to consider interpretations and possible applications of neuroscientific research conclusions, a number of scholars have emerged as "neurophilosophers." These individuals are posing such questions as:

- Is deception a mainstay evolutionary survival mechanism in human beings?
- What ways can we prevent harmful prejudice in light of research on bias that exists below awareness and does not rely on conscious deliberation (Amodio et al, 2004)?
- What are the implications that relate to the prevention of war or of prejudice (See Plant, 1998)?
- What is the biological and spiritual basis for social trust and how can social experiences be healing and restorative (see Carter, 2007)?
- What can neuropsychological studies tell us about the mind-body-spirit connection (Harmon-Jones, 2007, p. 6)?

Neurophilosophy attempts to make practical sense of the technical research that is changing views about such things as perception, belief-formation, and consciousness (Mandik & Brook, 2005, p. 1). It engages many of the disciplines that describe various approaches to cognitive and social behavior that neuroscience embraces, such as neuropsychology, cognitive neuroscience, affective neuroscience, social psychophysiology and social neuroscience. All of these involve the study of the relationships between brain functions and behaviors, such as arousal, attention, consciousness, decision making, language, learning, memory, sensory perception, bias, deception, planning, problem solving, social interaction and cognition, response

to cultural influences, etc. Most of these disciplines depend upon advanced technologies, such as functional magnetic resonance imaging and positron emission tomography.

In this book we refer to neurophilosophy as an umbrella term that covers other related disciplines that try to help guide human behaviours for the best. One of these is "neuroeconomics." This is a relatively new transdisciplinary field of research that emerged from bioeconomics which uses evolutionary biology to build models that predict human behavior (Zak 2002). It uses neuroscientific measurement techniques to identify neural substrates associated with economic choices, economics being defined by any evaluation of alternatives whereby individuals make choices according to some sense of reward or punishment. One of the most important researchers in this field is Paul J. Zak from the Center for Neuroeconomics Studies at Claremont Graduate University. Our first chapter on generosity relies heavily on research from this arena.

There is also a concentration in neuroeconomics that the late Margaret Gruter of the Gruter Institue for Law and Behavioral research calls, "neurojurisprudence." It looks at the usefulness of laws and punishments to determine the impact of legal punishment on the perpetration of crime. This field's focus on empathy and trust tend, as will be seen, to be supportive of Indigenous wisdom while at the same time are vulnerable to the kind of criticisms mentioned above. For example, Western researchers in this field make assumptions when describing their experiments that presume that humans have a strong sense of ownership (Camerer 2003). As will be seen, this may be a feature of Western cultures but not of Indigenous ones. Another arena under this category is "neuroethics." It studies what parts of the brain are activated as relates to behaviors that are universally considered to be wrong or right.

Neuroanthropology," which has a collaborative blog headquartered in the departments of Anthropology at Macquarie University (Sydney, Australia) and the University of Notre Dame (South Bend, USA) has this to say about its goals:

> We hope to bring together scholars from around the world interested in the implications of new findings in the brain sciences for social, cultural, and psychological theory in anthropology… With links to social, cultural, and psychological anthropology, neuroanthropology also brings a critical perspective on how biological ideas are often used to essentialize and naturalize what are largely sociocultural processes (http://anthropology.net, accessed July 22, 2008)

"Neuroreligion" also has its own blogs. Those who study in this arena are looking at what happens to our brains when we conceive in one way or the other about the concept of God. Monastersky (2006) writes in the *Chronicle of Higher Education*:

> Wander down the halls of some neurobiology departments these days and you may catch a few decidedly nonscientific terms floating by in conversations there. Researchers reared in the hard materialism of Western science may well be chatting about Franciscan nuns, the Dalai Lama, the soul, or enduring happiness. These scholars are part of a small but growing group of metaphysically minded investigators exploring the connections between the

> brain and spirituality. Some of them are treating religion as just another object to put under the microscope – or inside a brain scanner. But others are breaking the bounds of accepted scientific tradition, raising taboo topics such as whether the mind exists beyond the body or whether basic scientific knowledge must be linked to human values (p. A 14).

All of these expanding fields of study surrounding neuroscience relate to the early history of neuropsychology which began during the 1950s when social norms against overt racial prejudice emerged. "Being wary that participants' concerns over these norms might threaten the veracity of their self-reported racial attitudes, researchers turned to biological measures that might be resistant to overt control efforts" (Harmon-Jones, 2007, p. 4). This wariness included challenges to psychology and philosophy, whereby the new scientists refuted the idea that one could know anything true by merely self-reflecting. (According to Indigenous wisdom, self-reflection is, under certain conditions, the best source for understanding reality, as will be seen.)

In 1956, Wilfred Sellars replaced an emphasis on introspection with the theory that people develop a common sense "theory of mind" by observing dispositions and behaviors until a sense of consistency leads to predictability, or perceived predictability of others. This became known as "folk psychology" and the idea that it is a theory has become known as "theory-theory" (Morton 1980). Folk psychology, however, will not always coincide with neuroscientific explanations and therefore a number of scholars like Churchland (1981) have completely dismissed folk psychology, claiming neuroscience as "the proper scientific approach to the mind and arguing that folk psychology will not fit with mature neuroscience; as a result, the folk ontology should be rejected in favor of a neuroscientific ontology (Nichols 2002). This outright dismissal of folk psychology or common sense as a valid theory of mind is referred to as "eliminative materialism."

We mention these debates about how we might understand human nature, beliefs, behaviors, etc. and make predictions based upon some theory of mind to introduce the concept of "Indigenous Wisdom" and bring it into the discussion. Lehrer reminds us that "Neuroscience is a reductionist science (2008). If it is, then Indigenous wisdom stands at the other end of the scale. Therefore, it may be vital to have a collaboration between neuroscience and a holistic, inductive way of seeing the world if we are to successfully transform human social systems so they can be sustainable in the future. Indigenous worldviews offer this opportunity and the remainder of this Introduction attempts to be sufficiently convincing in the centuries-old effort to bring forth this ancient wisdom that still lives, however, ignored, throughout the world.

## INDIGENOUS WISDOM

Indigenous Wisdom is not folk psychology, although intuition, self-reflection (especially as relates to experience with both the visible and invisible worlds), meta-cognition, self-reflection and observation of human nature have certainly contributed to it. It is the product of careful and methodologically sound observations

of the natural world (which includes humans). It has been tested and re-tested for thousands of years in the most rigorous real-life laboratories for survival and well-being. Indigenous Peoples, meaning those cultures who themselves or the ancestors have, by inhabiting a location for thousands of years and retaining ancient ways of understanding it, produced a "theory of mind" that is every bit as scientific as modern ideas, especially as relate to predicting outcomes, perhaps more so. This is not only true as relates to the many inventions and contributions that relate to food development, storage and preparation; herbal-based medicines; forms of clothing and transportation; astronomy; sustainable practices, etc., but also relates to contributions to democratic government concepts; child discipline; and inter-personal relationship psychology. Indigenous wisdom about world history may also be as scientifically based as any modern theories. In her article, "A Scientific Spiritual Philosophy," renowned theosophist, Blair A. Moffett, wrote:

> Indigenous wisdom is neither utilized nor thoroughly appreciated (1975). The ancient American perspective of our past is manifestly grander and more logically appealing than any we ourselves have so far conceived. It is also thoroughly evolutionary, hence scientific. The Indian at the same time likewise had a strong conviction of the absolute necessity for right living and right action as the key to successful human progress in harmony with surrounding nature. His profoundly spiritual conceptions of life, the universe, and his relations to them are demonstrated again and again in his philosophy and culture. Only in certain few expressions such as the Aztec culture, which had degenerated into a bloody perversion of the earlier, pure emphasis on a life of self-sacrifice for the good of the race and the world, is this spiritual outlook lacking. We have good reason to believe that the primeval American wise men knew that these serial humanities represented no more than facets in time and space – phases – of an immensely rich and complex evolution of the consciousnesses composing the solar universe. We, trying to comprehend their vision solely with our minds or intellects, all too often see but its shell and remain baffled by the terse, elliptical symbolism they used to record their cosmic insights. The Indian accounts can in fact be studied successfully only by means of our intuitions and awakened spiritual vision. It is not too much to say that until these faculties are brought by us into more active use generally, the theosophy formulated and lived by these remarkable peoples through long epochs can be neither fully.

Many scholars and philosophers have noted the tragedy of dismissing Indigenous wisdom and Indigenous science as it relates to contemporary affairs. For example, Niaz Ahmed Khan, a professor at Dhaka University in Bangladesh and an honorary research fellow at the Centre for Development Studies at the University of Wales, UK recently compiled and collated academic studies on indigenous knowledge and was able to identify and record only seventy seven peer-reviewed articles/book chapters. In an editorial he refers to this figure and laments that such wisdom remains a generally ignored subject (2008). Edgar Mitchel, Apollo astronaut and found of the Institute of Noetic Sciences has said that "only a handful of visionaries

have recognized that indigenous wisdom can aid the transition to a sustainable world." (amazon.com reviews at http://www.amazon.com/ Shapeshifting-Techniques - Global-Personal-Transformation/dp/0892816635).

As for the topic of "world peace," Indigenous wisdom has also been suppressed, even misrepresented. In Four Arrows' text, *Unlearning the Language of Conquest: Scholars Expose Anti-Indianism in America (2006)*, contributing author, James DeMeo, wrote the chapter, "Peaceful Versus Warlike Societies in Pre-Columbian America: What do Archeology and Anthropology Tell Us?" It challenges the conclusions of such popular books as *Constant Battles: The Myth of the Peaceful Nobel Savage*, written by Professors Steven LaBlank and Kathyrn Register or *Wild in the Woods: The Myth of the Peaceful Eco-Savage* by Robert Whelan, with its chapter titles like "Dances with Garbage." All one needs to do is study Yale's Human Resource Area Files, an internationally recognized organization in the field of cultural anthropology founded in 1949 to facilitate worldwide comparative studies of human behaviour, to see that most human societies prior to the rise of monarchies in the West were relatively peaceful and did not practice war as we understand it today. The remarkable research of Johan M.G. van der Dennen, published in her doctoral thesis and subsequent book, *The Origin of War: The Evolution of a Male-Coalitional Reproductive Strategy* (1995) also supports the idea that Indigenous Wisdom can help re-member ways of living in harmony that can lead to peaceful co-existence.

> Peaceable preindustrial (preliterate, primitive, etc.) societies constitute a nuisance to most theories of warfare and they are, with few exceptions, either denied or 'explained away.' In this contribution I shall argue that the claim of universal human belligerence is grossly exaggerated; and that those students who have been developing theories of **war**, proceeding from the premise that peace is the 'normal' situation, have not been starry-eyed utopians…(p. 2).

She goes on to offer evidence the shows all war is a deliberate and seemingly rational political strategy, based on perceived cost/benefit considerations and ethical judgments by those in power. She describes the complexities that may have led Indigenous people to develop social mores that actually limit rather than promote violence. For example, she refers to Plains Indians' emphasis on individual feats of bravery such as a counting coup or stealing horses were far more important objectives than killing an enemy. She offers a comprehensive literature review of both biological and cultural theories of war, including many references that establish that primitive societies placed a great emphasis on healthy reciprocity as opposed to competition. For example, Leavitt's research found war absent or rare in 73% of hunting and gathering societies and it nearly half of those employing agriculture of some form (1977).

Although we have been talking about reclaiming our Indigenous Science and remaining critical of an over-reliance on Western Science, keep in mind that this book partners the two approaches in a complementary dialogue that intends to better understand how humans can regain our ability to live in harmony on Mother Earth.

This partnership is discussed by Dr. Elisabet Sahtouris, an evolution biologist, futurist, author, consultant and speaker who did her post-doctoral work at the American Museum of Natural History in New York, taught at the University of Massachusetts and M.I.T., was a science writer for the HORIZON/ NOVA TV series, and co-founded the Worldwide Indigenous Science Network because she was "convinced that the knowledge indigenous people have about living in balance with other living systems is critical to our own species' survival" (http://www.ratical.org/LifeWeb/Articles/survival.txt).

In her presentations about a sort of partnership between Western and Indigenous understandings, she often refers to an ancient Hopi Indian prophecy:

> Red and White Brothers, sons of the Earth Mother and the Great Spirit who gave them different missions. The Red Brother was to stay at home and keep the land in sacred trust while the White Brother went abroad to record things and make inventions. One day the White Brother was to return and share his inventions in a spirit of respect for the wisdom his Red Brother had gained. It was told that his inventions would include cobwebs through which people could speak to each other from house to house across mountains, even with all doors and windows closed; there would be carriages crossing the sky on invisible roads, and eventually a gourd of ashes that when dropped would scorch the earth and even the fishes in the sea. If the White Brother's ego grew so large in making these inventions that he would not listen to the wisdom of the Red Brother, he would bring this world to an end in the Great Purification of nature. Only a few would survive to bring forth the next world in which there would again be abundance and harmony.

She also tells about the Colombian Kogi's creation story that has a similar motif:

> Aluna, the Great Mother, the primeval waters, is the source of all creation… put humans, including Elder and Younger Brothers, into the world. From the beginning, Younger Brother caused so much trouble that eventually he was given knowledge of technology and sent far, far away across the waters. Five hundred years ago, the Kogi say, he found his way back across the waters and he has been causing trouble ever since. If he does not listen to the Kogi, to Elder Brother, who is telling him to stop destroying the Mother, to stop digging out her heart in his mining and cutting up her liver in his deforestation, he will bring this world to an end.

She refers to other Indigenous prophesies that warn that although technology is an important aspect of humanity, "it must be brought into harmony with the sacred natural world through the deep Earth wisdom of indigenous peoples." She asks how indigenous peoples knew what technology would bring without this balance and she answers:

> The answer to this question lies in a fundamental difference between the worldviews of indigenous and industrial peoples. The failure of Euro-American scientists to predict the consequences of the technology they spawned is

> directly related to the fact that their mechanical worldview is diametrically opposed to the organic worldview of indigenous peoples…Native science, which by Euro-American scientific categorization includes biology, geology, astronomy, navigation, meteorology, botany, medicine/ pharmacology, psychology, agricultural engineering, plant genetics, ecology, social and political sciences is based on thousands of years of observations…Pre-Inca and Inca agriculture developed hundreds of varieties of potatoes, high protein grain and beans, corn and many other carefully bred crops, feeding millions of people on the same lands without destroying them. Over half the food eaten in the world today traces its roots to the Andes. Their mountain agriculture included automatic irrigation systems and climate-control to prevent freezing. .. Much indigenous science is extremely sophisticated in what we call "interdisciplinary sciences," such as geology and meteorology. The Hopi, for example discovered that in the Southwest underground copper deposits draw down lightning, bringing life-giving rains to the desert. They know that mining can change weather patterns as surely as the Kogi know that deforestation and mining are drying the climate around them so their mountains no longer have adequate snow to feed the rivers on which their crops and lives depend.
>
> When the White Brother's inventive genius comes together with the Red Brother's deep wisdom, we will develop an appropriate technology that does not violate the Earth, but restores it and permits all creatures to live in health (IBID).

Perhaps such a dialogue with its radically different views from Western science, may help engage a neurophilosophy that will more likely lead toward a more healthy balance in human affairs.

## AN IMPORTANT CONCERN

The reader may have noted that the above references to those who offer support for the application of Indigenous wisdom into matters of human behaviour have been non-Indian. I have done this almost defensively to help assure that the many non-Indian readers will be motivated to acknowledge the credibility of Indigenous worldviews without the bias of self-promotion, something Indian people shy away from anyway. For more than 500 years American Indians and their ways were treated with disgust and dismissal. Many still hold on to negative stereotypes and it does not help that academics continue to write through the conqueror's lens as James Clifton does in his 1990 book, *The Invented Indian*, where he says "acknowledging anything positive in the native pas is an entirely wrongheaded proposition because no genuine Indian accomplishments have ever really been substantiated (p. 36)." There are many more contemporary versions of this kind of work that still embrace the opinion of British historian Hugh Trevor-Roper who wrote, "How unrewarding is any serious study of the

gyrations of barbarous tribes in picturesque but irrelevant corners of the globe, whose chief function in history, in my opinion, is to show to the present an image of the past from which, by history, it has escaped (1965, p. 9)."

However, there is a risk in quoting non-Indian authors who promote Indigenous wisdom. The risk is to promote, if indirectly, a more indirect continuation of anti-Indianism by honouring the conqueror's voice to speak for us. New-agers, non-Indian Native Studies scholars who make their living teaching about Indigenous ways of knowing, and entrepreneurs who appropriate Indigenous spiritual ceremonies and charge money for participation, all in their own ways continue to cast a shadow over the authentic voices of Indian Peoples.

## BOOK STRUCTURE AND CHAPTER TOPICS

There are eight chapters in this text. Each focuses on a different concept that has significant implications for healthful, harmonious, human civilizations. Each has been the target of neuroscientific studies and each is of major importance to Indigenous Peoples. The concepts, in order of their presentation, are generosity/altruism, truthfulness/deception, courage/fear, humour, art/music, Nature, spirituality and, finally, the concept of balance.

Chapters open with a relevant quote that offers an Indigenous perspective chosen to initiate critical thinking about Part I which follows. Part I presents a synopsis of state-of-the-art neuroscientific studies on the chapter topic. These study reviews were conducted and written by Ph.D. candidates who are completing the doctoral degree in neuropsychology at Fielding Graduate University. They are straightforward literature reviews that begin with an overview of the material then proceed to summaries and descriptions of a number of specific research studies. The reason the opening quote may inspire critical thinking when reading the research summaries is that it offers a hint at how the Indigenous perspective might either not be in synch with the scientific interpretations, might support them, or might offer a complementary view of human nature. The reader can either study the details of the experiments; simply scan the scientific studies and jump quickly to the conclusion; or begin with Part II and refer back to Part I as needed.

Part II changes gears. Here, two Indigenous scholars, Greg Cajete and Four Arrows, join with a South Korean neuroscientist, who also happens to be a student of Buddhism, to engage in a conversation about the chapter topics and the neurophilosophical conclusions offered by the researchers. Our goal is to begin a dialogue we hope that you, the reader, and your associates will continue. We augment and, as it turns out, often challenge, the neurophilosophical possibilities that stem from the Western scientific interpretations.

Part III, "Continuing the Dialogue," presents the reader with some questions to help stimulate a continuation of the dialogue and increase an understanding of the material, especially as relates to the similarities, differences and complementary perspectives gleaned from considering both the Western neuroscience and the Indigenous wisdom. We end this chapter with such an exercise.

## CONTINUING THE DIALOGUE

1. Considering the history and various traditional academic disciplines that interact with social neuroscience, what would you say is the ultimate goal of social neuroscience?
2. Do you believe that the social sciences will offer viable solutions for the problems facing humanity today? Why or why not?
3. In your own history of learning, what has been the general regard for "Indigenous wisdom?"
4. How would you characterize the differences and similarities between Western neuroscience and Indigenous science at this point?

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# BEGINNING WITH WHO WE ARE

*In the Indian Way*

*"One of the most fundamental principles of Aboriginal research methodology is the necessity for the research to locate him or herself…We resist colonial models of writing by talking about ourselves first and then relating pieces of our stories and ideas to the research topic."*

(*Kathy Absolon & Cam Willet in Research as Resistance, edited by Leslie Brown and Susan Strega, 2005, p. 99*).

FOUR ARROWS, *aka Don Trent Jacobs*

Equally proud of both my Cherokee and Scots-Irish blood, I nonetheless go by my Lakota name, Wahinkpe Topa (Four Arrows), given to me in a naming ceremony subsequent to a vision I had in preparation for my third Sun Dance. The story is too long and complex for here. Suffice it to say that by going by "Four Arrows" as I have been guided to do, I hope at least acknowledge the importance of Indigenous perspectives. In saying this, I must admit that I, not being raised among traditional Indian people, am far from being qualified to be a spokesperson. Nonetheless, I bring to this work a variety of relevant experiences. I have worked as a fire fighter and medic, a school teacher, a health psychologist and hypnotherapist, a director of a school for troubled youth, a night-club piano player, a horse trainer, and a professor. I have written eighteen books, a number of invited book chapters, and nearly a hundred articles. I possess doctorates in Health Psychology, specializing in psychoneuroimmunology, and in Curriculum and Instruction, specializing in Indigenous Worldviews. I lived with a number of First Nations over the past twenty years and, when serving as Dean of Education at Oglala Lakota College, I fulfilled my Sundance vows. Before coming to my current position as faculty in the College of Educational Leadership and Change at Fielding Graduate University, I was an Associate Professor at Northern Arizona University where I had the fortune to work with Navajo and Hopi students and elders. I currently live in a remote fishing village in Mexico during the winters and in an equally remote village on the west coast of Vancouver Island, British Columbia during the summer. My wife Bea is a polo photographer and website designer; my daughter Jessica is the mother of two boys, a math teacher, and an agent for her actor son. As for my grandsons, I hope they will inherit a more balanced world than now exists and that in some small way this book will help. In the meantime, I continue to see the beauty of life while living in a remote fishing village in Mexico with people who, like me, are essentially "mixed bloods" in the winter and on the west coast of Vancouver Island in the summer.

As we begin this journey together, I offer this “prayer” into the universe: May our work, our reflections and our learning be motivated by a deep concern for all sentient life, for now and for future generations.
Mitakuye Oyasin (We are all related)

## GREG CAJETE

I am an educator of Native American people. What I have been doing and where provides context for understanding what is meant by indigenous science, and the role I play as a Native American educator. I am a Tewa Indian from Santa Clara Pueblo which is one of six Tewa speaking villages north of Santa Fe, New Mexico. Each of these Pueblos is autonomous but is related to others through custom and language. I grew up in this pueblo in New Mexico and was raised partly by my grandmother because my mother worked in Los Alamos, New Mexico where she had to spend long periods of time. As a result, I grew up with my grandmother in a distinctly traditional way. Of course, at the time I didn’t know that this was education, as it involved an old style of teaching and old ways of learning, ways children had learned essentials important to my people for thousands of years. The public school was close by so I didn’t have to be enrolled in boarding school, as my mother and grandmother had. I was able to grow up in my own community, which allowed me to gain sensitivity to the differences between the way we understood ourselves and the way the Pueblo community was different from mainstream society.

When you grow up in a community with other people of your culture who are related or are living the same way, you don’t realize your difference. You don’t really understand until you face mainstream society process and culture, and I wasn’t affected until I began to interact with other cultural groups. Then I realized how different Indian people were, and how we viewed life and education in some very distinct ways. When I was ready to go to college, I had to fight to stay in New Mexico. At that time there was a full scale attempt to recruit native people from reservations and take them off to Ivy League schools. I was courted by schools like Harvard, Dartmouth and Stanford. Many of my friends did go to those places, but I stayed home. I went to a college that was not far from my home, and that allowed me to maintain constant contact with my community.

After I graduated, I was given the opportunity to teach at a school which had opened in 1962, the Institute of American Indian Arts (IAIA) in Santa Fe. The purpose of the IAIA was to evolve a context in which the artistic potentials of young Native American people from all over the United States could be cultivated and expressed. The IAIA was an experiment in cultural education, an experiment using the arts as a primary vehicle, but also aimed at helping native young people learn about themselves, their culture and their identity. After its opening in 1962, the Institute became famous as a model school as it was recognized by UNESCO as being one of four culturally based schools of note in the world.

For five to eight years it was indeed a shining light in the world of Indian education. But, as is the case when an entity is connected with the US government, and especially with the Bureau of Indian Affairs, it was vulnerable to the winds of

political change. In the Seventies the Institute fell on difficult times and was moved from its original campus to The College of Santa Fe, where it became a "tenant" of that college.

In 1988, Congress enacted new legislation entitled the American Indian Arts and Development Act, which chartered the IAIA as a public/private entity with its own direct congressional funding. It remains a kind of experiment because even this new legislation is designed to see whether this arrangement will work and maintain both its ideals and the congressional mandate.

I began to teach high school science at the Institute of American Indian Arts in 1974. At that time the school had a junior and senior high program as a feeder program for the two year Associate of Fine Arts degree program in the college. During my first year of teaching, I realized that many of the ways of teaching and approaching science, or so called text book science, were just not appropriate for my students. These Native American students came from all over the United States, from urban environments, rural environments. Some were very traditional in terms of their upbringing, others were not. All had a common thread and that was an interest and a willingness to explore the arts. They also possessed a common alienation from science educational approaches they had experienced in reservation and community schools. Charged with making a program work for these students, I put aside all the textbook methods I had brought with me from the Teacher Education College and created new curricula based on my own experiences as a native person. It was a grand experience in that I was allowed to do things that would not have been allowed in another school, certainly not in any public school. I explored and created with the students a process that allowed them to learn in ways they felt good about.

A curriculum evolved over the years. It began with the introduction of native uses of plants in a health science class I was teaching, and it grew into a full culturally based science program. Its story is a story of creation, of the process of interaction in science, art and culture and the integration of those aspects into the expression of a curriculum–a learning, teaching process that actually works well for Native students who wish to understand and learn about their lost heritage as it relates to science. The curriculum evolved around the idea that every indigenous culture has an orientation to learning, and that orientation is metaphorically represented in its art forms, its way of community, its language, and its way of understanding itself in relationship to the natural environment that contexts or cradles it.

I am currently Director of Native American Studies at the University of New Mexico and an Associate Professor in the College of Education. The perspective on cognitive brain research, which I address in this book, reflects an extension of the cumulative influences of Indigenous philosophy that also informs my professional work, Native science, cultural education and the creative process. The insights gained from research in these areas and their implications for the way science is communicated to Native American students form the orienting basis for my contribution to this work.

## JONGMIN LEE

During the period of active restoration of Korean economy after post-war chaos, I was born in Daegu, Korea. I was named as Jongmin by my father under the family name of Lee. Since we Korean have similar background with the other Far East Asian cultures, we still use Chinese characters in special situation such as naming newborn kid. My first name Jongmin comprises of two components, Jong and Min. The name Jong is registered name in the pedigree of our family. This registered name has been already selected long time ago based on five rotating elements of ancient Oriental philosophy, Taoism and Confucianism. These five elements are metal, wood, water, fire, and earth. The name Jong contains the radical of metal. My father's registered name contains the radical of earth. My son's is water. The rotation of the five elements have common root with Buddhist speculation of circulating life. The name Min was the only name which my father could choose. The meaning of Min is jade gem. Although I don't know the exact intention of my father to choose this character for me, I guess he wanted for me to become a precious person within the society. The exact family name of mine is "Lee from Gwangju". Almost family names in Korea have its origin, the name of home town. When I trace back the pedigree, I could reach up to the 9$^{th}$ century in Silla dynasty. Subsequent Korea dynasty, Chosun dynasty, Japanese colony, and Republic of Korea were stained on our pedigree. These facts imply that the traditional philosophy, including Taoism, Confucianism, and Buddhism, maybe resolved into my mentality or encoded into my gene.

Within the strong obligation of these philosophies, my grand grandmother became Christian during the persecution era in Chosun dynasty. My mother has the family name of "Chang from Indong" and her parents were also Christian during the Japanese colony era. Therefore my parents were very strong in-born Christians and subsequently I had been baptized in Catholic Church as soon as my birth regardless of my own opinion. In addition, my father had studied western law in Tokyo Japan and Leuven Belgium. My mother had studied western music in Tokyo Japan and she became a soprano singer. My father was always reasonable and logical to me (probably for the education of his kid). In contrast, my mother was rich in affection and made me confused whenever I decide something. My brothers and sister were also in reasonable side rather than emotional side, since they studied western science with inherited logical way of thinking.

I grew up in this unusual environment comprising several philosophies from Taosim to western modern science, although my thinking is heavily influenced, I'm sure by my western medical training. Since I had great interest in engineering, I became a radiologist and I am affiliated with both radiology and biomedical engineering departments in a medical college.

A perspective I bring to this book is the idea that homeostasis is a very important concept in neuroscience. There are many reciprocal interactions in medicine such as sympathetic-parasympathetic nervous systems, insulin-glucagon enzymatic system, osteoblast-osteoclast cellular system, and so on. The disruption of the homeostasis will result in pathological situation. The status of homeostasis should be the most efficient way of energy consumption to keep normal physiological

function. Therefore the homeostasis can be expressed as the balance of physiological functions. In Confucianism, the doctrine of the middle path is regarded as the supreme virtue in human behaviour. The doctrine gives caution to be in extreme edge where the conflict occurs with high energy consumption. To keep the middle path, human should lay down their avarice which is the source of all conflict within human mentality. The homeostasis and the doctrine of the middle path seem to be a single concept described differently by Oriental or indigenous philosophy and western science.

When Four Arrows invited me to be a co-author of this book, I felt strong ambivalence since I had no academic knowledge beyond the territory of western science. However, I could understand and had agreement with his speculation about indigenous wisdom, I decided to jump on this adventure boat. During the writing our dialogues, I could revisit and reform my ideas about western science and oriental philosophy. This job has been a very exciting journey for me like putting my hand beyond the star gate. I hope our dialogue and my contribution to it will help inspire further conversation that will guide “neurophilosophy” in a useful direction.

CHAPTER 1

# GENEROSITY

*They are so naive and so free with their possessions that no one who has not witnessed them would believe it. When you ask for something they have, they never say no. To the contrary, they offer to share with anyone.*

– Christopher Columbus (quoted in Zinn, 2005, p. 3).

## I. NEUROSCIENCE STUDIES OVERVIEW

*Jennifer Mitchell and Shahzad Chaudhry*

Historically, psychologists believed that altruism is a selfless means to a selfish end; in other words, altruism carried an expectation that the generosity would somehow be returned (Gintis, Bowles, Boyd, & Fehr, 2003). Technological developments have allowed researches to investigate the underlying biological mechanisms involved in generosity, and the results have created a theoretical shift. The following seven studies reflect the current trend to explain human generosity in terms of neuroeconomics. Neuroeconomics combines the study of the brain with economic theory in an attempt to elucidate the decision-making process. Each of the studies summarized below depict critical components of the neuroeconomic theory of generosity. The first study lays a foundation by indicating the crucial role that emotions play in the decision-making process, and illustrates that humans experience emotional reactions to fair and unfair offers. The second study depicts a clear preference for helpful versus unhelpful individuals as early as infancy. The third study introduces the current theory that acting in generous, cooperative and/or altruistic ways activates reward processing centers of the brain. The fourth and fifth studies provide additional support for the idea that being generous is processed as a reward in the brain. The sixth study lends further support to a reward-based theory of generosity by investigating the neural mechanisms involved in altruistic punishment. The final study examines the role that empathy plays in anonymous generosity. All of the studies provide glimpses into the underlying neural explanation behind generosity; the brain processes acts of generosity as a reward, which serves to encourage future acts of generosity in order to obtain additional rewards.

### S*tudy 1: "The Neural Basis of Economic Decision-Making in the Ultimatum Game"*

*Summary.* Sanfey, Rilling, Aronson, Nystrom, and Cohen (2003) looked at the role that both cognition and emotions play in the decision-making process. The authors used functional magnetic resonance imaging (fMRI) to highlight the areas

of the brain activated during an economic game called the Ultimatum Game. During the game, participants were scanned as they were offered what were considered fair and unfair offers. Unfair offers stimulated brain activity in the anterior insula (region of the brain implicated in emotions) and the dorsolateral prefrontal cortex (region of the brain implicated in cognition). An additional discovery was that when a participant rejected what was deemed an unfair offer, there was increased activation of the anterior insula. These findings suggest that emotions play a central role in the decision-making process. As a key component to virtually all social interactions, understanding decision-making and the emotions behind them can elucidate the motivations behind human interactions.

*Description.* The authors described a need for research in understanding the role of emotions in the decision-making process. The authors hypothesized that unfair responses would trigger activation in areas of the brain associated with emotion, and that the severity of the emotional reaction would largely determine whether or not offers were accepted or rejected in the Ultimatum Game. In the study, participants were made an offer to split a sum of money, and the trials were evenly split between a human partner making the offer, a computer making the offer, and a control where money was simply doled out. Based on the offer, participants had to determine if the offer was fair and they accepted it, or unfair and they rejected it. All participants received identical offers, but at differing points of the study.

A total of 19 participants in the Ultimatum Game underwent fMRI scans while responding to fair and unfair offers made to them. As expected, all the fair responses were accepted and the unfair responses were rejected increasingly as the amount offered decreased. It is interesting to note that emotional reactions to unfair offers were significantly higher when the partner was a human instead of a computer. The emotional reactions, signified by activation of the bilateral anterior insula, were also higher for offers that were considered less fair. The authors report that this region of the brain has been associated with pain and disgust in previous studies.

*Study 2: "Social Evaluation by Preverbal Infants"*

*Summary.* Hamlin, Wynn, and Bloom, (2007) found that humans are capable of evaluating social situations in preverbal stages of infancy. According to the authors, the ability to evaluate social interactions during infancy indicated that the skill is not learned, but inherent in everyone. The infants were not only able to detect differences, but showed a preference for helping others. The presence of this ability at such an early stage confirms its importance, and suggests possible biological underpinnings.

*Description.* The authors arrived at their findings through experimentation on two groups of healthy infants, 16 10-month-old infants and 12 6-month-old infants. The infants were placed in their mothers' laps for the experiment and the mothers were asked to close their eyes and not interfere in any way.

An initial habituation phase allowed the infants time to become accustomed to the characters made of wooden pieces of various shapes (e.g., square, triangle, etc.) with eyes glued on them. During the actual experimentation phase, one of the characters was either assisted up a hill or hindered by a third character, which physically blocked the climber's way. By allowing the infants to reach for their preferred character, 14 of the 16 10-month-olds and all 12 of the 6-month olds showed a preference for the character that had been helpful towards the climber. Through these outcomes, the authors verified their hypothesis that infants are indeed capable of recognizing social aspects of an event, and determining either like or dislike for people based on their function. The authors also varied the experiments in several ways and verified their findings that social interaction was at the heart of the infants' choice. For example, in one scenario the characters were presented simply as blocks (without eyes), and the infants did not show a preference between the helping and hindering characters.

Based on the findings of this study, the authors argued that the ability to facilitate these evaluations at such an early stage of life suggests evolutionary and developmental components. In past societies, not only would it have been beneficial for people to recognize those who were cooperative but also to distinguish those who would not reciprocate helping behaviour, ultimately damaging group cohesiveness and the ability to complete basic tasks (e.g., food gathering, warfare, hunting, etc.).

This ability to socially evaluate others is also expected to play some role in the moral development of the infant, which could have significant implications for the infant later in life. A specific issue to consider is the relationship between an infant's exposure to others who have been either prosocial or antisocial in their interactions with others and the infant's own helping behaviour later in life.

*Study 3: "A Neural Basis for Social Cooperation"*

*Summary.* Rilling, Gutman, Zeh, Pagnoni, Berns, and Kilts, (2002) focused on the concept of reciprocal altruism and how specific areas in the brain (i.e., nucleus accumbens, caudate nucleus, ventromedial frontal/orbitofrontal cortex, and rostral anterior cingulated cortex) may be responsible for the increase in mutual cooperation instead of selfishly accepting favors from others without reciprocating.

*Description.* the authors note that historically, one behaviour that has helped various groups of humans to survive a variety of harsh situations has been their willingness and ability to share material resources, especially food, for the benefit of each other. Furthermore, while reciprocal altruism has been rare in other animal species, it has been noted in humans with the understanding that two preconditions must have been met for the evolution of this behaviour: first, there must be repetitive social interaction between partners who are to reciprocate altruism, and secondly the individuals must have the capability to distinguish between those who are altruistic and those who are not.

To study reciprocal altruism, the authors used the "Iterated prisoners' dilemma game," where two participants make a choice to cooperate or defect, and their choices impact the amount of money each receives at the end of the experiment. The payoff amounts are setup so that the highest payoff is for a defector when the other is cooperative, while both participants cooperating or defecting earns is in the middle, and the lowest earning is for the cooperative participant when the other is defecting. To earn the maximum amount of money, it is important to defect as much as possible while the other person does not defect at all. The likelihood of one person continuing to cooperate while the other defects, however, is rather low.

For this study, the authors ran two separate experiments where 19 women were paired off with another human and 17 women were paired off with a computer. The participants were informed that the computer did not have a fixed strategy and instead would respond with a choice based on their response on the most recent choice. The authors found a different level of neural activation when the women were paired off with a human versus when they were paired with a computer. They also noted that a previous cooperative or defect response from both participants was more likely to be followed by another cooperative or defect response. During this interaction, there was activation in the participants' brain in the anteroventral striatum, subgenual anterior cingulate cortex, and the ventromedial/orbitofrontal cortex, which are areas of the brain known to be involved in reward processing.

The authors wanted to clarify whether the activation in the brain was resulting from the reinforcement from monetary reward or earning it during social interaction with another participant. The authors studied the brain activations during the human paired portion of the game and when a human and computer were involved. They found that the anteroventral striatum, rostral anterior cingulate cortex, and orbitofrontal cortex were activated more during the reciprocated social cooperation than receiving the monetary reward during the non-social situation. Furthermore, the rostral anterior cingulate cortex and the anteroventral striatum only activated when there was cooperation between two human partners, instead of one human cooperating with a computer. Following a cooperative response, the decision making period on whether to cooperate or not during the next response also showed activity in the left anterior caudate, the right post-central gyrus, rostral anterior cingulate cortex and the anteroventral striatum.

The authors noted that after the experiments the subjects reported mutual cooperation to be the best situation, even though it resulted in a decreased monetary award. This was more desirable than defecting against a cooperative partner, because defecting increased both feelings of guilt and the possibility that the partner would then defect on the next exchange, and could result in a destabilized relationship and decrease in reward. During the cooperative interactions, the activations in the orbitoforntal cortex and ventral striatum support the idea that there is a reward component to mutually cooperative/altruism behavior.

*Study 4: "Neural Responses to Taxation and Voluntary Giving Reveal Motives for Charitable Giving"*

*Summary.* Harbaugh, Mayr, and Burghart, (2007) studied the concepts of "pure altruism" and "warm glow," as possible causes for people's feelings of reward and specific neural activity when there is either a mandate to pay taxes or they voluntarily contribute for the benefit of society.

*Description.* The authors looked at the differences between taxation and voluntary donations to charity in the Unites States and how each of these behaviours impacts a person's neural functioning. They distinguished between two types of possible rewards for helping society. The first occurs when a person feels good or receives satisfaction from simply seeing his/her giving of money as a benefit to society, and is more likely to fall in the category of "true altruism". On the other hand, when a person feels good about having made a decision to donate seeing it as a benefit to another, this is less likely to be true altruism and is termed "warm glow." The authors argued that if a person is in the "true altruism" group then he/she should show neural activity associated with the brain's reward centers whether they donate money on a voluntary or mandatory basis. The authors also argued that those in the "warm glow" group should only show activation in the brain's reward centers when they are voluntarily donating money and not when they are being taxed.

The authors noted that past research showed that the ventral striatum and the insulae are involved in the processing of various types of information. Specifically, they are implicated in reward processing related to rewards of money, food, and drugs, as well as abstract rewards such as contributing to charities, punishing unfair players in sharing games, etc. For this study, the authors used fMRI scanning of 19 females while they played the Dictator Game. The subjects were given $100 at the start of the experiment and were allowed to make decisions on whether or not to donate money to a local food bank, while also having mandatory (tax-like) transfers made to the food bank from their fund. While multiple offers of mandatory and voluntary transfers were made, the participants had to accept the offered transfers with the understanding that the experimenters would remain unaware of their choices. Furthermore, at the end of the experiment, one of their mandatory and one voluntary transfer would be randomly chosen and implemented. The authors also had participants complete satisfaction ratings after the transfers were accepted or refused.

During the study, the authors were able to divide the group into 2, separating out 9 egoists and 10 altruists. The egoists had a higher neural response to their own payoff versus the charity, and the altruists gave money to the charity on an almost 2 to 1 ratio when compared to the egoists. Satisfaction ratings for voluntary giving were almost 10% higher than for the mandatory transfers, and the voluntary transfers also resulted in a higher activation in the caudate, right nucleus accumbens, and the insulae. Based on these findings, the authors conclude that the findings support the "warm-glow" theory of giving, but that both "pure altruism" and "warm glow" are important motives for giving to charities.

*Study 5: "Human Fronto-Mesolimbic Networks Guide Decisions about Charitable Donation"*

*Summary.* Moll, Krueger, Zahn, Pardini, Oliveira-Souza, and Grafman (2006) noted that, at times, humans will sacrifice material benefits to endorse or to oppose societal causes based on moral beliefs. At first glance, this seems to go against the evolutionary concept of survival and looking out for one's own needs. The authors set out to study the neural bases for human altruism through their decisions on charitable donations. They found that the mesolimbic reward system is activated by donations in the same way as when monetary rewards are obtained. Additionally, the medial orbitorfrontal-subgenual and lateral orbitofrontal areas mediate decisions to donate or to oppose societal cues and more anterior sectors of the prefrontal cortex are activated when altruistic choices prevail over selfish material interest.

*Description.* The authors recruited 19 participants to undergo fMRI scans while they either endorsed or opposed societal causes through anonymous donating or refraining from donating. The participants were then given a few seconds to review a specific offer from one of the four following scenarios: (1) the participant would not benefit monetarily but the charity would, (2) the participant would benefit but the charity would not, (3) the participant would lose money and the charity would benefit monetarily, and (4) both the participant and charity would benefit monetarily. To avoid a monetary fine for failing to respond, they had to make a choice within the allotted time. At the end of the experiment, the participants were allowed to keep the balance of money they had remaining.

When participants made the altruistic decisions, whereby the charity received the bulk of the donation, there was an associated activation of the anterior prefrontal cortex, including the frontopolar cortex and the medial frontal gyrus. The authors noted that distinct neural systems are involved in the decision to donate or to oppose societal causes; the mesolimbic reward system provides the general reinforcement mechanism, the subgenual area and the lateral orbitofrontal cortex mediate social attachment and aversion responses, and the anterior prefrontal cortex is crucial for representing more complex reinforcement contingencies related to altruistic decisions. These findings are in line with prior understandings of these brain systems; the mesolimbic system regulates overall reward reinforcement and is activated by a host of stimuli, including food, sex, drugs, and money, and the subgenual area is known to be involved in the social attachment function and release of the neuromodulators oxytocin and vasopressin. The authors further noted that recent studies have indicated that the administration of oxytocin to humans resulted in increased trust and cooperation in economic interactions.

Based on the findings of this study, the authors speculate that humans' ability to feel attachment or aversion to societal causes may have emerged through the same evolutionary mechanisms that resulted in the reciprocity theory. This would allow the primate reward, social attachment, and aversion neural systems to operate beyond the immediate issues of relationships, thereby allowing humans to directly

link value to abstract collective causes, principles, and ideologies. While these primitive centers of the brain are linked to altruism, the uniquely developed anterior prefrontal cortex becomes involved when immediate self-interest and moral beliefs are at odds.

*Study 6: "The Neural Basis of Altruistic Punishment"*

*Summary.* de Quervain, Fischbacher, Treyer, Schellhammer, Schnyder, Buck, and Fehr (2004) looked at the willingness of people to punish others at a personal cost to promote cooperation. This phenomenon is termed altruistic punishment, and is one aspect of strong reciprocity, which is believed to be the evolutionary root of human cooperation. The term implies that those that cooperate are rewarded, and those that do not cooperate are punished at the punisher's expense. Through neurological imaging, the authors were able to determine that reward processing centers of the brain were activated when non-cooperators were punished. This adds to the current body of literature suggesting that brains are not only hard-wired to reward generous behaviours, but also punishment towards those that are not generous or cooperative.

*Description.* The authors sought to determine the neurological effects of altruistic punishment. Positron emission tomography (PET) scans were taken while participants took part in an economic game. Although two people took part in each trial, all interactions were anonymous. The first person (A) was given 10 monetary units (MU) and asked whether he wanted to keep the 10 MU or pass it on to the second person (B). If A gave B the 10 MU, B was given an extra 40 MU from the experimenter. If A did not give anything, then the 10 MU was retained and B received nothing. In the second phase, B was asked whether to split the 50 MU with A, or to retain it all. Based on the reaction of B, A was given the option to punish B and allowed a one minute period to decide. The authors posited that if B did not return the generous act, A would consider this unfair and it would create a desire to punish A for violating the cooperation norm. The authors took scans during this 1 minute interval to determine the area of activation when the desire to punish was evoked.

The sample was comprised of 15 males, of which 14 initiated the game by trusting B and passed on all 10 MU. Scans were taken of A whenever B did not respond with trust and kept the 50 MU. Results supported the authors' hypothesis that punishing B increased activation in the caudate nucleus, which has been implicated in reward processing. Activation also increased in the thalamus, which has specifically been tied to the processing of monetary rewards. When B failed to return the generous act and proved untrustworthy, A responded with a desire and willingness to punish, which then activated areas of the brain associated with reward processing. The authors found that the greater the willingness of A to punish B (more costly to A), the greater the activation in the caudate. This suggests that A anticipated the satisfaction or reward that would be experienced if B was punished. The authors argue that punishing norm violators elicits a reward process in the caudate, and that altruistic punishment is a strong motivator in human cooperation.

*Study 7: "Oxytocin Increases Generosity in Humans"*

*Summary.* Zak, Stanton, and Ahmadi (2007) pointed out that although there are numerous instances of generous behavior towards strangers, there is as of yet no clear explanation behind one-shot anonymous generosity. A new research interest in the area of neuroeconomics seeks to explain this form of generosity towards strangers in terms of empathy. The authors aimed to elucidate the role of empathy in generous behaviour. Oxytocin was used to stimulate empathy in individuals while they participated in typical neuroeconomics game play. The results indicated that oxytocin increased generosity by 80%, leading researchers to argue that empathy creates an emotional reaction towards another which in turn leads to generosity.

*Description.* The authors distinguish between altruism and generosity, indicating that both involve the act of giving, but that generosity implies the act of giving more than what is needed or asked for. The authors utilized a double blind placebo experiment to elucidate the underlying mechanisms involved in generous behaviour. The participants were randomly assigned to either the experimental or control groups, with 34 males in each group. The experimental group was given a nasal inhalant containing oxytocin, while the control group received a nasal inhalant comprised of only saline. The design was based on previous research indicating the role empathy plays in generous behaviour. In order to simulate empathy in a controlled environment, the researchers used a neuromodulator called oxytocin. The authors noted previous research which illustrated the ability of oxytocin to promote attachment, trust, and reciprocity.

A total of 68 participants were given the nasal inhalant, with 34 receiving oxytocin and 34 receiving saline. They each filled out demographic information while they waited one hour for the oxytocin to take effect. After the mandatory wait period, the authors tested various money transfer scenarios to determine the effects of oxytocin (empathy) on altruistic and generous behaviours. The authors used two common games from economics theory, the Ultimatum Game and the Dictator Game, to create the test scenarios. Participants within each group were randomly assigned to roles of either the first decision maker (DM1) or the second decision maker (DM2) and took part in both games. For the Ultimatum Game, DM1 was given $10 and asked to present an offer to split the money with DM2, and DM2 was asked to state the lowest offer he would accept. This game aimed to elicit purposive offers from DM1 that reflected a willingness to consider the DM2 participant's perspective. Based on the offer, DM2 could accept and the money would be split, or reject and no one would receive any money. If DM2 rejected the offer, he had the opportunity to punish DM1 for a poor offer, but at a personal cost to DM1. In the Dictator Game, all methods remained the same, except DM2 was forced to accept all offers, which meant that DM1 was not obliged to consider DM2's perspective. The hypothesis stated that taking another's perspective into consideration (showing empathy), would increase generosity. Therefore, the Ultimatum Game offers could be compared with the

Dictator Game offers to determine any difference between altruistic and generous offers. All identities were masked, and no communication was allowed between experimenters or participants.

The authors found that the average offer was 21% higher for the oxytocin group than the average offer for the saline group in the Ultimatum Game. The authors also found that the oxytocin group averaged $1.89 for accepted offers, and the saline group averaged $1.06 for accepted offers. The authors defined a generous offer as one that exceeded the mean acceptable offer given by DM2 prior to beginning the game. For example, if DM1 made an offer at or below the average acceptable offer, then this was classified as altruistic. If, however, the offer was greater than the average acceptable offer, then it was classified as generous because it went above and beyond what was expected or needed. The authors developed a mathematical computation that determined the oxytocin DM1 group showed 80% higher generosity than that of the saline group. Offers made by DM1 in the Dictator Game were then compared to the offer the same DM1 made in the Ultimatum Game. This allowed the researchers to control for altruism, and to partial out only acts of generosity. The findings suggested that even after controlling for altruism present in initial offers of the Dictator Game, the oxytocin (empathy) did result in higher levels of generosity. The authors argued that the act of considering another's perspective (empathy) reflected generous behaviour, and this resulted in 80% higher generosity. Conversely, they argued that not considering another's perspective will decrease the act of generous giving.

The authors briefly review available literature on the effects of oxytocin on neurological functioning. They indicate that it has been linked to increasing dopamine in areas of the brain associated with reward processing. Although oxytocin levels were increased artificially in this experiment, the authors noted that occurrences can also raise oxytocin, including touch and other positive interactions with others. The authors posit that these positive interactions stimulate oxytocin levels and promote generous behaviours, thus explaining generosity towards strangers.

## II. INDIGENOUS PERSPECTIVES DIALOGUE

*Greg Cajete, Jongmin Lee and Four Arrows*

*Four Arrows.* I think these studies could be used to support intuitive, universal and Indigenous wisdom as relates to the importance of empathy and trust in human potentiality. The experiment with the infant is difficult to argue with as evidence that generosity is more of a biological imperative than is selfishness and that cooperation is more natural than competition. They do reflect a shift somewhat from the idea about generosity being a more or less selfish act for the sake of future returns. However, I still find the emphasis on reward and punishment to be continuing a misunderstanding about the nature of generosity, whether human or animal. It seems that Huxley, Freud and Wright's contentions that there is no such thing as morality in evolution and only through deception and self-deception do we

make believe otherwise, are still operational concepts that cloud the lens of current neuroscience on this topic. From an Indigenous perspective, I believe this reward-punishment and selfish motive is misleading and ultimately not of benefit to humanity. As I hope we will discuss, I also think that animal studies relating to conflict resolution and reconciliation support Indigenous thinking on this topic. Much of this research can be reviewed in Changeux's edited work, *Neurobiology of Human Values* (2005).

Part of the challenge in looking at these experiments has to do with the assumptions and frameworks that are utilized in setting them up. I don't think that using monetary rewards and punishments or thinking in terms of selfishness or non-selfishness as experimental factors or as rationales for behaviour will get us to the deeper truths relating to generosity, no matter how rapidly we identify the related chemicals and neuralpeptides like oxytocin or places in the brain where activity seems to be most pronounced. Nonetheless, I think that observations about empathy and something different happening than happens with "pleasures" like drugs or sex offer a starting place for dialogue in neurophilosophy.

It is understandable how Western scientists, no matter how open-minded, might use a lens of understanding that is colored with Western values. Although most societies claim generosity as an important value, and although the major religions of the world endorse it passionately, the last several thousand years of human existence is characterized largely by greed, competition and selfishness. Whether or not the major developed countries, or their citizens at large, might be identified by the concept of generosity or altruism is not a topic for extensive discussion here. The answer is complicated and controversial. However, sifting through the literature does not cause one to characterize most of countries as being truly generous. Certainly the claim that the U.S. is a "generous country" needs rethinking. In fact, researchers like Sardar and Davies write in their book that the conventional idea that the U.S. is a generous nation is "knowledgeable ignorance" (2003). A *Boston Globe* article entitled, "Global Analysis Dispute Perceived US Generosity" reported that since the Reagan administration U.S. donations fell continually to their current low (Dec. 31, 2004). The Organization for Economic Cooperation and Development has had a long established target of 0.7% GDP that only few Scandinavian countries achieve. Where private and public donations occur, few people give without being asked to do so, and even then giving is closely related to self-interest, tax benefits, social status and donations to one's religious institutions (Kendall, J., 2003). As for the wealthy givers, consider this fact for a perspective. Ebay founder Pierre Omidyar was ranked the eighth most generous billionaire, giving 549 million dollars from 2002–2006. He was ranked the 32$^{nd}$ wealthiest person in the world with 8.9 billion (San Francisco Chronicle, 2008). (Keep in mind that one billion dollars is one thousand million.)

On the other hand, generosity is considered as an identifier of many if not most Indigenous cultures, both today and historically. In fact, the entire philosophy and spiritual understandings revolve around a complex notion of sharing and interconnectedness (Murray, 2000). Noted educator Larry Brendtro claims that virtue in American Indian ways of being in the world is "reflected in the

preeminent value of generosity (Brendtro et al, 1990, p. 35). Wells writes that giving in Native cultures is a way of life (Wells 1998). Dagmar Thorpe, the granddaughter of Olympic Gold Medalist Jim Thorpe says the "underlying values, principles, philosophy and world view of giving are universal concepts among Native People" (1997, p. 13). Daniel Wildcat in a book he co-authored with Vine Deloria, Jr., writes, "I find it difficult to discount the impressions of so many non-Native persons, from conquistadores to Harvard anthropologists, who in spite of incredibly ethnocentric, if not racist, assessments of our ancestors, all saw indigenous North American societies possessing something they found admirable and lacking in their own Western societies: generosity and a social well-being (2001, p. 141). Gilliland's research shows that generosity is an inherent aspect in the learning styles of contemporary American Indian students (Gilliland, 1999). Swisher's research came to similar conclusions (1989).

So what is going on Greg? Why in spite of the research pointing to the natural tendency for humans to be generous do we face such a lack of generosity in our world?

*Greg.* I agree that generosity is the expression of a deep biological instinct connected at the physical level to the way we as humans think. I also liked the neuroeconomic emphasis on studying choice as it relates to reciprocity. Generosity involves a reciprocal mindset based on giving and receiving. Indeed in some ancient languages the word for giving and receiving were one in the same. So what is it in the Indigenous way of giving and receiving that takes the altruist social form of Generosity that we can explore to give some insight into the underlying biological and social value of being generous?

As you have pointed out with your references, to give of oneself, of what one has materially is an Indigenous value rooted in a life oriented dynamic, a spiritual ecology of relationship. To give away what one has to others is to honor that most precious thing that has been given…Life. It is a primal quintessential reciprocal relationship with life that is honored. Giving and receiving, giving and receiving emulates the central animating dynamic of life itself. Indigenous mind mirrors Natural mind. And so, it is the Indigenous way to emulate the ways of Nature in the social ways of community. I think this idea of mirroring nature is missing in neurophilosophy even though I understand that neuroeconomics includes the role of rewards and punishment in animals other than humans.

All Indigenous cultures reflect this central dynamic of life giving and life receiving through both a personal and social forms of "giving away." Indigenous traditions of generosity and its expression through hospitality are intimately tied to the function of sustaining both the life of the individual and the community. Given the pervasiveness of hospitality as a social value in all cultures of the world through time, there is little doubt that there is a bio-social foundation stemming from the way our brains have evolved. Ultimately, one can trace the function of human generosity to the human instinct for survival, but again, survival when considered in Nature's terms is a symbiotic phenomenon with little room for the kind of selfishness seen in the world today.

The exploration of generosity and its expression through hospitality opens a window into the natural process of the mind. The social contexts of giving along with those everyday exchanges of giving and receiving between family, friends and strangers afford both windows and mirrors into the brain itself. The thinking, language, social, situational contexts in which generosity is shown all reflect brain function and more importantly the human meaning and mindful intent of giving. The host and the hosted exemplify a kind of cosmic giving and receiving which belongs to the realm of the first creator and to the manifestations of his first creations in the form of the universe. The ultimate host is the Great Mystery. One might metaphorically say we are all guests, guest of the universe, of our mother earth, of life giving spirit itself. So to be generous to another is to be generous to one's own life spirit. It is an acknowledgement of the Grace that we have been given through our own life and that which we see, acknowledge and honor in another. Of course, as with all things in nature, there is an opposite force, energy or intent that forms the creative tension necessary to define a whole. This dark quality is what is often metaphorically personified in the many Indigenous stories of sacred twins, ogres, monsters and shadows. These teaching stories help us remember our natural ways and relationships and how easily we can risk them or find ourselves out of balance with them.

In Indigenous contexts, giveaways are founded on such guiding stories which tell of sharing the gifts of life with other people, with animals and spirits of nature. The gifts that are shared are many times symbolized by food as the most foundational element of life. The feast as the context for sharing and the context for the expression of generosity appears to be the oldest and most commonly shared cultural ritual expression. The sharing of food reminds us of our personal and collective connection to the sacred sources of life. The sharing of food and other material possessions is a representation of the mutual reciprocal nature of the process of life. The sharing of food reminds us that the first expression of generosity that we must acknowledge is the generosity of the Earth in her sharing of the bounty of life with human beings thereby allowing human life to perpetuate. This is an implicate understanding that seems to be wired into our brains which in turn finds expression in the ways food is culturally symbolized as a primal source of life.

The social and spiritual transactions in Indigenous cultures which surround the giving and sharing of food form the backdrop for the practice of generosity, the sharing of life and material wealth in a way that gives special focus to the importance of sustaining both people and community. All aspects of Indigenous community life involve the sharing of food at some level. In some cases the food is the prime focus of the occasion. In other cases it is a part of the sharing of words, knowledge, history, ritual or fellowship.

In a broader sense these acts of ritual giveaway represent the natural process of giving and receiving at every level of the natural world. The given of food water and clothing symbolically represents the ethic of care for others and these acts reinforce the bond of relationship that is ultimately essential to both the survival of the individual and the group. So this is the payoff of generosity of individuals in

relationship to communities. The survival of both individual and community and the imprinting of the mind with the life sustaining ethic of giving through the practice and storying of the giveaway. Sacrifice and giving become valued over self centeredness and hoarding. These are the values which sustain community and mimic in human terms the mutual reciprocal processes of natural communities. For the giver the benefit is a transformation of self from a self centered orientation to a community centered one. This is an essential conditioning for a tribal society for it is one way to perpetuate the tribe through time.

When I was about five, I remember going with my grandmother to visit with her friends and relatives in the Pueblo. I remember those days vividly because each visit was an adventure, a break from the usual routine. I seem to remember everything and every place we visited during that year. It was the year before I started first grade at the local elementary school. I learned so much during that time before school with my grandmother. This was also the time when I was immersed in the practice and process of generosity. This was generosity being practiced not as a concept but as an everyday reality.

In traditional Pueblo life generosity was expressed in a multitude of ways. Generosity was expressed in helping others, with sharing knowledge, work, goods and the fellowship of community. I remember watching my grandma and other women and men of the Pueblo replastering their houses with adobe mud, laughing, and working as if they were “one body”. I remember visiting people who were ill and my grandmother taking her “special bundles” of plants to give them and giving special instructions about their use and the proper prayers to say. I remember my grandmother and other aunts baking bread in the special outdoor Pueblo ovens called “ornos”. I remember those special feasts when all my relatives would come to my grandmother’s home or those times when she would go to help others prepare feasts for weddings, baptisms, and even funerals. All of these events involved the generosity of sharing in community.

Generosity then is intimately tied to family, community and spiritual virtue. There is a saying “as Nature, so as Man” meaning that man is a reflection of Nature and man’s nature is formed and informed by the same principles that operate in the natural world. This also means that generosity is both a biological and an ecological principle predicated on the essential activity of giving and receiving that characterizes the central dynamic of living communities. Man’s brain and hence man’s nature are wired toward expressing behaviour that enhances his own survival and that of the human family and community upon which he depends.

Although I know that neuroeconomics studies the brains of animals to see what happens when they make choices that are considered by the researchers to be either generous or selfish and they do this with some interspecies experiments, I think a missing link in understanding generosity is an emphasis on the idea that hospitality, generosity and kindness are not only the expression of ethical behaviour honored by every human culture in some way but it is also an expression of our instinct for bio-affiliation. There is a kind of associative empathy between humans and other living things which is grounded in the physical nature of our body, mind and spirit.

A Harvard zoologist has termed this empathy, “biophilia” or the innate human instinct to affiliate with other living things. Biophilia may be the biological human instinct which forms the foundation for human relationships of all sorts and the tendency to form the bonds of love and relationship found between human beings in families and communities.

*Four Arrows.* Greg, do you think that we might better understand what is coming out of neuroscience and contribute to neurophilosophy if we could describe how Indigenous wisdom sees generosity as a spiritual value?

*Greg.* Yes, I think so. As I’ve hinted at, the first expression of generosity that is recognized by Indigenous peoples is the generosity which is modeled by Mother Earth. In the various expressions of Indigenous spirituality among American Indians, the active focus on maintaining and/or striving for a harmony between one’s self and one’s natural environment was the most essential principle for applying knowledge. As a result of this orientation, Indian people determined that there were right purposes, right acts, right ways of approaching and understanding the natural world. These codes of behaviour were in direct relationship to the way that Indian people conducted themselves in a reciprocal relationship to the natural world. When something was taken from the natural world or animals were killed, ceremonies and symbolic ritual acts were performed to ensure the perpetuation of this right balance and attitude toward relationships.

“Mutual reciprocity” was engendered and reflected in all the kinds of acts that Native people experienced within the context of their natural environment. Indeed, ceremony and ritual were primarily social and spiritual mechanisms which maintained and/or re-established harmony with natural processes, if they had been lost. It was also a way of learning how to maintain one’s relationship to the natural sources of life which Indian people recognized within their place. The offering of tobacco after taking the life of an animal, such as the deer or antelope or buffalo, was a reflection of this understanding, this environmentally-educated sense of being which Indian people practiced in their everyday lives.

For Indian people, the Earth is alive and had its own sense and expression of consciousness and being. The natural environment is a spiritual reality and the earth entities, living creatures, were not to be used haphazardly and without great respect or reflection on the repercussions of their use and/or abuse. A sense of spiritual ecology, founded on a deep spiritual resonance with the natural world, characterized the process and reflection of environmental education among Indigenous people. This sense of relatedness to the natural world came from a much deeper source than simply intellectual understanding. It came from a spiritual orientation to conscious relationship and direct responsibility for maintaining that relationship with those things which allowed human life to exist and upon which human life depended for survival. This sense of relationship unfolded through the perpetuation of what may be called “natural community”, which, in turn, reflected a “spiritual ecology” which connected the People to their Place, their environment and to each other. Since everything was viewed as being mutually dependent, mutually inter-related, nothing in nature could be

viewed as purely self-sufficient, including and especially human beings. The idea of a community which included not only the human species, but all species of plant, animal, insect, which were a part of the place that a tribe recognized themselves as being a part of, became an integral foundation and context for expressing Indigenous environmental education. In turn, the understanding that there was such a thing as a "natural community" led in specific ways to the social organizational concept of "natural democracy". Within this context of natural democracy, natural community, there is the idea that plants and animals, and those other entities in the natural world which share their presence and place generously with man, have rights of their own and must be accorded generosity and given similar respect, truthful and honest presence as would be given to any member of a human tribe.

*Four Arrows.* Yes, and if I may say I worry that without this context neuroscience could lead in the same negative directions that research into the atom has led. Greg, you speak of "a reciprocal mindset" as being behind the emphasis on generosity practiced by most Indigenous cultures. I think you and I understand this as a "returning in kind" in order to maintain balance in the universe. So if we take a branch from a willow tree to build a lodge, we offer hair or tobacco in return to reciprocally acknowledge that each breath or achievement results in a depletion of some other being. I'm not sure if the brain science is being interpreted in this way, however. How do the studies that indicate a reward-punishment based theory of generosity or even an empathy based cause for generosity fit into your idea of a reciprocal mindset? How might we make a connection between empathy, a selfish sense of reward and an Indigenous reciprocal mindset?

*Greg.* There is a largely unexamined bias of Western Science that is generally ignored by scientists in favor of thinking and saying that science is acultural and objective. On closer examination of the scientific method you will find that it is a creative process of inquiry which reduces our innate subjectivity as human beings to the lowest level of expression. But as long as we are human we will have human subjectivity that is influenced by our personal and cultural history. From this perspective nothing that humans do is totally objective. Therefore, subjectivity (which is the ego conditioned mind) always exists in scientific investigation. The observer affects that which is observed. If you seek the selfish nature of brain function and design, that is what your brain, with the active involvement of the mind, will facilitate you finding. If you seek the communal, empathetic nature of the brain that is what the brain with the mind will facilitate you finding. The mind as an emergent quality of brain functioning is very accommodating. This is the quantum quality of the mind. From my perspective human communities and the cultures that they create can be both selfish and empathic at the same time. Individual self preservation and communal perpetuation are not diametrically opposed. They can and do work in a symbiotic harmonious way with one another. This *both and quality* is exactly how natural communities operate. Human and natural communities are first and foremost complex adaptive systems.

*Jongmin.* I can agree about both the symbiotic and the adaptive design of our brain functions, but as a scientist who studies brain functions, I probably do tend to give more power to objectivity than does Greg. I believe that the reciprocal mindset can be built up by the brain's summation of long-standing trials and errors, either consciously or unconsciously. Based on much continuous feedback from the results of their behaviour, people can develop a reasonable knowledge for sustaining their environment, either locally or globally. Thus the reciprocal mindset is powered by superego. In addition, the reciprocal mindset can be fortified when the subjects are exposed to some risk of losing their well-being or happiness. In this case, the reciprocal mindset is driven by both unconscious symbiotic instinct and reasonable knowledge.

*Four Arrows.* So you agree with Greg about reciprocity and symbiosis being a primary function of adaptation?

*Jongmin.* I think so. An extreme example might be how during the tough army training or battle, soldiers are mentally tied together with great generosity stronger than between family members, to help one another survive. Similarly, humans will work in harmony with the mountain to plant trees so future generations will enjoy the beauty and health of the mountain. Or they will be sure not to hunt young animals so as to maintain a healthy population for future generations. I think this is all about reciprocity.

*Four Arrows.* But Jon, this is exactly what is NOT happening in our world! The Western way of "thinking" or "unthinking" is destroying the mountain and animals and more for future generations. And the situation with the soldiers is not about survival for future generations, but immediate survival. On the other hand, Greg talked about how his Pueblo re-plastered their houses with adobe mud, laughing and working as if they were "one body." This seems to be the ultimate form of empathy but is more than just empathy. I remember a story about a guy who tried to save someone from jumping off the Golden Gate Bridge. He was holding on to the heavier man's arms with his toes on the rail about to go down with him when the police hauled both men to safety. When asked why he risked his life for a stranger, the man said "For a moment I could not tell the difference between him and me." Is this reciprocity or something else? I tend to think that the Western cultural emphasis on reward and punishment relates to the devastation of life systems on earth. What can we learn from Indigenous wisdom and research on the brain to help us be generous in ways that can bring us back into balance?

*Jongmin.* The emotional mental function of the human-being is sensitively and quickly activated but shows fluctuation influenced by the other kinds of emotion by time and environment. So perhaps other influences are causing the emotions to move in unreasonable directions and this causes our destructive behaviours. I think that reasonable thinking takes longer to activate and when it does it is coming

from our super egos, not our egos. And at the super ego place, the reciprocal mindset, which stems from the reasoning activity of the brain, combines with empathy, which stems from emotional centers in the brain, combine to create appropriate survival adaptation. The example of the brave man who saved a heavier man would be an extreme case of empathy alone, whereas the Pueblo Indian's activity would be a typical case of reciprocal mindset driven by high-level empathy.

*Four Arrows.* I think the example on the bridge is an extreme example in Western culture but it is not extreme or unusual in Indigenous cultures nor in other animal kingdoms. So such emotional activity as you mention was somehow special in the rescuer but what is it that allows emotional triggers to be so widespread in Indigenous cultures? We know from neuroscience that moral judgments are associated with the stimulation of certain emotions. Perhaps the deep understanding and oneness with all things in Nature and the ways of going beyond fear that Indigenous people employ sets an emotional thermostat in a way that is cultural?

*Jongmin.* The western reward and punishment principle would efficiently construct the generosity driven by very reasonable and logical thought not by indigenous altruism either emotional or unconscious. However, in the viewpoint of oriental scholar not western scientist, I would like to comment about "karma", which is a very important concept in Buddhism and Confucianism. The basic concept of karma is that all life-forms, which you encounter in your life, have had a special relationship with you in your former life. Of course the species of the life forms can be transformed during the "circulation of life". Therefore, people should not deal with life forms as if they are trivial. With referencing this idea, I would say there is something which cannot be explained only by examining emotion and reason. I think there is something else encoded in the human brain that drives people to give more generosity than simple sympathy to the others in exceptional ways.

*Greg.* In the broader context of the natural world what at the surface may seem to be a basic punishment and reward scenario in isolation turns into a mutual reciprocal play of events in the broader context of community. Human beings are social beings and we derive meaning as much from our relationship with the world and each other as we derive from our own self exploration. Our brains are wired at one level to facilitate our individual survival and yet at another level to facilitate our bio-affiliation, our group or communal mind and yet at another level our spiritual or transcendent mind. The human brain has evolved this way and indeed is still evolving this way … the emergent mind is the sum of all of these parts of our brain …. But the sum is always greater than the parts and this is what Indigenous cultures, philosophies and traditions of community learned to work with … the emergent quality of the natural mind. This is the ancient ecology that Indigenous cultures are trying to revitalize, perpetuate and preserve.

Re-introducing this quality of mind and natural propensity of brain function into a contemporary context of expression is what Indigenous traditions of thought have to offer to bring balance back to the dysfunctional collective mind of modern society.

*Jongmin.* From my medical/science view, such generosity is driven by emotional activity. Emotion is a highly complicated brain function which requires abundant cerebral functional resources. This is especially true as relates to the frontal lobe of the cerebrum which is in charge of high-level mental function and emotion. The hypothalamus and pituitary gland, where stress hormones spring out, are activated during emotional events. However, when the brain is operating in balance, in complementary communication with itself, then no evident emotional activity or conflict appears or seems to be required. Due to this fact, the reciprocal mindset would not need strong brain activation. People feel more comfortable when the brain's reasonable function overwhelms the emotional function. There is no apparent stress. So reciprocity as we are describing seems to be the highest, healthiest state of the human brain. Therefore, getting back to what you were asking Four arrows, perhaps the Indigenous relationship that you describe has more to do with a balance between the brain's complementary hemispheres than with some emotional setting.

*Four Arrows.* Very interesting, Jongmin, This reminds me of the research we did together where the student had people watch a simple sights and sounds of nature film and also a portion of Al Gore's film, "An Inconvenient Truth," while we monitored brain functions under an fMRI. I recall that while watching the latter scary predictions about the future, the brains had much stress and emotional activity, especially from the pituitary, but during the simple sights and sounds of nature film, the brain activity was quiet except along the corpus callosum, where communication between the right and left hemispheres was high. Nevertheless, I want to ask another question. You said reciprocity is the highest, healthiest state of the human brain. But why just the human brain? Although intraspecies cooperation with non-kin is an issue that has attracted substantial attention in neuroscience, it is not at all understood. (See Boyd 2003 and Brosnan and de Waal 2003). In the absence of this understanding, the research thus far tends to conclude or imply that reciprocal altruism is rare in other animal species, with some exceptions. I have trouble with this and wonder if you agree that Indigenous ways of knowing see animals as being generous for largely the same reasons suggested by Indigenous wisdom? And if animals are generous, is it because of an activation of places in the brain that stimulate "good feeling" chemicals and reward feelings that are also served by food, sex, drugs and money?

*Jongmin.* I believe that only human-beings can perform "genesis," like the replanting of trees or a garden, etc. We seem to take joy in doing this and thus it is a high level emotional function. Due to this kind of behaviour, human-beings play a major role in maintaining the balance of the world. I think this stems from empathy for other parts of the world. However…

*Four Arrows.* Excuse me for interrupting my friend, but I am recoiling inside at the assertion that humans today have empathy for other parts of the world. I agree we play a large role in maintaining the balance of the world, but it has largely been about upsetting the balance! The Indigenous perspective says over and over in our stories and teachings that the animals are the teachers and the main creatures for balancing the world, whether it is the buzzards cleaning up road kill or bacteria doing what it does.

*Jongmin.* However, any reciprocal mindset of animal species other than human-beings is based on selfish desire, I think. The emotions of animals are primal and the basic components are 'like' and 'dislike'. If the 'like' component is stronger than the 'dislike' component, the animal will tolerate the 'dislike' variables. For example, Penguins in Antarctic islands show tight gathering together when it is very cold and windy to keep their body temperature and make the kids warmer. During this activity, they have to give up asserting their territory of family or themselves and they seem to be very generous to the others by allowing closeness. But in warm weather especially during egg-laying, they are very strict in keeping their territories.

*Four Arrows.* We perceive it as selfish with our Western eyes and our belief that competition is the way of the wild, but it is not true and Indigenous Peoples know this.

*Jongmin.* I think we can compare the behaviours of young animals, especially mammals, with human babies. Human babies, especially during the early infancy, can express their emotion and desire using few behavioural actions such as crying, smiling, wriggling, etc. These behaviours express their emotion of "like" and "dislike" in either simple ways during the newborn or negotiative way during infancy and early childhood. We used to compare the intelligent quotient (IQ) of human and animal. For example, a dolphin's IQ is evaluated as similar as the IQ of a 3 or 4 year-old child. Although I don't have professional knowledge about animal intelligence, I think, this comparison would reflect the ability of negotiation to express their desire and emotion of "like" and "dislike". During this negotiation process, we can observe some generosity which will be compensated by bigger rewards sooner or later. Chimpanzees are regarded as the most intelligent animal and their IQ reaches up to preschool or early school age child. Even we can feel some mind of Chimpanzee in close contact. However, the highest intelligence of animals reaches the level of the child before completion of the 'ego identity.' In human development (or growth), remarkable behavioural advancement occurs at the moment of building up 'ego identity' around 5 to 7 year of age. For human, ego identity is 'acknowledging the existence of himself or herself' and the human starts to think in reasonable and logical ways more than through emotional response. After this level of development, we can talk about wisdom either indigenous or educated. Therefore I would like to comment that the reciprocal mindset with unconditioned generosity is superior to simple empathy and is a property of the human being although we cannot be free from empathy and instinct.

*Four Arrows.* Study #5 offers support for what you are saying but also offers opposition I think. Recall that the authors speculate that humans' ability to feel attachment or aversion to societal causes may have emerged through the same evolutionary mechanisms that resulted in the reciprocity theory applied to animals. This study supports what you are saying in its conclusion that humans may operate beyond the primate reward, social attachment, and aversion neural systems, allowing humans to directly link value to abstract collective causes, principles, and ideologies. However, keep in mind that the "primitive centers of the brain" are still linked to altruism. So just because we may have a uniquely developed anterior prefrontal cortex that becomes involved when immediate self-interest and moral beliefs are at odds, animals don't have to have this because they do not experience such contradictory behaviours. That's why they are the teachers!

*Greg.* Jongmin, I respectfully disagree also. I think it is a limited view to reduce animal behaviour to simple reward/punishment oriented stimulus response mechanisms of brain function. My first college degree was in biology with later graduate level training in wild life biology. My early professional training as a "field" biologist, as we were called in those days, involved many hours of field based observation of animals in their natural habitat. This professional field training combined with a lifetime of prior and current "nature watching" lead me to think that brain chemistry may provide an underlying foundation with some indication of certain behaviour patterns of some basic human and animal behaviour, but it is not all that determines behaviour. I have seen many examples of something greater than just brain chemistry operating to determine both human and animal behaviour. Both Humans and animals exhibit an "emergent" quality called Mind. It is the mindfulness nature of humans, animals, plants, places, the Earth and celestial beings and spiritual entities that Indigenous wisdom is keyed into. So, whether animals are truly generous or are just motivated by instinctual drive, I would point to the countless examples of animals acting in altruistic ways toward each other and toward humans.

Interestingly, or one might say synchronistically, while writing this I stopped to watch a Discovery Channel program about the plight of the polar bears as they attempt to survive the melting of sea ice in the Arctic manifesting as a result of global climate change. There are two scenes in the program which illustrate Indigenous perspective that I have presented. In the first scene a large male polar bear has ambushed a colony of walrus sunning themselves on the rocky shore of an arctic island. The male bear has surprised the colony and they are flipping to safety in the ocean. In the frenzy of the colony's flight the polar bear is able to corner a walrus pup by coming between it and the safety of the ocean. The pup screams it's distress call and the sister of the mother of the cub re-emerges from the safety of the water and pushes its way between the cub and the polar bear, giving time for the cub to escape This walrus gives its own life to save the life of the pup which looks on helplessly with its mother as the polar bear ends the life of its relative. Therefore, what is the motivation of this selfless act of self-sacrifice on the part of the older walrus to save the life of this pup. Is it reward and punishment based on

brain function or is it something else? In the next scene, as this large male polar bear is devouring its prey, another much smaller female polar bear approaches and tries to get a share of the walrus. This is highly usual for another polar bear especially a female polar bear to approach a male which is eating. The larger male bear could easily kill the female for exhibiting such bold and aggressive behaviour. But the female is starving and if she does not feed she will certainly perish within a few days. The male bear initially charges the female and drives her away but in desperation she persists and continues crying for food. In a brain conditioned scenario the male bear would have killed the female. But the male bear seems to sense the desperation of the female and it an "act of generosity" the male bear allows the female to feed with him on the walrus. These acts of "generosity," cooperation and mutual reciprocal relationship among animals of the same species and among interspecies including humans are what Indigenous hunters observed since time immemorial. It is these kinds of acts which formed the basis for the ethical and mythological construct which form the basis of Indigenous wisdom of fostering life through rightful relationship.

*Jongmin.* Greg, basically I know about the existence of animal generosity cases that people enjoy watching. But I don't think this generosity works constantly all the time in the animal world because it cannot be based on reasonable consciousness since, in the field of psychiatrics, the superego is described as a specific mental function to the human being.

*Four Arrows.* But this is just a theory developed by a species that has continually alienated itself from the "other" animals.

*Jongmin.* Of course empathy, emotional exertion, should exist in animal brain function and it may also be fluctuating by external stimuli as in humans. I tend to think that the empathy might be a core of animal generosity. In addition, I think that the scene of generous animal behaviour would be produced by instinctive brain function including some hormonal and chemical neurotransmitter reaction.

*Four Arrows.* I agree that empathy is key, but in human generosity as well. The Indigenous idea expressed in the Lakota prayer that asserts "we are all related" is the expression of the spirituality based empathy Greg described.

*Jongmin.* But without reason, just emotional chemicals is not enough for generosity. It requires reasoning. For example, after feeding period or independence of their offspring, animals might be indifferent to each other or even they cannot acknowledge each other. These behaviours can be explained based on the influence of biochemical reaction in their brain. Even in the case of humans, well-known hormone-related behavioural changes can be observed. For example, during menstruation or pregnancy, some people do violations such as stealing, kleptomania, or fall into a manic-depressive bipolar disorder. Not only in animals but also in human beings, the instinct governs their behaviour of maternity. It is even called

"maternal instinct." These examples are also described as hormonal influence in the brain since a remarkable change of hormonal secretion pattern occurs during the period of pregnancy and lactation. But to be generous in these times, only humans with consciousness can do.

*Four Arrows.* I don't disagree with what you are saying. I'm not saying that any creature is always generous. And I think you and I are really saying the same thing and this is why Indigenous wisdom is crucial. But as you say, there are these similarities between humans and emotions but also there are great lessons to be learned from the animal who eats its young and from a deep understanding of it I contend we truly learn a spiritual, Nature-based generosity.

In my work in the field of character education, I have often written that the great virtues such as generosity, courage, patience, fortitude, etc., are not human created but rather are sourced in the larger animal kingdom. I contend that humans learned these virtues from the animals and that we are not the original creators of these concepts or ways of being in the world. It of course has been quite a controversial contention.

*Greg.* There is many stories in Indigenous traditions that relate the generosity of animals to humans and to other animals as well. These stories certainly originated from actual observation of animals in their natural environment as they were from the creative imagination of the story tellers. The generosity of animals is either related directly or indirectly in these stories. One of my favorite stories is the Blackfoot story of Scarface. A condensed version goes something like this:

Scar Face lived with his grandmother for his mother and father had disappeared shortly after his birth. His face had a birthmark which set him aside from all others and also became the source of ridicule and shame. Because he was different, he was taunted by the other children and "whispered" about by others in the tribe. As Scar Face grew older he withdrew within himself and spent much of his time alone in the forest befriending and learning the ways of the animals he encountered. It is said that he learned "to speak with them." And through them he learned how to be related with all things.

As Scar Face grew older he experienced all the things of life with humility and great reverence. He even fell in love, as young boys do, when they come of that age and express that facet of their "face". The focus of Scar Face's affection was a young woman, Singing Rain, the chief's daughter. Singing Rain was also "a special person", kind and with a gift of insight. Although all the other young men competed for her affection, it was Scar Face who she came to respect and love because of his honesty, generosity and "good heart". However, when Scar Face asked for her to marry, she revealed her sacred vow to the Sun to never marry as a pledge of spiritual piety in the way of the Blackfoot. The only way she could marry was if the Sun were to release her from her pledge. On hearing this, Scar Face determined to undertake a journey to the "place where the Sun dwells" to ask the Sun to release Singing Rain from her pledge. And so, it is said that Scar Face began his visionary journey to the land of the Star People.

Scar Face did not know where the Star People lived, only that they must live in the direction of where the Sun set every evening, beyond the Great Water in the West. So, Scar Face prepared himself with help from his grandmother and when he was ready he set forth on his journey, a journey to the land of spirit. He first travelled familiar territory, but then began to enter into lands which neither he nor other members of his tribe had ever seen. As the snow of winter began to fall, a hundred paths became open to him and he became confused, he did not know which way to go. He met a wolf on one path and with great humility asked for help and direction. Knowing the goodness of his heart, the wolf spoke to him and guided him to the right path. He travelled that path for a great distance until he came to another series of paths and again he became confused. He stopped, set his camp and prayed. Soon a mother Bear and her cubs appeared on the path in front of him. Again, with great humility he asked for guidance form the mother Bear.

The Bear spoke with great kindness and pointed out him to the right path. Scar Face followed the bears' path for many days until the path ended. Now there were no longer any paths in front of him to follow, only the vast expanse of the great forest. As he stood and pondered in front of the forest, two white snow owls approached him. He called to the owls and they landed in a pine tree above him. Again, he asked for direction and help from the owls. Knowing his heart and the nobility of his quest, they responded with great kindness. They guided him through the forest to the edge of the Great Water, where, exhausted, he made camp. He thanked the birds and he thanked each of the animals which had helped him by offering them a gift of song and tobacco. He could see a twinkling of lights across the Great Water and he knew that that was the land of the Star People.

Scar Face did not know how to cross the water to "that place that his people talked about." But he was determined to find a way. He made camp and then fasted and prayed for three days and nights. On the fourth day, a path of sunlight began to form in front of him leading toward the "that place". He leaped onto the path and followed it as it took him higher and higher into the sky. When he reached the end of this path of sunlight, he came to a beautiful forest and another path, a path of great width as if made by thousands of people travelling on it for a long, long time. As he followed the path he came upon a richly decorated quiver of arrows leaning against a tree. He wondered who they must belong to, so he waited to see. Soon on the path coming from the other direction was an extraordinary-looking warrior dressed in richly decorated white buckskin. As the Warrior approached, Scar Face could see that this man was an image of perfection. He asked Scar Face if he had seen a quiver of arrows. In response, Scar Face showed him where the arrows were. Grateful and curious, the stranger introduced himself, "I am Morning Star." Then he asked Scar Face his name and where he was going. "I am called Scar Face and I seek the lodge of the Sun. Then come with me, Sun is my father and I live with my mother Moon in his lodge."

When Scar Face arrived at the Lodge of the Sun, he saw that the walls were painted with the history of all people of the world. Morning Star introduced Scar face to his mother the Moon and as his father the Sun entered the lodge a great light

entered with him. Morning Star introduced Scar Face to his father Sun, the greatest chief. Scar Face was so impressed that he could not bring himself to reveal his reasons for coming to the land of the Star People. Sun and Moon treated Scar Face with great hospitality and asked Scar Face to stay with them as long as he wished. Over the next few days, Morning Star showed Scar Face the many paths in the beautiful land of the Star People. There was one path to a distant mountain that Sun had warned Morning Star and Scar Face never to go near. It was a mountain on the top of which lived a flock of seven giant birds which the Star People greatly feared.

One morning, Scar Face woke to find Morning Star gone. Scar Face arose and quietly left the Lodge of the Sun to take a walk and decide how he might ask the Sun to release Singing Rains from her vow. He thought he might meet Morning Star and ask him for advice. As he walked, he began to feel that something was wrong and the nearer he came to the mountain where the Giant Birds lived thegreater his feeling became. He knew that for some reason Morning Star had gone to the forbidden mountain.

Scar Face set out in search of Morning Star. As he climbed to the top of the mountain of the Giant Birds he found Morning Star engaged in a ferocious battle with the birds. These birds were indeed savage and extremely large. They were about to overcome Morning Star when Scar Face joined the battle. Scar Face fought valiantly and soon turned the tide of battle. One by one, Scar Face and Morning Star began to kill the Giant Birds until all seven were slain and their tail feathers taken by the two warriors.

Tired, yet proud of their accomplishment, Scar Face and Morning Star descended the Mountain and returned to the Sun Lodge to inform Sun and Moon of the defeat of the Star People's most feared enemies. Sun and Moon were very impressed by the courage shown by both young men and were especially grateful to Scar Face for saving the life of Morning Star. In honor of the courage of Scar Face, Sun offered to fulfil any desire that he would request. Yet, Scar Face could not speak his greatest desire and remained silent until Moon, knowing his heart spoke of Scar Face's love for Singing Rains and her vow to the Sun which prevented them from being together, spoke up. Sun immediately responded by saying to Scar Face that he would release her from her vow. Sun touched the cheek of Scar Face and the scar which he had borne all his life disappeared. Morning Star in turn gave him special personal gifts and revealed to him that he was his "spirit" father, confirming the feeling that Scar Face had felt all along. Then Sun and Moon began to sing songs in praise of Scar Face and Morning Star. Sun and Moon then gave Scar Face many gifts, rich clothes and a special shirt. In addition, Sun renamed Scar Face "Mistaken Morning Star" because now without the scar on his face he looked like Morning Star. Sun taught "Mistaken Morning Star" his own special dance, the Sun Dance. He said that if Earth People wished to honor him and bring health and well being to their tribe they should dance the Sun Dance each year when he had reached the highest place in the sky. Then Morning Star led his Earth son to the path called the Wolf's Trail (the Milky Way) and placed a wreath of juniper on his head. In an instant, Mistaken Morning Star was back on Earth and on a path leading to his own village.

Singing Rain was the first to meet Mistaken Morning Star as he approached the village. He told her that Sun had released her from her vow and she knew in her heart from seeing and feeling the magnificence of him that they could now be together, always. Mistaken Morning Star called the people together and taught them the rituals of the Sun Dance. He showed the women how to build the Sun Dance Lodge and he taught the men how to conduct the sweat lodge ceremony and raise the Sun Dance pole. He taught them about the sanctity of their individual "spirit" and the nature of scared visioning. He taught them from "that place that Indian people talk about".

There are profound lessons to be learned from stories like Scar Face. The traditional versions of the tale told in the Native language have a richness and depth of meaning which is difficult to express. Such richness and depth of meaning is true of other similar tales among Indigenous people around the world. They are like the mythical "spirit" deer: they leave tracks for us, beckoning us to follow, if we would but follow. [13] These stories also embedded the understanding that human beings have always been learning from animals and celestial beings. They represent the generosity of animals and other spirit beings in providing human beings, with food, clothing and advice.

*Jongmin.* I appreciate ending this dialogue with the story because, indeed, it has meaning that is difficult for us to express otherwise. Still, I will try to summarize my final opinion, for I think the dialogue has modified it a little. In this dialogue section, I adhered to the analytical evaluation of generosity, which might be the highest mental function in reciprocal mindset, in the viewpoint of a scientist. I bisected generosity into emotional and reasonable traits to understand bipolar characteristics of generosity, prompt sympathy and consistent and cautious altruism. Animals and human babies express more emotional generosity and grown up humans express more reasonable generosity. Paradoxically speaking, the emotional generosity would be more common and frank whereas the reasonable generosity would be less common and hard to be expressed by common people.

Sometimes, the source of generosity is difficult to differentiate. This would be due to the emotional and reasonable traits of generosity being interlinked and intermixed. In ancient Sumer tribes, they were very cautious when making important decisions. At first they would make a decision with a clear mind and subsequently would make the same decision after drinking wine, or vice versa. This cautious behaviour stemmed from the wish not to make any mistakes about important decisions since they treated both emotional and reasonable ways of thinking with equal weight and even they could not decide which decision was right.

The Buddhist philosophy emphasizes the virtue of 'balance'. The whole world is a single perfectly harmonious world and all life forms including human beings are components of this dynamic world. This concept is quite similar to the concept of "Gaia" in western philosophy. But one distinctive concept of Buddhism not found inwestern philosophy is the "circulation of life". Even this "circulation of life" is included in the whole world as a component. As a component life form,

people respect the other life forms as colleagues or siblings. Buddhists think the relationships of all the life-forms are perfectly organized along with the balance of the whole world including this and former life. This concept would deal with the mindsets of human and animal on the same level. In this viewpoint, the externally observed generosity, either human or animal, has similar features. Whether the hidden motivation of the generosity is emotional or reasonable traits, the generosity itself should be respected as a great virtue to keep the balance of the nest which we and our offspring should inhabit forever.

## III. CONTINUING THE DIALOGUE FOR UNDERSTANDING

1. After having read the brain research study summaries and the dialogue that followed, where do you see similarities between Indigenous views and Western neuroscience and where do you see differences?
2. Do you believe there is a possible paradox between the idea of a "spiritually" based or Nature based source for generosity and a brain neurotransmitter caused phenomenon? Why or why not?
3. Considering the historical and cultural differences in a widespread practice of generosity/altruism between Western cultures (generally speaking) and Indigenous ones, how would you explain the difference?
4. In Indigenous wisdom, it is understood that the highest expression of courage is generosity. This is why encouraging a young child to give away its favourite puppy might have been a lesson in generosity. How might this kind of cultural understanding of a connection between sacrifice and generosity influence or contribute to neurophilosophy?

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CHAPTER 2

# HONESTY AND DECEPTION

*"None Excel Them in Virtue and Honesty"*

(From DeJong, D.H. "Ecclesiastical and Military Descriptions of the Gila River Pima, 1694–1848" in *The American Indian Quarterly* 29.1& 2 (2005) pp. 24–55)

## I. NEUROSCIENCE STUDIES OVERVIEW

*Joy Welcker and Krista Freece*

We have selected and present seven imaging studies investigating the neuroanatomical pathways implicated in deception. In general, the studies support the contention that deceptive behaviour is guided by activity of more highly developed and sophisticated areas of the brain, specifically within the prefrontal cortex. Several studies also implicate the anterior cingulate cortex and the amygdala, which are more primitive structures associated with emotion and reward seeking. However, there exist differences in the particular neuroanatomy associated with deception, across the studies. Changing the circumstances surrounding a deceptive act results in activation of diverse sets of neuroanatomy, including areas implicated in linguistics, impulse control, inhibition, attention, planning, and theory of mind, emotion, and memory. Differences are even found among individuals performing the same task. The cognitive complexity of deception is affirmed by subtle variations in findings among the studies reviewed.

The empirical exploration of deception has been facilitated by the availability of improved neuroanatomical scanning devices, such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET). According to the research, deception is a common human behaviour, serving as a means to avoid punishment, as in lying about committing a crime; serving as a way to achieve social acceptance, possibly by averting a negative truth; or serving to reduce external stress, by allowing the organism to predict and escape unwanted interactions. Spence et al. (2004) affirmed that the purpose of lying has roots in cooperative social interactions among members of the human species. Limited disclosure and tactfulness serve to promote healthy social relationships that aid in survival. This may facilitate protection, communication, and promotion of knowledge among humans. Deception is also present in more pathological forms, exemplified by such mental health disorders as Factitious Disorders, Somatization Disorder, Conversion Disorder, Pathological Lying, and Malingering (Hughes, et al., 2005). Spence et al. (2004) also hypothesized that lying requires multiple cognitive processes within prefrontal systems, and that truth-telling can be used as a baseline measure for neuroimaging

of deceit. Thus, a main feature of telling a lie is the cognitive ability to suppress the truth (Langleben, et al., 2005; Spence, et al., 2004). Lying also involves using context to make it believable, and remembering the difference between what information is real and what information is fabricated. In the studies below, honesty (or truthful responding) is used as a control mechanism by which to compare neural activity generated by deceptive acts. However, it is argued that using this method alone may be problematic (Spence, 2008).

Deception can be viewed from an evolutionary perspective. Previous research speculated that the cognitive ability to lie probably emerged within the primate brain, prior to the evolution of man. For example, Byrne and Corp (2004) found that "the size of the neocortex in a modern primate species predicts the extent to which individuals of that species use deceptive tactics for social manipulation" (p. 1696). Deception eventually evolved into "an integral part of human social interaction" (Hughes et al., 2005, p. 278). Hughes and colleagues (2005) also suggested "deception has evolved in later, more sophisticated organisms, and … it persists for a reason" (p. 273). Effective use of deception requires theory of mind, or the ability to infer one's own mental state as well as the mental state of others. Further, Lee et al. (2002) precisely defined lying as "the recognition of, and attempt to manipulate, the mental states of others" (p. 163). This requires one to be able to know what one is thinking, suppose what another is thinking, and premeditate a way to manipulate another's train of thought. Hence, lying involves the complex activation of prefrontal areas of the brain, which direct executive function. Further, the idea that propensity for deception exists among higher-order species as an innate behavioral characteristic that is influenced by culture, is supported by current lexical research suggesting that honesty should be considered a sixth factor of human personality development (Ashton, Lee, & Son, 2000).

Deception may also be viewed from a developmental perspective. Ford, King, and Hollender (1988) speculated that the act of deceit serves to create a boundary between "self" and "other", particularly between a young child and mother. The authors asserted that lying is a skill that naturally arises during childhood and constitutes "normal" human behaviour. From a biological standpoint, children develop the cognitive capacity to lie because it benefits them as adults in society. Hughes et al. (2005) also reported that studies of children have acknowledged the natural development of deceptive strategies. In fact, they asserted that "from a cognitive neurobiological perspective, deception resembles an executive task," (p. 274) suggesting that the inability to successfully deceive another may be the result of neurological dysfunction.

The act of deception encompasses a broad range of mental activities, whose activation is dependent on the exact set of circumstances that bring about the need or desire to lie, thus a human's propensity to lie is a well-developed, complex, and sophisticated skill. According to Mohamed et al. (2006), numerous areas of the brain are involved in deception as a broad concept, including the following: lingual gyrus of left hemisphere (differentiating language), anterior cingulate gyrus (attention and response inhibition), inferior parietal lobe of right hemisphere/ inferior frontal gyri of left hemisphere (mirror neuron system enabling theory of

mind), hippocampus (memory and emotion), and amygdala (fear and anxiety). Ganis, Kosslyn, Stose, Thompson, and Yurgelun-Todd (2003), found that different patterns of brain activation are present when people tell lies than when they tell the truth. The parietal lobes (bilaterally) are associated with truthful responding (Langleben et al., 2002), while deception is associated with frontal lobe activation, particularly the ventrolateral prefrontal cortex, anterior cingulate cortex, and the amygdala. However, as the following studies will show, the neural processes that underlie deceit seem to vary among individuals, likely because each person's qualitative experience during deceit is individualized. This makes detection and measurement of deception an imperfect science.

Current methods of detecting deception include polygraph (using electrodermal activity to measure anxiety, supposedly resulting from guilt), Guilty Knowledge Test (GKT) in conjunction with polygraph (uses multiple choice questions to elicit electrodermal changes when a guilty subject sees the correct answer, thus the test targets change in heart rate, respiration, and blood pressure), event related potentials (ERP) (a measure of response latency), and most recently neuroimaging, including fMRIs and PET scans (Hughes et al., 2005). The GKT has been shown to be a relatively effective measure of psychophysiology (Ben-Shakhar & Elaad, 2002) and the polygraph is routinely used to determine if a person is being truthful. However, neuroimaging techniques and ERP to date have been used to measure deception and response times primarily in a research setting because their efficacy has not been standardized. But it can be inferred from the literature that fMRI and PET scans may be used in the future to enhance the detection of deception, by pinpointing the activation of particular neural processes, associated with deceptive acts. Following is a summary of studies that explored various circumstances involving deception; the differences among the findings should alert the reader to the multi-faceted nature of the cognitive processes underlying this broad concept.

### *Study 1: "Correlates of Deception in Humans"*

Spence and colleagues (2001) believed that lying is a "normal component of human social interaction" and its development can be traced through the evolution of the primate species (p. 2849). They proposed that deception is achieved through a series of cognitive processes, including the ability to determine what another is thinking (theory of mind). Current methods of detecting deception may be too simplistic and fail to capture the gestalt of the cognitive processes that activate during intentional lying.

Using 30 subjects, Spence et al. (2001) found consistent behavioural and neurological output during a simple lying task (using dichotomous yes/no responses). During lying, response times were longer than during truth-telling, and areas of the prefrontal cortex were activated. This study sought to identify differences in cognitive processes during lying behaviour using visual versus auditory tasks.

Thirty healthy subjects completed a 36-item questionnaire of yes/no questions. Next, the questions were read from a computer screen (visual administration) and the subjects were prompted to lie in accordance with a "color rule" (red or green).

In the visual condition, the series of questions was administered twice, and over the course of the two runs the subject provided a true and a false response for each question. This format was then duplicated for two voice-automated presentations of the questions (auditory administration). Finally, ten males were selected from the original 30 subjects for scanning (BOLD fMRI). Data was collected on both the non-scanned and scanned samples.

Data collected from outside the scanner revealed significantly longer response times for lying behaviour in both the visual and the auditory conditions. Similar results were found for the smaller sample inside the scanner. While subjects exhibited consistent fMRI responses within some areas of the PFC, there were differences observed in the sites of activation for the two conditions. During the visual administration, the ventrolateral PFC and the medial PFC were activated during lying. But during the auditory administration, the ventrolateral PFC and the medial premotor region were activated while lying.

These findings suggest an inhibitory function (withholding the truth) while lying; it is speculated that this cognitive function may be absent in the autistic population. This particular study required both suppression of the truth and production of a lie, thus it did not allow for investigation of differentiation between response inhibition and response alternation.

*Study 2: "The Complexity of Deception"*

In this study, Ganis and colleagues (2003) conclude that lying should not be treated as a single category of behaviour because it requires the activation of several different neural systems, based on the specific conditions underlying the deception. They stressed that future research on lying behaviour must recognize different types of lying conditions and treat them independently.

More specifically, various types of deception require the activation of specific sets of neuroanatomy within the PFC. Ganis and colleagues (2003) explored two different types of lying: spontaneous lies (which require the integration of stored info) and memorized lies (which require only retrieval from memory), with the assumption that different types of lying will elicit activity within distinctly different areas of neuroanatomy. First, they hypothesized that retrieving a deceptive memory is more difficult than retrieving a truthful memory. Second, they hypothesized that there would be differences in neural activity between isolated lies (about a simple event) versus coherent lies (must fit into a scenario). Third, they expected that working memory must play a greater role in the creation of coherent lies. The study investigated neural activity using fMRI for three conditions: truth, memorized lie, and spontaneous lie.

Ten subjects (ranging in age from 20 to 30) were required to write about their most memorable work experience and their most memorable vacation experience. One week later, the subjects returned and their stories were reviewed. The subjects were then asked to create an alternate (untrue) scenario of one of the situations; this story served as the Memorized/Scenario (MS) lie. The subjects were then placed in the scanner and asked to recreate the MS lie. Next the subjects were asked to

recreate their story about the other scenario; this served as the Spontaneous/Isolated (SI) lie (for which they were unprepared). Finally, the subjects were asked to provide honest responses, based on their initial stories.

Results revealed differences in cognitive activation between the truth condition and the lie condition. Also, different areas of the brain were activated under the two distinct lie conditions. MS lies activated the middle frontal gyrus, while SI lies activated the anterior cingulate gyrus, the premotor cortex, the precentral/post central gyrus, and the right cuneus. Brain regions activated by both conditions included the middle frontal gyrus, fusiform/parahippocampal gyrus, right precuneous, and the left cerebellum. In sum, "different patterns of brain activation arise when people tell lies than when they tell the truth, and the type of lie modulates these patterns" (p. 833). These results also support the contention that the cognitive act of deception is multifaceted, and lying in different scenarios creates experiences that are qualitatively different.

*Study 3: "Measuring Brain Activity During Deception"*

Because deception is associated with numerous medical and mental health disorders, Kozel et al. (2004) asserted a need for measuring deception in a manner more reliable than the current methods, including peripheral measures of deceit, such as the polygraph. They suggested that using fMRI and PET scans in the future to detect deception by revealing brain activity associated with lying behaviour, may offer a more dependable measure to aid in patient diagnosis and legal decisions. Kozel et al. used blood oxygen level dependent (BOLD) fMRI and electrodermal activity (EDA) to identify brain regions, specific to deception. Since no prior studies of this nature (using the same two measuring techniques) were available at the time, the authors investigated the whole brain, while hypothesizing that activity in the orbitofrontal cortex, anterior cingulate gyrus, and amygdala would be heightened during deception. These brain regions were selected due to their suspected involvement in response inhibition, divided attention, and anxiety.

Eight males, ranging in age from 21 to 28 years, were given the opportunity to earn up to $100.00 each for participating in the study. Each participant was directed to find the object beneath which a $50 bill was hidden, remember the location, and leave the money in place. All participants were then randomly assigned to either the "truth room", where they were instructed to accurately report the location of the money, or the "deception room", where they were asked to respond in opposition to the truth. Participant groups took turns in each room so that each participant provided both truthful and deceptive responses. All responding resulted from nonverbal gestures requiring the participant to hold up one finger to signify "yes" and to hold up two fingers to signify "no" in response to the investigators' standardized question set. Brain scans acquired from the "truth room" were used as a control against which to compare responses generated from the "deception room". Participants were motivated by the opportunity to earn $50 for correctly reporting the location of the money in the "truth room", and an additional $50 for being able to deceive without being recognized in the "deception room". Both group and individual analyses were performed.

Group analysis of EDA changes and BOLD fMRI changes confirmed the presence of statistically significant activity in the orbitofrontal cortex and the anterior cingulate gyrus during deception (as hypothesized), but failed to confirm statistically significant activation of the amygdala. Other brain structures that were not included in the original hypothesis were also found to be significant, including the superior temporal gyrus, cerebellum, and the frontal gyrus.

Individual analysis of EDA changes and BOLD fMRI changes revealed that no specific regions of the brain were activated for *all* subjects during the deception task. However, six out of seven subjects showed significant right orbitofrontal activity, and five out of seven subjects showed significant right anterior cingulate activity. Also, no additional brain regions (outside of those in the original hypothesis) revealed significant activity in response to the deception task consistently across individuals.

*Study 4: "Neural Correlates of Telling Lies"*

Phan et al. (2005) pointed out that deception is a common human behaviour that can be used as a positive social adaptation or a means to evade the consequences of violating societal law. As such, it is important to be able to determine with accuracy who has broken the law and who is innocent of offense. Because deception employs several semi-independent neural systems, including those responsible for theory of mind, constructing lies, telling truths (pre-potent responses), monitoring tasks, and motivation, the endeavour to predict deceptive activity becomes convoluted. fMRI was used to simulate conditions similar to that of polygraph testing in order to examine neurological activity during deception. This was achieved by replicating a study design by Langleben et al. (2002). Initially, 14 subjects, ranging in age from 23 to 48, were given two playing cards (a five of clubs and a two of hearts). They were asked to memorize the cards and place them in a pocket. The subjects were then asked to lie about one card and to tell the truth about the other card (half the subjects were asked to lie about one card and half were asked to lie about the other card). Subjects used a button press to respond "yes" or "no" to questions about the cards.

For the actual study, an entire deck of cards was used. Subjects were placed in the scanner and told that their performance was being monitored (similar to a polygraph situation). The five of clubs served as the lie/truth condition, the two of hearts served as the truth/lie condition, the ten of spades served as the control condition, and the remaining cards in the deck were "non-target responses" always answered with "no"; they served to sustain attention to the task. The subjects were given one card at a time and they were asked questions, such as "Do you have this card?" and "Is this card the ten of spades?"

Results revealed activity across several prefrontal cortical regions during the telling of a lie; these areas included ventrolateral PFC, superior temporal sulcus (associated with malingering, but not other types of deception), dorsal medial PFC (associated with awareness of one's own emotions and theory of mind), and dorsal lateral PFC (associated with impulse control). The medial PFC was the area most consistently activated across subjects; therefore, it could be viewed as a "neural

signature for the generation of lies, suppression of the truth, or both" (p. 169). These results support the idea that, in fact, very precise areas of the prefrontal cortex are involved in deceptive behaviour. The authors also asserted that lesions within these areas are likely to result in specific patterns of cognitive dysfunction in rodents, primates, and humans. In the future it may be possible to use fMRI scanning in conjunction with polygraph-like instruments to enhance the reliability of lie detection.

*Study 5: "Types of Deception"*

Abe et al. (2006) discuss that humans deceive each other for various reasons, both trivial and serious, citing deceptions between husband and wife as an example of trivial deception, and deception between nations as serious deceptions. Further, they consider the powerful effect deceptive acts can have on the lives of self and others, prompting an interest in "why people tell lies, when and where they do, how they do, and whether or not we can detect the deceptions of others" (p. 192). In this study the authors examined two types of deception: "experienced" events in which the participant pretended not to remember performing a task, and "unexperienced" events in which the participant pretended to remember performing the task, although he/she did not actually perform it.

Fourteen male participants, ranging in age from 18 to 23, were asked to perform twenty tasks (e.g., coloring a picture, shaking maracas, solving a puzzle) in a randomized order, during an "experience" phase. During the PET scan experiment, the participants were shown pictures of both tasks they had performed and those they had not. The participants were asked to respond to the pictures by sometimes telling the truth and sometimes lying. This created four conditions: truth-old task (TO), in which they truthfully responded to a task they had performed; lie-old-task (LO), in which they lied about a task they had performed; truth-new-task (TN), in which they told the truth about a task they hadn't performed; and lie-new task (LN), in which they lied about a task they hadn't performed. The authors found that the lateral PFC and the medial PFC were activated during deception. Additionally, the anterior cingulate cortex was activated only during the "pretending not to know" condition (LO). They also concluded that "the cognitive processes associated with deception are more complex that those associated with truth telling", as evidenced by measuring reaction times (p. 196). Overall, these results suggest the "possibility of dissociable roles of the prefrontal and anterior cingulate cortices in human deception" (p. 197).

*Study 6: "Emotional Aspects of Deception"*

According to Abe, Suzuki, Mori, Itoh, and Fujii (2007), deception consists of not only the inhibition of truthful responses and the production of untruthful ones, but also the intention of deceiving someone. Thus, emotional regulation and social processes are thought to be involved. The intent of their study was to determine whether different regions of the prefrontal cortex were activated during two

deceptive activities, producing untruthful responses and attempting to deceive someone, by asking questions during a PET scan. The authors used a 2 X 2 factorial design to measure the main effects of the truthfulness of responses to the questions (truth versus lie) and attitude toward the questioner (honest versus dishonest), as well as any interaction effects.

During the course of the study, each participant was asked a total of 12 autobiographical semantic questions; four related to elementary school, four to junior high and four to high school. Each answer was a one word verbal response. In one task, the participants obeyed the interrogator and told the truth in response to questions (honest-truth; HT). In the honest-lie (HL) task the participants obeyed the interrogator and told lies in response to questions. During the dishonest-truth (DT) task, the participants deceived the interrogator and told the truth in response to questions when they were asked to lie. In the dishonest-lie (DL) task, the participants deceived the interrogator and told lies in response to questions in which they were instructed to tell the truth.

Before each of the DT and DL tasks, during a ten minute break, a second experimenter had entered and asked the participants to deceive the first experimenter by doing the opposite of what the first experimenter asked. The participants were told that the first experimenter did not know they were being asked to do this, and that deceiving the interrogator was the most important purpose of the study. In addition, participants were asked to make sure that the first experimenter did not discover their deception.

The results indicated a main effect for lying in the left dorsolateral PFC, whereas the right anterior PFC showed main effects of both lying and dishonesty. The ventromedial PFC and amygdala showed a main effect of dishonesty only. In summary, each of the deception conditions in this study affirmed activation of areas within the prefrontal cortex, but only the condition specific to dishonesty revealed activity in the amygdala.

*Study 7: "Affective Response of Self to Moral Violations"*

Berthoz and his co-researchers (2006) suggest that honesty is a component of morality which "depends on a set of cultural rules that regulate interpersonal behaviour and provide a basis for social cohesion" (p. 945). They explain that a person's affective response to a violation of these cultural rules depends on if the event was accidental or intentional, and whether the individual committed the transgression or witnessed the event. Consistent with their hypothesis, the authors found that the amygdala was activated when individuals described stories of their own intentional violation of cultural rules.

The participants of the study were twelve males, ranging in age from 19 to 36. The study design was a two-way factorial in which intentionality (accidental, intentional) and agency (self, others) were factors. The participants were asked to read four types of stories: self-accidental (SA) (subject engaged in an accidental violation of social norms), other-accidental (OA) (someone else engaged in an accidental violation of social norms), self-intentional (SI) (subject purposefully

engaged in a violation of social norms), and other intentional (OI) (someone else purposely engaged in violation of social norms). The stories for self and other were identical except for the protagonist of the story. The severity of the accidental and intentional violations of cultural rules was judged to be equivalent. Neural activation for each type of scenario was measured using fMRI.

When comparing intentional violations to accidental ones, the areas of the brain showing a significant differential pattern of activation during intentional violations included the left dorsolateral cortex, superior frontal cortex, anterior cingulate gyrus, left inferior parietal cortex, left superior occipital gyrus, left amygdala, right cerebellum and bilateral precuneus. When comparing accidental to intentional violations, the only significant activity occurred in the right temporal pole. The main effects of agency showed significantly different activation of the left precuneus and the right cerebellum, specifically when the participants read the "self " stories, rather than when the violation was committed by another. In the SI condition, significantly different bilateral amygdala activation was seen when compared to the other conditions. The authors suggest that further research is needed to determine whether the activation of the amygdala "reflects the anticipation of punishment" (p. 949). Overall, precise areas of prefrontal activation differed among the various tasks.

## II. INDIGENOUS PERSPECTIVES DIALOGUE

*Greg Cajete, Jongmin Lee and Four Arrows*

*Greg.* These studies seem to reveal that deception is a higher order brain function that evolved to help humans survive. This does not make much sense to me. In Indigenous ways of thinking, we learn to observe and listen carefully so as to understand physical reality and experience, not to find ways to misrepresent it! There can be little doubt that deception has "evolved" to play a large role in the world today, but this says something different. Indigenous Peoples have always believed that it is important to see what is real about a situation, a thing or an entity. If something did not occur in the physical plane, it did not occur. Our languages help in such understanding because they are rich with descriptive terms and action verbs that minimize reductionism and abstract generalizing.

At the same time, Indigenous thinking honors the reality that there are always two sides to the two sides, that there are realities and there are realities. Learning how they interact is real understanding. Our knowledge comes from our stories, stories that mirror the way the human mind works. They echo a truth lived and remembered because their roots go beyond the context processes of the brain. They stem from the heart of the human psyche. Thus understanding what is true is a matter of heart and mind and this also helps one know what cannot be comprehended or articulated. If it were otherwise, if deception, not right thinking and remembering were tools for social cohesions, as these studies seem to conclude, it seems that survival would be compromised, not enhanced. Moreover, Nature is the first and foremost teacher of how things are in the world. This is why animals and plants are

considered to be teachers for us. Neither Nature nor animals lie about reality. Animals may have instinctive ways of hiding food or playing dead or stalking prey, but these are not examples of misrepresenting reality in the ways human deception does. I think deception is not a cultural adaptation for survival and social cohesion but rather a moral failing and thus agree with David Putman's ideas that self-deception, like greed, is a vice that is justified in Western culture on utilitarian grounds (Putman 1987, pp 549–557).

All of this is to say that, as a virtue, honesty is extolled upon metaphorically and symbolically in many aspects of Indigenous cultures. This is why it is highlighted or alluded to in many Indigenous stories, especially Trickster stories, and is a part of the central teachings of Indigenous spiritual traditions. But why have people who have lived on the Earth for so long and in such close harmony with her come to view honesty so intently?

A key to understanding the origins of honesty in the human psyche and in human society is to view it as one of the traits which supported a group oriented way of life that placed value on belonging to a group and to a community. Human beings are after all social animals. Our brains and subsequently our behaviour are conditioned by our social instinct for living and relating in intimate groups. Early human evolved in groups whose way of being in the world did not place value on amassing material goods, avarice, self-centeredness or aggression. It was belonging to a group and the complex of values that supported such belonging that were valued. Honesty supported good long term relationship and facilitated the cooperation and adaptation so essential to maintaining human social groups. In other words, valuing honesty which in turn reinforced trust provided the first human families with the edge that was the essence of early man's survival. In the development of early human societies a single isolated individual had no chance at long term survival. Of course, this perspective, as we have seen, stands in opposition to many Western academics view on the value of deception in survival.

Still, it was the "group mind" that developed first among human beings. This "group mind" was rooted in the interdependence and mutual reciprocal behaviour which paralleled the symbiotic relationships found in natural communities. The dynamic process of human adaptation to ever changing environmental conditions that is so much a part of the "genius" of human evolution is based on our singular ability to evolve social environments conducive to the needs of our group. Honesty is both a value and a way of behaviour which is required for the development of "trust" with in a group. Honesty reinforces "trust" between members of a community which in turn fosters the cooperation necessary to sustain the group. Human adaptive values are those that encourage individual and family relationship, love, honesty, cooperation, collaboration, compassion, generosity and self-lessness. These are the values that keep a group working and living together for mutual benefit. Pre-agricultural humans cultivated these values of group cohesion because the survival of the group was the first and foremost priority. For our pre-agricultural ancestors belonging to a group mattered and belonging to a place mattered. Values that reinforced belonging to a group form a deep part of human consciousness. Psychologically, pre-agricultural people did not see themselves as separate from

their group or the natural place in which they lived. The community or group mind and its affective orientations of belonging, interdependence, mutual - reciprocal behaviour characterize all tribal societies. Some socio-biologists would refer to this deeply embedded sense for belong as an expression of our human instinct for "biophilia," the predisposition to relate or affiliate with other living things particularly other humans. This instinct might be said to be the biological basis for socialability, relationally and community.

In hunter-gatherer communities there was a general absence of stealing. Richard Erdoes writes in his book, *The Sun Dance People:*

> Among a people without locks, keys, or money there were no thieves…Without lawyers, no contracts, or anything in print, men found it impossible to cheat. Without any jails, there could be no criminals.

Invariably the practice of horse theft, theft of women and children during raids on other tribes comes up. And why does the theme of theft come up in a variety of Native American stories, especially related to the exploits of tricksters which abound in stories from all tribes.

According to Erdoes:

> Ideas of acquiring more wealth and personal property than one truly needs were foreign to Native Americans. This is not to say that they were not concerned with self-image. Quite the contrary, it is hard to imagine people more aware of honor, their status and their place in the eyes of peers, than Native Americans, past and present. But the orientation was towards people rather than the individual. A man of great wealth who did not share freely was not well respected… If someone did something purely for himself – such as stealing another tribal member's property – he committed a double transgression. Not only had he stolen, he had placed his own interests above that of the people. Punishment for such an offense was usually the most devastating sort of treatment imaginable to the group-oriented Native American – to be exiled or completely ignore. (Stealing Horses, Joseph Bruchac in Parabola. pp. 54–59. Vol. IX. No. 2. April 1984).

Stealing horses [from enemies] on the other hand was an act of great courage and a great service to one's people. It served to benefit the people and to extend the survivability of the people from the standpoint of Plains Indian society. In terms of individuals it bought honor as a warrior. Stealing for the good of the people brought honor in Plains Indian society. The deed of stealing horses showed the individual warrior to be a person of character, willing to face danger for the good of the people. It showed the person to individual to be a person worthy of trust, a person that could be depended on to work for the good of the people. Honesty as a value that promoted trust within the group was actually mirrored by the "stealing" of horses as an act for the benefit of the people which also engendered trust in the individual. Horses were considered sacred animals and possessing them brought not only honor but great luck as well. All the Indian groups who encountered

the horse early on such as the Plains Indians, the Apache and Navajo created a place for it as a spirit animal in their story and spiritual traditions. This was because its introduction and use for transportation, hunting, trade and warfare transformed their cultures. In short, it was a gift of the spirits which "revolutionized" while at the same time sustained their cultures. Bruchac gets right to the heart of what at first glance might seem like a paradoxical relationship of theft to the adaptive value of honesty in Indigenous societies.

> If there is one evil which is greater than all others to Native American people, it is selfishness. When someone owns something which can benefit others and does not share it, it is a great wrong especially when that something is one of the great gifts of the Creator such as Tobacco or Fire o or Light… or the Horse. (p. 59).

The theme of "theft" for the greater good of the people may be said to be a kind of "mirror" value to honesty in that it mirrors the importance of trust in a group. Theft for the greater good was often intertwined with lessons of the importance of honesty in trickster stories. Native American Trickster stories allude to or directly present the value of honesty as an antithesis to the behaviour of Coyote. By extensively representing the less than honest nature of Coyote these stories reflect on why honesty is important as a value and as a way to conduct one's life. In stories where theft is a theme, Coyote's propensity for trickery and deceit ultimate benefits others. In these stories, theft becomes an acceptable outcome because it improves the life of the people in some way.

*Four Arrows.* I agree Greg. All of these studies tend to support the idea that deception may be an evolutionary survival mechanism and this does not make sense to me either. Yet this seems to be one of the major conclusions in neuroscience. For example, in his book, *Why We Lie*, David Livingstone Smith, Director of the Institute for Cognitive Science and Evolutionary Psychology at the University of New England, says, "Deceit is and probably always has been a major concern of human culture (2004, p. 12)." He contends throughout the book that "the very structure of our minds has been shaped from our earliest beginnings by the need to deceive (backcover)." He even refers to hunter-gatherer populations, past and present, and asserts that "It would be a grave mistake to draw the sentimental conclusion that these people are "noble savages," innocent of a thirst for power" and speaks to his presumed "fact" that warfare was common among Indigenous Peoples as one source of evidence, p. 174). Of course, his claim about the prevalence of Indigenous warfare is itself is a deception, as shown, for instance, in my book, *Unlearning the Language of Conquest*, and more thoroughly in Johan M.G. van der Dennen's 2005 dissertation, *The Politics of Peace and War in Preliterate Societies*, that begins, "Peaceable pre-industrial (preliterate, primitive, etc.) societies constitute a nuisance to most theories of warfare and they are, with few exceptions, either denied or 'explained away'." http://dissertations.ub.rug.nl/FILES/faculties/jur/1995/j.m.g.van.der.dennen/OW_APP.pdf

I think what these researchers reveal is a Western worldview that comes from having for too long used the kind of "abstract generalizations" that you mentioned to make sense of the world. Robert Lawlor says it well in *Voices of the First Day:* "In Western thought, generalities are used to make sense of the world around us, but they impose an order on reality rather than connecting us to the world's living presence and the metaphysical dimensions from which it arose (1991, p. 271)." He explains how this has led to stereotyping, making assumptions, deception, and totalitarianism. He even ties this to the brain, saying that the practice of reducing and generalizing actually reinforces a filtering mechanisms in the lower brain stem called the reticular formation causing us to be less able to perceive direct reality. This is supported by the pioneering work of cellular biologist, Bruce H. Lipton, whose work reveals that thought patterns act formatively on the brain ((2008).

*Jongmin.* Before I speak in my capacity as a neuroscientist, let me join this dialogue with an idea from my Buddhist perspective that tends to support where I think Four Arrows is going with his comments about how a certain way of thinking might change the brain. In Buddhism, in the "Eight Fold Path, there are eight paths of righteousness. "Right speech" is the first principle of ethical conduct. This precept is about avoiding words that are spoken with the intent of misrepresenting truth. It tells us that such a practice can deteriorate the mind, and vice versa in a vicious cycle. This is another way of saying, as Dr. Lipton does, that words and thoughts can change the brain perhaps. It at least explains the addictive quality in which those who practice deception tend to repeat it over and over again. The goal is for right speech that will lead to right speculation and right behaviour and perhaps this too can become a biological tendency of the brain. Whether a particular worldview can cause such changes is an interesting question.

*Four Arrows.* Jongmin, let's stay with this question about worldview then. Indigenous wisdom seems to be sourced in the emotion of compassion self and all others. Emotive power is related to the authentic respect for and knowledge of the social and environmental surroundings that range from family and community to plants, animals, rivers, rocks and trees. It is not really organized around the brain in the kind of hierarchal control system that we might be accepting in a book such as this that is about brain research. Greg, am I stating this right, because I want to be sure you agree with me on this before I go on?

*Greg.* Yes, I think compassion for all of life is a requirement for or goes hand in hand with believing in the sacredness of relationships, a belief that defines Indigenous culture. And although I'm not sure where you are going, I'm happy you brought it up in this talk about deception because learning about self-deception, perhaps the beginning for all deception, is a key aspect of Indigenous preparation for learning about life. This begins with understanding the purpose of learning and this purpose begins with compassion and sacred respect for all things. Learning and acting truthfully requires an awareness that ambition, self-gratification, power and control as purposes for learning are forms of self-deception and have to be

avoided because they lead to misuses of knowledge and further perpetuation of self-deception. And yes, to get back to your question, I think compassion, authentic, empathetic care for others, respect for others, giving significance to others, is the opposite of the kinds of emotions behind greed or lust for power.

*Four Arrows.* OK, so here is where I'm going I think and what Greg says here really helps. What I want to ask Jongmin is this: Referring back to the "heart-mind" holistic approach to life typical in traditional Indigenous life, I believe that emotional-rationale phenomenon that lead to honesty and away from deception require a balanced and complementary relationship between right and left hemispheres, medicated along the corpus callosum. Cultural values and practices shape the circuits in ways that promote or do not promote an absence of deception. A culture that does not create brain activity that moves away from a perceived need to deceive is dysfunctional.

In accordance with Indigenous wisdom I believe that emotions are a precursor to appropriate ways of perceiving and representing the world when the primary emotion is compassion and feelings related to it like empathy and respect. Furthermore, naturalistic and spontaneous trance states allow beliefs, whether based on compassion and respect or on fear and narcissism, continually use words to shape our neural circuitry until our integrity or our deception become both conscious and unconscious operations.

And if what I'm saying is so, if compassion for the well being of others is the dominant emotion, rather than say, fear, or some other ego-centric driven emotion, then might this admittedly simplistic idea offer some explanation of the difference in thinking about deception between Indigenous and Western conclusions about the role of deception in human nature?

There seems to be some Western science that supports what I am saying in addition to different interpretations of the studies that began this chapter. For example, Eisenberg's work showed that when empathy and compassion are primary cultural worldview based emotions, integrity and altruism tend to emerge over deception and greed (2002, pp 131–164.) Antonio R. Damsio's work also has demonstrated that emotions are essential to rational thinking (1994). Westen's work on emotional bias at Emory University also comes to mind and has relevance to what I am saying.

Westen showed that when people were supposed to be making a rational, truthful conclusion about a political candidate's obvious, evidence-based deceptions, a network of emotion circuits lit up when they reflected their bias as opposed to the truth. When their lies were concluded, and I'm calling their irrational biases lies, then reward circuits lit up. Yet none of the circuits involved in conscious reasoning were engaged, no activation of the dorsolateral prefrontal cortex involved with reasoning (LiveSciene, 2006). And what about Joo-Yeon's experiment about stress and the activity of the corpus callosum you and I were involved in, how it might relate? It seems that the spiritual precept of Indigenous wisdom relating to everything being related and everything, from rocks to birds deserving respect and compassion, in addition to Indigenous use of ceremony, dance and music to induce trance, is at the heart of what is happening in the brain (no pun intended).

*Jongmin.* I think I understand what you are saying Four Arrows. As we can see from the studies, the prefrontal cortex is regarded as the main brain center for deception. However the prefrontal cortex is not specific center only for deception. Any kind of high grade mental function can be generated from prefrontal cortex. For example, during deep speculations in fields of theoretical physics, criminal investigations, philosophic discussion, or even designing your own house, the prefrontal cortex should be activated. And, to get to your point, it is also involved significantly in the processing of emotions. The ventromedial prefrontal cortex has reciprocal connections with other regions involved in emotional regulation.

In the literature, lying is reported to provoke the brain more than telling the truth. We can explain this fact with the level of anxiety that activates higher mental functions. So emotions tend to force the brain to work with some degree of stress, such as might be seen from activation of the pituitary gland. Lying seems to cause such stressful activity in the brain. Areas of the brain associated with emotion, conflict and cognitive control, like the amygdale, the rostral cingulated, caudate and thalamus light up during deceptive thinking but not when telling the truth. During telling the truth, you can be comfortable without any anxiety or conflict. as if my mind had to work harder to generate the fictitious narrative.

Four Arrows referred to Joo-Yeon's study for her dissertation, *The Last Leaf* (2009). Well, there we saw that emotional reactions to watching the frightening possibilities for human survival in Al Gore's film, "An Inconvenient Truth," while monitoring the brain via fMRI, caused much stress in both hemispheres with little activity in the corpus callosum. Yet, when the subjects watched her simple "sights and sounds of nature" film, there was no stress indicated and the corpus callosum was highly active, indicate a balanced and cooperative communication back and forth between both hemispheres. The mental stress should be the key to activate high grade mental function in prefrontal cortex either with or without emotion centers being activated. Perhaps the emotion you refer to as compassion, as one of the positive emotions, creates a mental state in which there is no need for deception and thus the viscous cycle I referred to earlier is stopped or is replaced by ways of thinking that de-emphasize deception. There was a study at the University of Wisconsin using fMRI scans that showed that brain circuits involved in emotional responses were actually changed in Tibetan monks who practiced compassion meditation. So this goes back to Lipton and his biology of belief work.

It is interesting to consider the possibility that the abnormal findings of deception in neurofunctional imaging might be a simple reflection of various mentally stressed situations relating to the deception, rather than specific features of deception itself. Just as happens to the muscular structures during rigorous physical activity, the brain would fatigue with the kind of complex workload brought on from deception. Maybe this explains much of the illness in our world today. I agree with both of my colleagues that the deceptive behaviours are against the natural functioning of the brain. Perhaps understanding this secondary gain of health could be a key improving the deceptive behaviours of human beings, whether they are related to Western materialism and self-centered thinking or not.

As for the studies that represent current research in this area, I agree with the conclusions that we are talking about a complexity here that is not easily understood. Deception comprises of various grades of dishonesty such as simple dishonesty, simple lying, tied lying, pathological lying, intentional lying, and criminal lying such as swindle. Higher grade dishonesty requires higher grade mental function with stronger brain activation especially in prefrontal cortex. This fact may paradoxically support the phenomenon that simple dishonesty shows higher activation in cingulated gyrus and amygdala in basal ganglia which is more primal brain than prefrontal cortex in a viewpoint of evolution. This complexity increases because the activated cerebral cortex by deception varies time to time by environment. Based on this reports we can infer that deception has various optional components over basic higher grade mental function. During telling a lie the prefrontal cortex, the center of high grade mental function, activates constantly in functional MRI. In addition, various additional activations are demonstrated by the optional components of deception. For example, if you are telling a lie about food, your olfactory, taste, and salivary centers would be activated in addition to the constantly activated prefrontal cortex. If you are lying in emotionally upset state, the emotion center such as amygdala would be additionally activated. If you are focused on telling a lie itself, your linguistic center activation would be conjoined. Such multiple factors force me to acknowledge the fact that the deception is not simple mental function but the integration of highly complicated and variable mental functions. The scientific trials to reveal the brain cortex specific for deception or to identify the contents of deception in functional MRI or PET are very limiting in their accuracy since our scale to measure deception is too simple to understand it thoroughly. Perhaps Indigenous wisdom and Buddhist philosophy that reinforces the Indigenous worldview (They share the “ubiquity of the sacred, the expressiveness of nature and the nonduality of matter and spirit” (Routledge Encyclopedia of Philosophy), ultimately will be better indicators of the natural place deception has in human nature than our machines.

*Four Arrows.* It is indeed interesting to speculate, as we will throughout this book, on the possibility that the lens through which we attempt to understand human interactions by looking at the brain and its measured activities might take us further away from what may be true rather than closer. In his book, *After Babel*, author George Steiner argues that deception was at the root of the development of human language. Perhaps, even though I disagree with his idea that deception is fundamental to human behaviour, his assertion has some validity as it relates to the kinds of languages that dominate Western culture, languages that work well with categorizing, generalizing, reducing, labelling and asserting. They tend to stimulate more left brain activity and less right brain. But let’s save this related issue for the chapter about “balance.” What I’m getting at is this: I believe that Indigenous wisdom has long understood a way to activate right-brain/left brain balanced learning and that such learning, accompanied by the obvious realization that group survival depends more on trust and assumptions that people describe reality truthfully than on any possible range of deceptions, represents the “natural” design

of human nature and brain functioning. Such learning creates implicit attitudes and regulates them so they are in synch with values that relate to compassion and a sacred interconnection with all things. Thus deception and self-deception are cultural phenomenon that is not evolutionary, but de-evolutionary. If we re-look at all the studies at the beginning of the chapter with this perspective in mind, a different set of interpretations emerge from what we see. For example, in Study 2, where we learn that retrieving a deceptive memory is more difficult than retrieving a truthful memory, we can see that it is less likely that evolution would create such a condition for survival!

In his wonderful book, *A Time Before Deception: Truth in Communication, Culture and Ethics*, Cooper writes about how Native peoples' first reactions to European habitual lying was believing that the invaders must be insane because in their cultures only insane people who had lost touch with reality spoke in ways that misrepresented it. His research also shows that lying can become a deviant strategy. The strategy may, like the use of weapons of mass destruction, lead to some temporary benefits for a small number of individuals, but in the long run they are not an evolutionary boon to humankind at all.

Cooper also details a research project where when Indigenous individuals and Western individuals suggested and ranked various aspects of cultural values that might have an impact on integrity, Native peoples ranked "respect" above all else but it did not even make the Western list. He shows how the concept of appreciation for life and the recognition of spirit in all things pervades traditional Indigenous thinking and that such perception informed all communication in ways that are incompatible with deception. In reading his book I was reminded of Vine Deloria, Jr.'s famous book, *Red Earth, White Lies: The Myth of Scientific Fact* (1995) and how it might shed light on the implausibility of Smith's contention in *Why We Lie* that "Mother Nature has seen to it that the conscious mind is relatively blind to the nuances of social behaviour (p. 146)." I think it is vital for neurophilosophers to consider Indigenous ways of knowing and the histories of Indigenous Peoples before drawing conclusions too quickly from the kinds of studies and scientific conclusions that have been reported here.

## III. CONTINUING THE DIALOGUE FOR UNDERSTANDING

1. Choose one of the studies in Part I and specifically use it to:
   a. Support the Indigenous perspective relating to deception and human nature
   b. Challenge the Indigenous perspective relating to deception and human nature
2. Explain the main differences between the conclusions about deception and honesty offered by the Western researchers compared to those presented by the Indigenous scholars.
3. Name an idea or an observation that is common to at least four of the seven studies in Part I.
4. In what ways does your own worldview support the idea that deception is a higher order evolutionary development for humankind or that it is a natural and unavoidable function of the human brain. Defend your answer.

5. Do some independent research on the phenomenon of hypnosis and describe it in a way that makes a connection between this state and the predominance of deception in Western culture.

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