

NATIVE SCIENCE AND PARTICIPATORY RESEARCH

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INTRODUCTION

Until the present time, we have had to stretch Western science so far that knowledge about Indian culture seems unreal. Research has been perceived and presented as mono-cultural, thus not accepted by the Indian community. All peoples including Native Americans have science or a way of coming to knowledge; each tribe has its specific methods, but for the purposes of introducing the concept of Native science and exploring its relationship with Participatory Research, we will deal in generalization about "Native" metaphysics.

Reflecting on the implications of two sciences, it is clear that a bicultural research model recognizing both Indian science and Western science needs to emerge. Newly evolved Western research methods such as ethnographic research, content/issue analysis, and the framework of Participatory Research can be drawn upon to complement or meet Indian science and culture.

Traditional Indian science must be articulated in contemporary terms to permit scholarly exchange growth and to empower Indian people in the scientific arena. Further, an integration of Western and Indian ways of thinking must occur if we are to develop research strategies and outcomes which are acceptable and respected by both cultures. ("Integration" refers to a blending of research findings, not the domination or extension of ideological control by one culture's science).

A bi-cultural research model must be both valid and reliable; strengthen traditional Indian science and enhance cross cultural communication and understanding, while at the same time promoting the growth of both sciences. This paper will present an epistemological foundation of Indian science and will explore the possibility of creating a scientific, intercultural, infrastructure by the use of Participatory Research as a rosetta stone or translator.

INDIAN SCIENCE

**"....This is what Raven did for us...The shelter
is the tree..."**

Indian science, often understood through the tree, is holistic. Through spiritual processes, it synthesizes or gathers information from the mental, physical, social and cultural/historical realms. Like a tree the roots of Native science go deep into the history, body and blood of the land. The tree collects, stores and exchanges energy. It breathes with the winds, which tumble and churn through greenery exquisitely fashioned to purify, codify and imprint life in successive concentric rings - the generations. Why and how the tree does this is a mystery but the Indian observes the tree to emulate, complement and understand his/her relationship to this beautiful, life-enhancing process.

The Meaning of Science

To the Indian, the tree is the first spirit or person on Earth. Indeed, the tree which oxygenated Earth's atmosphere, is the precursor to our human existence. Because of its antiquity it is a respected Elder but the greatest power of Native Science lies in the reasons behind the trees existence.

When discussing the origins of the tree Chief Donawaak, Tlinget Elder says:

"This is where stories begin, there is no story before this...When Raven spirit and Black Raven are working on this land, they put coves in it where you can come in when it's blowing - a place where you can come ashore."

My Great Grandfather who told this story to me said - the cove is where you're going to be safe. If you pass the harbour you're not going to go very far...you will tip over or drown. But if you come to the cove you will be safe. This is what Raven did for us. The shelter is the tree. You could get under the tree and stay there overnight. All this is what the Raven did... (Colorado, 1985).

From these words we see that Native science has a sacral basis and that its teachings are grounded in the natural world. The Navajo and the Natural World are one; he expresses that unity in this way:

The foundation, you have to know your roots, where you are coming from. It is understood that we all come from God, God created us. But you have to understand in your own Indian way, where your roots are. You see a tree that is weak, about to give up. Sometimes you find people like that. Why is that tree just barely making it. Because the roots are not strong. If the roots are solid and strong, then you see the tree is strong and pretty. It can withstand cold, hot weather and winds. The human has to have those roots because we are growing too. The Great Spirit put us here with nature. We have to understand the nature. That is why we understand how an animal behaves. This is why we have to talk to them. We don't pray to them, we talk to them because they breathe the same air we do. We are put here with them. We are also a part of the plant life. We are always growing, we have to have strong roots (Colorado, 1985)

Indeed all of life can be understood from the tree.

...just after the earth's crust was formed Raven (the Creator) made the tree. Why did he make this tree? He made it to shelter us. Even before Raven broke light on the World, people took shelter from the tree. And after he broke light, look what you're sitting on, what's above you, it comes from the tree.



And that's where the Tlingit gets his canoe, his house, his clothes - everthing. The Raven put it there for him (the people).

And look, what's growing under the tree? The grass. In the spring the Bear comes down to eat that grass and the wolf, the moose and the mountain goat. All these things, they come. And the berries, growing there - salal, salmonberry, huckleberry, and beneath them, the plants, the medicine. All that, it comes from the tree...(Colorado, 1985).

So the roots and their functions form the basis of Native scientific methodology. Seeking truth and coming to knowledge necessitates studying the cycles, relationships and connections between things. Indeed a law of Native science requires that we look ahead seven generations when making decisions!

Principles of Native Science

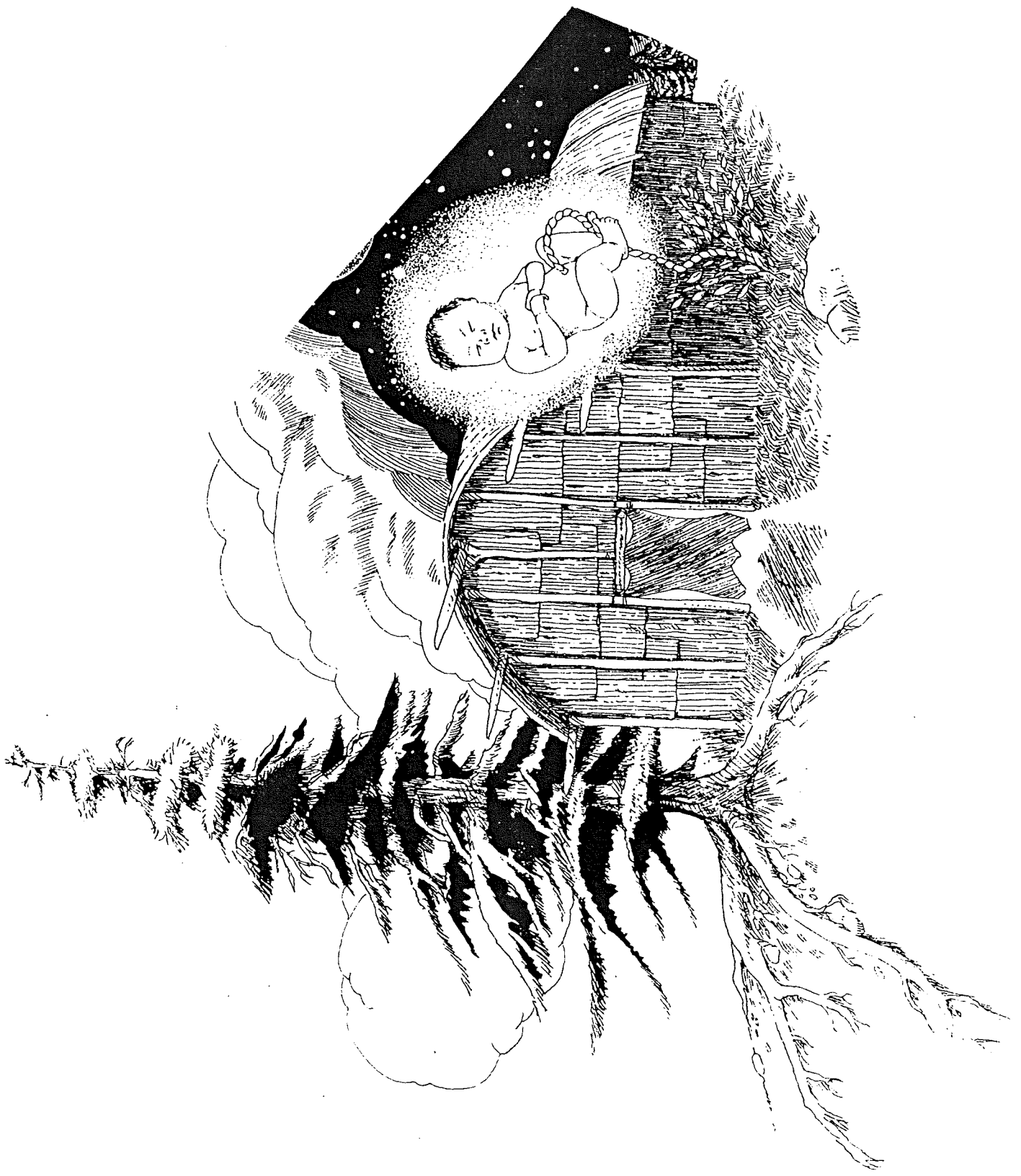
Laws and standards govern Native science just as they do western science. In an Indian way, Bear who is the North, represented knowledge, healing and comfort. The Bear is also fierce, his claims are non-negotiable. Western Science understands Bear in terms of rigor, reliability and validity.

In the spring, Bear marks his territory on the tree. Stretching as far as possible, Bear uses his claws to score the tree. Other bears, passing by are challenged to meet this standard. If they cannot reach the mark they leave the territory. For the Native scientist the tree is not merely science but science interwoven inseparably with life. We meet the mark or die. Like the Bear passing through, no one watches us; the science relies on utmost integrity.

Native science assumes its character through power and peace. Vine Deloria, (1986) noted Lakota scholar discusses its principles:

Here power and place are dominant concepts -- power being the living energy that inhabits and/or composes the universe, and place being the relationship of things to each other...put into a simple equation: Power and place produce personality. This equation simply means that the universe is alive, but it also contains within it the very important suggestion that the universe is personal and, therefore, must be approached in a personal manner...The personal nature of the universe demands that each and every entity in it seek and sustain personal relationships. Here, the Indian theory of relativity is much more comprehensive than the corresponding theory articulated by Einstein and his fellow scientists. The broader Indian idea of relationship, in a universe very personal and particular, suggests that all relationships have a moral content. For that reason, Indian knowledge of the universe was never separated from other sacred knowledge about ultimate spiritual realities. The spiritual aspect of knowledge about the world taught the people that relationships must not be left incomplete. There are many stories about how the world came to be, and the common themes running through them are the completion of relationships and the determination of how this world should function.

Deloria notes that there is no single Native science, each tribe or Nation follows ways specific to a locale. However, the tree and the Bear are nearly universal. From South America to the Arctic, the tree and all that it implies has been guiding and shaping the thoughts of Native people since the dawn of humanity. Those who follow this natural science do so in search of balance, harmony, or peace with all living relations. Iroquois call this SKANAGOAH.



The Goal of Indian Science

Skanagoah, literally interpreted as "great peace", is the term used to describe the still, electrifying awareness one experiences in the deep woods. This feeling or state of balance is at the heart of the universe and is the spirit of Native science. For the western educated, audience, the notion of a tree with spirit is a difficult concept to grasp. The English language classifies reality into animate and inanimate objects, with most things falling into the inanimate classification. Native languages do not make the same distinction. As Deloria says, the universe is alive. Therefore, to see a Native speaking with a tree does not carry the message of mental instability; on the contrary, this is a scientist engaged in research!

Put another way, western thought may accede that all natural things are imbued with energy. Much like the electromotive force in a capacitor, the force of the energy is transmitted without there being a direct flow of energy. If you had a piece of wire, electricity would travel from one end to the other uninterrupted. But if you put a capacitor in the line, the force is transmitted from one side to the other without there being a direct flow of electricity from one side to the other. This is how energy is transferred from tree to tree to person without there being a direct flow of energy. The spiritual energy of a tree isn't transmitted directly but rather its life force is felt. Like a capacitor, the thickness of the dielectric, the physical distance

between the person and the tree, is not important; the exchange still occurs.

This exchange suggests that human beings play a vital part in Skanagoah. Western thought teaches the value of the specialist, especially to the masses who are mostly generalists. In an Indian way, we may think of the Bear as a specialist, indeed, if I match his proficiency. But the generalist, in this case, human beings determine the continuance of Bear's habitat. We are related, we are all one, life and death, good and bad, we are all one. The Indian acknowledges this and so discovers the most liberating aspect of Native science; LIFE RENEWS and all things which support life are renewable.



The Bear Has Made His Mark...

Can You Reach It?

Methodology

Four dynamics drive Native science.

1. **FEELINGS.** The Basis, The Medium, The Message, The Understanding. The nature of Native Science is that it is qualitative and subjective rather than quantitative and objective. Feelings tell us whether we are prepared for the task, whether the situation is right, whether location is correct and whether there is balance.

“To do this work, you have to have feelings and love for the child. Many times I pray with my kids as I do this research, especially when I have hurt feelings, or need an open mind, I pray when I need guidance. When I go to interview, I have to know how to approach people. Some people I know; I can visit them right away. Others I don't know so I go to visit once or twice just to get them comfortable with me. Some I don't know how to approach so I get the help of other Elders. I say, 'You know me and you know the other family; we don't usually talk but I have this work to do...' I then explain the Child Welfare research and ask how can I approach them to get something good out of it, and they tell me. In every interview you have to establish trust; you have to put a relation type thing in it. I know when to interview. Before I interview I have to make me feel good first. If I'm not feeling good, I don't interview anyone that day. I pray or see an Elder and wait until my mind is open again (Theresa Tuccaro, 1987).”

2. **HAA SHAGOON, HISTORY AS A TOOL.** ..Haa Shagoon is a concept by which Native science collapses time and space; i.e., collapses the distance between the creating and this place.

“In Western thought, history is no more than an objective chronology of the occurrences of events. Whereas, to Natives, it is a way of experiencing all of the feelings, emotions and responses to events experienced by ancestors, beginning with the creating (Woodrow Morrison, Jr., 1987).”

To be valid, our research must be more than longitudinal chronology. Today, every day, we see our ancestors making the trail for us as we work and move about the face and surface of our mother, the Earth. Past, present, future perfect and future exist at this moment. For example, when a baby is born, an Elder cradles the infant and speaks softly into the child's ear.

“When you're talking to the newborn baby, when that little baby listens, it stays there, everything we say. Anytime in life that child starts talking, it's (the words you spoke to it) going to come out in front, like the tape recording when you play it. That's the reason we talk to our babies so that what we try to teach will stay in its mind (Chief Donawaak, 1985).”

3. **GII LAII, Prayer as a Medicine**—Gii Laii is the quiet, still place (a round hole in the bed of a stream or lake of water and the quiet, still place of balance within ourselves.) Prayer is a medicine where all life begins, exists within, without and between us and our relationships. It is an actual place and state of being that marks the endpoint/beginning of our science. Occasionally non-Indian people report experiencing a sense of time slowing down; a sensation of suspended animation. This is something like Gii Laii (the water held in suspension while life continues to move through it), with one distinction. That is Gii Laii created a sensation of total alive“ness”, awareness, and peace along with the sense of slowed time. But, then, where is this place; how do you find it and how do you know that, “this is the Place”?

“Another thing about interviewing; you have to pick a good spot, and you have to feel, ‘this person will fit in good here’. One day I went to see a Social Worker. I explain the research, what I’m trying to do and she agrees to be interviewed. But, I don’t do it because it don’t feel right. So I tell her how about tomorrow morning? I’ll bring coffee, she say OK. The next day, I come back to this office. I bring two cups of coffee. I can see it; the spot is right. But you have to know the right place/time to begin. You don’t just jump in. You have to visit, make the other person feel comfortable (Theresa Tuccaro, 1987).”

True Native scientists actually see the “spot”. This ability stems from prayer, the hallmark of Indian science. In prayerful research, the voice of the people becomes the data; the words create a feeling in the reader and give a credence to the findings. This is the normal method by which Native people arrive at consensus, or in this case, confidence in research findings. This process is similar to triangulation in western science and is vividly and poetically portrayed in Pulitzer prize winner, F. Scott Momaday’s, House Made of Dawn.

4. **RELATIONS.** The Indian theory of relatedness demands that each and every entity in the Universe seek and sustain personal relationships. Furthermore, the spiritual aspect of knowledge about the world teaches that relationships not be left incomplete, (Deloria). Traditional protocols, Native language and stories teach the lessons of relations. For an example, let us look at the function of the Story. Native stories, which may be 30 to 50,000 years old, have the ability to integrate and synthesize all the living relationships or events at any given moment in life. When we rely on a story to guide us we are not only integrated with the natural environment around us and with our living relations, but also with the timeless past and culture of our ancestors. Because American Indian cultures are so ancient, and the stories so old, there is almost no human experience or learning which has not been recorded in those stories. Moreover, they are tied to

intricately with motion, relations, and a sense of collapsed time that there is a spiritual essence to them which people often describe as timeless.

“When my Grandmother used to tell me stories, I would close my eyes and I would feel as if I were walking through that time. I could just imagine everything the way that it looked, the tools that people used, what kind of clothing they wore, how the weather felt, what people were feeling; it all came alive to me! It is as if I was right there at the time.”

When American Indian people come to an experience in life, we are comfortable the stories have walked us through this before. Thus, ancient wisdom helps in the decision making and learning of today. “Relations” become an integral part of this research through language. Researchers must be bilingual, so that the community is free to express itself.

“When that person is relaxed, you begin. Also, keep the language simple, never put yourself above someone else. It won't work. And the interview has to be balanced. I watch the little things. If it's too serious, I joke and tease. As I begin, I have to put my knowledge, mind, and my feelings on the table. I have to come out with it; what I'm there for, what I'm trying to do, how I feel...everything. Then I have to really listen. Sometimes I have all my information and the person goes right on talking, two hours more! Some of our people have never had anyone listen to them; someone they trust to talk to. I just let them go on, as long as they like, and when I leave they always say “Come back again”. This is the toughest, hardest job I ever had...It's so amazing, this Indian way of life (Theresa Tuccaro, 1987).”



NATIVE SCIENCE METHODOLOGIES - INTERVIEWING

(Based on work done by Teresa Tuccaro)

Like energy or spirit moving through the roots of the tree, the Native scientist moves through the extended family or clan system to collect data. As a tree records its generations, the Native researcher interviews each generation in the community. The data, in keeping with oral tradition, are comprised of words.

Preparation:

1. Have to have feelings and love for the child.
2. Pray with kids.
3. How to approach people:
 - visit
 - get help of elders
4. Know when to do the interview:
 - a. make me feel good first before I interview
 - when I have a hurt feeling
 - need guidance or open mind
 - b. pick a good spot
 - you can see and feel a good spot
 - think this person will fit in good right here

Interviewing:

1. Know the right time to begin, "when the spirit shows itself".

2. Establish trust, put in a relation-type thing with the person you interview.
3. Relax yourself and interview.
4. Language must be simplified.
 - never try to be above the other person
5. Has to be balanced, have to work twice as hard,
 - watch the little things
6. Joke, tease.
7. Listen, sometimes people talk two or three hours after the interview; they need someone to listen to them.

Summation:

I put my knowledge, mind and feelings on the table.

- This was the toughest, hardest job I ever had!
- It is so amazing this Indian way of living.

Each of these methodological elements represents extensive knowledge, experience, and training. Let us examine, two - "the help of elders" and language.

1. Approaching Elders

One of the tenets of American Indian science is that the search for truth and learning is a spiritual relationship between the individual and the Creator. The rule that governs the behavior between elders and the younger learner is therefore that

of helper rather than instructor. The Elder does not interfere in the relationship between the individual and the Creator. But American Indian people begin the search for truth (and the scientific method) by approaching an Elder.

2. Who is an "Elder"?

Generally, an "Elder" will have some particular training or expertise in an area of life. Medicine people who represent the finest of Indian Elders can be characterized by their deep and abiding sense of humility, by their commitment to a traditional and natural way of life. This true American Indian scientist usually leads a life of poverty and has dedicated his/her life to Native people and the continuity of the natural world. A final note on Elders is this. Just like any other culture, some American Indians know a bit more about science than others. Although all American Indian Elders have a story to tell and have built up certain knowledge and wisdom over years of living, this is not to be confused with what we are talking about here, which is the specific understanding of traditional Native American ways of coming to knowledge.

Barriers to Traditional Science

Because of the colonialism and the disruption of traditional American Indian life, many accomplished younger Native people do not know how to approach an Elder. This is a critical issue

because cultural protocols do not permit the Elder to share information without being asked. The problem lies in the fact that young people who have been assimilated and colonized do not know these protocols; moreover, Elders are not aware that the young do not know how to approach them!

Even if an Elder is approached in a proper manner, he still may not accept the young person. Again, the accepting or rejecting of the applicant follows culturally dictated behavior. If an Elder responds, "I do not know" or simply shakes his/her head, the answer is no. But if the Elder says, "I'm getting old, it's difficult for me to remember", the door is opened for future visits.

The visit is an essential ingredient of Native scientific methodology. The visit includes introductions, establishing the relationship between the Elder and the younger person (i.e., - Who is your clan? Who is your family? What is your Indian name?) socializing including humor, and finally raising the purpose of the visit. Through visits a contract is established. Often the contracting process requires several visits, the apprentice will do chores around the Elder's home, listen attentively and follow directions about mundane activities. Through this process, trust is established and a genuine interest in the welfare of the Elder is promoted. This is important; the Elder is about to share knowledge that is powerful, sacral, and often of a personal nature - the recipient must be prepared.

In addition, the process of the visit teaches the younger person the qualities that are necessary for becoming a Native American scientist. These qualities include tremendous self-discipline, patience, a willingness to share, faith and a belief in prayer. The rather extended period of time for these visits also demonstrates to the Elder that the young person is leading a good life or is committed to a good life. The evidences of this good life are abstinence from alcohol and drugs and a morally correct life in a cultural sense. For example, the life of a future American Indian scientist, who is also a woman, would demonstrate that she takes care of the children, is willing to serve her community, and knows and obeys the rules of the culture.

When an Elder accepts an apprentice he will often share knowledge without asking, "Why is it that you want to know?" It is enough for the Elder to detect a sincerity and a true desire on the person's part to learn. Sometimes, even if a person is involved with alcohol and drugs, an Elder will patiently listen to this person and then share some piece of traditional knowledge that the Elder feels may help guide the individual back to himself and out of substance abuse or addiction. This wisdom that the Elder is passing on, although learned personally, derives from tribal experience and from a collective effort to know throughout time. The outcome of this science and knowledge is that people learn to live in balance in relationship with all

other living things. Therefore, the Elder faced with the young person who has serious life problems will share traditional information, but only when asked; they never volunteer it.

Learning that comes from an Elder is characterized by questions. Elders often teach by leaving us with a riddle, or with some question in our mind like the question posed about the tree, fence and person. The result is we go away curious, and wanting more. Furthermore, the way the information is passed to us from Elders causes us to think deeply, to look at our own lives intensely to try to figure out what the Elder was wanting us to see. This distinction is important. Unlike Western science, Native science relies on total involvement of the person with his or her environment. Coming to truth in an Indian way involves spirit, body, mind and relationships. While Western science stresses cognitive abilities and powers of reasoning, American Indian science relies on these two facets as part of the total way of coming to knowledge. American Indian science is based on observation, experience, information and prayer; Native language is the key to all.

Language/The Oral Tradition

Elders tell us to prepare ourselves mentally, physically, and spiritually for Indian Science and they stress the power of words, especially in Native language.

...My Grandfather used to tell me, "If you are going up the

river, cut a pole so they can push your boat up. Before you give it to your partner who is going to help you, you got to run your hand over the pole. If you don't, sharp ridges on it will cut your hand. Then your partner will not help you." You have to run your hand over the words before you say anything. I tell my children. They are beginning to listen, how to respect each other.

A traditionally oral society passes its history and culture by the spoken word. The way things are said are intrinsic to a culture. Translations lose much of the meaning. For example, in English we say, "Make me feel good first" - before I interview a Mohawk says, "Sah ni Kora Ahotoriso", which means not only "set your mind at ease", but describes the moment - "When you arrive at the good feeling, you're at harmony with the one you're speaking with."

Another example is the "Still Place". In Mohawk, we say "Yohts so non yahts tsiri yoh", which is interpreted as sheer joy, happiness, peacefulness, calm and contentment. It is a known, verifiable, objective state!

When we speak of relations, "tahtikosontotiye", we are really saying, "As you're being taught, your ancestors are with you as you teach future generations".

Finally, knowing when to start and stop an interview is expressed as, "the Spirit is going to tell you when to rest" or "I recognize that Good Mind or Good Spirit is Around".

Speaking the Native language is essential to the practice of

Native Science. Eber Hampton, a Ph.D. Chickasaw tells this story:

"Once as I was getting ready for a sweat, Manfred told me, "Eber, I know you can't pray in Indian, but when you are in the sweat, pray in Indian in English."

WHY DO WE NEED TO SPEAK ABOUT INDIAN SCIENCE?

An Emic View

From within Native culture, it is critical that Indian Science be discussed and renewed. This is why:

To strengthen traditional Indian science and to block further penetration of traditional Native science by Western science. In the juggernaut that was the "civilization" of the Americans, eighty million Native Americans perished. This process did not materialize from thin air. On the contrary, it originated in the birth and evolution of Western science. Aristotelian and Newtonian thought empowered large numbers of people to embark on dangerous oceanic voyages to the new world. What was this thinking? Kounosu identifies six characteristics that underpin Western science:

- The Universe is a large empty space time. Isolated atoms exist in the vast vacuum. The atoms are independent from each other and incapable of changing.
- There is no cause; the religious notion of cause (God) is denied by Newton, his force is not cause....
- There is no prophecy. There is no purpose or reason but accidents of conditions.

- Changes have to be forced and motions can only follow the course determined (dictated) by the mechanics of the Force. One simply has to be powerful enough to supply all energy needed for the desired motions.
- Human intellect is capable of knowing everything and to any accuracy desired. Hence, the courses of motions are controllable by human intellect.
- The Universe and everything taking place in it can be measured and treated in linearized approximation. (This is not from Newton himself, but held by the followers).

Kounosu observes:

"Newton formulated his mechanics some three hundred years ago...According to the mechanics if one knows a very, very small fragment of the universe, one can know everything including what will happen in the future. The sense of power generated in the minds of people then was enormous. For the first time in history..."human intellect became powerful enough to replace prophecy by scientific prediction."

Anatol Rapoport, leading Canadian scholar, notes that the discovery of the printing press furthered the explosion of "Newtonian" thought, for the press made scriptures available to the public. People no longer needed to depend on corrupt religious mediators for their salvation; man was autonomous.

"Newtonian mechanics and the birth of western science liberated European minds from fear of the unknown. Man no longer needed to fear nature. This notion encouraged and empowered Europeans to go out for the adventures of colonial explorations and manufacturing...." (Kounosu, 1986).

This belief system created the illusion that western science is the Universal Truth with the true methods. As a result, since the invasion of the Americans, the science that has studied Native life has been Western science. Even in critical issues such as alcoholism, we, Native people have become dependent on a

foreign system of thought for answers to the major cause of our destruction. In research, we try to use Western glasses, not Native glasses, to see the meaning of problems in our lives and to find solutions.

This poses an urgency because we are not using both Western and Native science; we have become exclusively dependent on Western science. Many of our young do not speak their language or even know how to approach an Elder for help. Yet Elders are the key to accessing the Native science!

How did we come to this point? Certainly, the abandonment of traditional science was not voluntary. For example, the Spanish burned the literature of the Maya nation. Bishop Landa wrote, from the Yucatan (15th century) as the last shreds of Maya civilization went with the books:

...as they contained nothing but superstition and lies of the devil, we burned them all which the Indians regretted to an amazing degree...) Josephy, 1961, p. 82).

In Northeastern United States, traditional Elders, keepers of knowledge, were deliberately murdered. In 1625, a minister named Stockam expressed the prevailing European attitude of the time:

Till their priests and ancients have their throats cut, there is no hope to bring them to conversion (Jennings, 1978, p. 55).

In recent times, the degradation of Native science has been more subtle. In Western terms, Indian scientists become Medicine

Men or Shamans. Tools of Native science are totally unrecognized, passed off lightly as prayers or described as hallucinogens, rattles, and paint. Our specialized scientific language becomes incantation or folk taxonomy; treatment regimens become ceremonies or customs, and our scientific revolutions are called Messianic Movements (Wilcox, 1970).

Such romantic colonial vocabulary serves to objectify; to make Indian's affairs and systems seem more child-like than the serious advanced affairs of Western Europeans. The English vocabulary chosen to describe Indians always goes toward proving that the people are inferior (Durham, n.d.).

Carrying the point further, Churchill comments on the inability of the mainstream science to deal with problems generated by its own structure and cautions that turning towards mainstream solutions for answers to our problems is not a viable solution. Nevertheless, through the processes of Western scientific colonialism, the legitimacy of Indian heritages/science is systematically negated...

"...through distortion and outright omission. Legitimacy in Europe and its overall tradition, a tradition which cannot ever be truly shared by the non-European despite, or perhaps particularly because, of assimilation of the European doctrinal value (Churchill, 1982, p. 53)."

This system of considering Western science as the central subject and object of legitimate, important or serious intellectual endeavour is quite simply part and parcel of the

total European colonial structure; intellectual imperialism. Both critics and advocates of the European status quo are equal parts of the system insofar as they accept the European intellectual traditions as sacrosanct (Churchill, 1982).

Bates and Berkhofer (1980) observed that through the succession of change in Western's scientific views of Indians - from scientific racism to the sociocultural paradigm - the predominant thought remains unchallenged. Traditional systems of beliefs and healing are regarded as primitive, archaic and largely irrelevant...as a result, there is virtually no literature deriving from Indian science and few pieces written by Natives employing Western scientific skills and speaking in English. Denied access to "Legitimate" science, Natives often challenge Western scientific colonialism in the political arena. Such challenges are typically met with a retreat into objectivity, the underpinning of Western science and legal thought. Citing objectivity, scientists have disclaimed any responsibility for the failure of their craft to positively impact Native lives or to facilitate the recognition of our science.

The need for Native science is clear from an intracultural perspective, but what of the West? Are there equally compelling reasons to suggest a link with, or to support the practice of, Native science? According to many scholars, the answer is "yes". Beginning with Einstein's theory and moving to contemporary

physicists including Bohm and Capra, Western science has been searching for a new paradigm. The old science can no longer contain the data it produces.

"There is a growing concern about where quantitative techniques are carrying us...our data manipulation techniques have become increasingly complete mathematically sophisticated and governed by strict assumption, but, paradoxically, our interpretive frameworks which make such data meaningful have grown looser, more open ended, fluid and contingent...there seems to be rather widespread skepticism surrounding the ability of conventional data collection techniques to produce data that do not distort, do violence to, or otherwise falsely portray the phenomena such methods seek to reveal...." (Van Mannen, 1979).

Thus, in the early 1980s cultural research and the science that guided the research were again in search of a paradigm that would work. Van Mannen observed:

"....there is something of a quiet reconstruction going on in the social sciences....There has come of age that significant realization that the people we study (and often seek to assist) have a form of life, a culture that is their own and if we wish to understand...we must first be able to both appreciate and describe their culture..."

Theories of Paulo Friere, South American educator, and research by UNESCO prompted researchers to look at culture in a very different way. Freire observed:

Research is a cultural action, if it has a humanist character, it is eminently dialogical and dialectical. In culture based research, "MEN DO NOT ACT ON OTHER MEN AS OBJECTS".

Friere concluded that research should not be

"our research on you, but rather a research project in which, together, in dialogue, we will come to know each other better and the reality in which we find ourselves so that we can more effectively transform that reality."

For the first time scientists began to recognize that Native people have a voice, and by extension, a way of knowing or science. Methodologies and approaches have evolved from this recognition. Popular writer, Milam, typifies the movement towards synthesis. While arguing for medical dominance of the field he nevertheless recognizes that the "ism" in alcoholism necessarily involves a human or family system not merely the alcoholic. Participatory research, systems theory and family therapy all focus on relationships, development and the strengths of an existing system.

**HOW CAN PARTICIPATORY RESEARCH HELP BRIDGE THE GAP
BETWEEN INDIAN AND NON-INDIAN SCIENCES?**

Possibilities emerge from the framework and methods of Participatory Research that suggest its suitability as a translator between Native and non-Native cultures/sciences.

a. Framework Implications:

The Political focus of Participatory Research (P.R.):

P.R. views aggression of a problem; it assumes that there is no neutral or objective science that the dominant hypothetical, deductive, positivists won't give up their power. It validates popular knowledge, asserts that

knowledge is power and advances the idea that theory must lead to social action. This suggests that P.R. may be able to recognize the existence of "sciences", as well as the historical relationship between the two worlds. Such recognition, by Western science, could become a powerful catalyst towards broad social change, justice and quality in our backyard!

b. Methodological Implications:

1. P.R. is collaborative, endogenous, heuristic and experiential. Transculturally, this implies an ability to accept the idea of Native science; and a sensitivity to the process oriented, communally based indigenous methodology. Through joint research projects between equal partners, P.R. can act as a flow-through mechanism for scientific findings from both worlds.
2. P.R. can accommodate Native scientific theory and practice as one of a number of multiple methods or approaches commonly used for triangulation of data. Through this recognition of Native science, P.R. not only "legitimizes" the indigenous way of knowing for the West, but also achieves its own goal of human development.
3. P.R. methodology utilizes both qualitative and quantitative methodology and may, therefore, translate verbal

qualitative data generated by Native science into "numbers" so that Western scientists can understand Native people.

4. The participation of people in P.R., similar to "relations" in Native science, can provide cross-cultural opportunities for collaboration, cooperation, and communication.

5. P.R. is an educative process, its philosophical bases of dialectical thinking and historical materialism can become the instrumental nexus for decolonization of Native/non-Native consciousness.

6. P.R. stresses the value of fun as part of research work this complements the Native dynamic of Gii Laii.

7. The professional role in P.R. calls for knowledge and skill in human interaction, interpersonal dynamics and conflict resolution, as well as group development. Again, this complements Native scientific methodology and may facilitate inter-cultural understanding.

8. Validity or truth in P.R. derives from trustworthiness of data. Trustworthiness is readily understood in Native science, evidenced in the discussion of Elders. Moreover, various forms of "P.R. validity" - catalytic, illuminative and dialogic (Reason and Rowan) have nearly direct correspondence to Native expectations of science.

- c. To restore integrity to the practice of Indian science. Because we live in a bicultural world, it is easy for articulate, self-proclaimed Medicine Men to rise to prominence and fame in non-Indian, academic circles. This recent phenomena results in distortion of Native ways and the exploitation of non-Natives and young Native people who are seeking knowledge through Indian science.
- d. Native science requires and provides a process for Native people to complete the relationship with non-Native people. If we are to survive as a people, we must regain our critical consciousness; we must become responsible to ourselves within our altered context Deloria, Lakota scholar, notes:

"The spiritual aspects of knowledge about the world taught the people that relationships must be left incomplete. There are many stories about how the world came to be, and the common theme running through them are the completion of relationships and the determination of how this world should function. Such tales seem far removed from the considerations of science, particularly as Indian students are taught science in today's universities. However, when the tribal concepts are translated into scientific language, they make a good deal of sense. Completing the relationship focuses the individual's attention on the results of his or her actions. Thus, the Indian people were concerned about

the products of what they did, and they sought to anticipate and consider all possible effects of their actions."

- e. Practice of Native science requires the natural world which is presently being exploited, desecrated, and on the verge of global collapse. Native Peoples were given Original Instructions from the Great Spirit to protect and nurture the Natural Creations.

Limits, Pitfalls, and Problems of Participatory Research as
Intercultural Integrator

Unfortunately, scientific pluralism without intercultural bridging is no answer because it does not halt scientific colonialism nor does it provide a means for the Native world view to inform Western science. The scope and breadth of scientific domination is formidable. If the goal of scientific pluralism is to renew Native science and to produce a conceptual change in Western scientific thought, not merely a contentual change, then appropriate strategies must be defined.

• Bates, a Native scholar warns us of the great differences between the sciences that mitigate against formal integration:

"It is as though everyone has forgotten the bureaucratic intrusion lessons of the past. Somehow dominant and established systems are supposed to behave differently today and government intervention is called upon solely to

"bridge the gap". Little recognition is given to the unforeseen consequences that could signal a co-opted alternation at best -- or a premature end at worst -- to a delicate system of healing that is only now finding its way back into the Indian way of life with the vigor it once knew."

- Does participatory research mean that indigenous people must participate in Western scientific research to the exclusion of indigenous science?

- The word "participate" usually refers to a group of people, but what about the group of different parts of our senses and functions within our mind. To what extent is P.R. willing to participate in feeling, passion, and values?

- To what extent is P.R. willing to participate in the poverty, suffering and lives of its indigenous target populations?

- Native science is an indispensable component in the infrastructure of cultural sovereignty of Natives. Can P.R. limit itself to permit indigenous people to regain autonomy of thinking?

STRATEGIES, RESOURCES AND TOOLS FOR DEVELOPING A BICULTURAL
SCIENTIFIC INFRASTRUCTURE

1. Conceptual Tools.

a. Acknowledge the limitations as well as the benefits of the western, positivistic science:

"People thought for hundreds of years that classical physics was the final view of the world - the truth, not just a way of looking. Atoms were not taken as convenient divisions, but as 'the way it is'....

Of course, breaking and dividing things up should not be condemned. It is necessary to divide things up for practical purposes. For example, we divide up fields according to what can be grown; we divide up all sorts of things. But this ability to divide things up has been carried too far because it has led us to divide things which should not be divided. This is an essential point. We attempt to divide things which are one and united" (Bohm).

b. Learn about and from nonwestern traditions:

"It is the special task of learning centers in the West to break out of the shell of western technology, to begin the overdue learning process about nonwestern traditions, and to identify the features and resources of the emergent new order and the skills at its disposal, so a collegial process of social construction can begin" (Boulding).

c. Assume the view that change begins with each of us:

"Global transformation is a major theme of Third World planning these days, and it is a major theme of the work of the U.N. University with which I am associated. It is a term, however, that makes first worlders very uneasy. Transformation implied the emergence of wholly new forms; with all the uncertainty and unpredictability of the new, the untried. What the first world wants is equilibrium, stability. Change is perceived as a reequilibrating process. Yet new theories of change, such as Ilya Prigogine's, are theories of dissipative structures, theories that direct us to look at the points of maximum disorder in the old system, a new order. We in the first

world have to be willing to be part of the raw materials for the new order, rather than imposing our old molds on the rest of the world. From the perspective of creation, we are all individuals and societies, prima materia for that which is to come" (Boulding).

2. Methods, recommended by U.N.U. and U.N.E.S.C.O.

a. Create a new international information order, correct our lopsided information system by drawing on research findings generated by the Third World.

b. Social science models have been operating overly simplistic models. Conceptual frameworks and research on international problems should be transdisciplinary and interdisciplinary.

c. Joint research and collegiality must be promoted between indigenous and western people.

d. "One source of learning for North American social scientists is the third world inside North America; the spaces where Native peoples of Canada and the United States live, the rural and urban hard-core poverty ghettos that trap ethnic minorities, blacks, women single-heads-of-household, and poor whites. Development failures are not confined to Africa, Asia, and Latin America. We have colleagues who have emerged from these ghettos to gain research training, and have returned to study what has happened to their people. The reconstruction of colonized cultures, the recovery of oral tradition, is happening every day in North America, too. No one can be ready to work with third world colleagues abroad who has not first learned to work with third world colleagues at home (Boulding, 1983).

e. Practice micro-macro interface modelling of social processes. "Individual, household, community, nation, would all have living membranes which rub against each other. We must look where the rub is: (Boulding).

f. Engage in mental play about possible futures. No one can work for a world they cannot picture.

g. Draw from UNESCO's new international order concept.

METHODS RECOMMENDED BY NATIVE ELDERS/MASTER SCIENTISTS

a. Elders recommend that an intercultural team approach be used and that we focus on relations. They will teach

educated Native people about traditional ways. In exchange, the Native professionals will be bridges with non-Native professionals. The Elders advocate the use of these teams because the children live in and have internalized the cultural mosaic of today's world. Many are bi-racial. The Grandmothers believe that a unified voice in treating these children will steer them back to themselves, their culture and Grandparents.

- b. Elders want the opportunity to work and interact with western educated Native professionals and non-Native experts. They would like the chance to collaborate in research, theory building and practice development with their non-Native equivalents.

CONCLUSION

It is true that many problems loom in the creation of scientific infrastructure between Native and non-Native peoples. But support for such efforts comes from all quarters. The U.N.U. hopefully predicts that such efforts will unleash creative social imaginations in all its members - students, teachers, researchers, policy planners and activists - and develop the everyday skills needed to make the dream come true. Native scholars agree:

"Western science must reintegrate human emotions and institutions into its interpretation of phenomena; Eastern peoples must confront the physical world and the effects of technology. We shall understand as these traditionally

opposing views seek a unity the world of historical experiences is far more mysterious and eventful than we had previously expected."

Former astronaut, Frank White, founder of the Noetic Research Institute, exquisitely expresses the power of cross cultural approaches to human healing and development:

"If the next step in human social evolution is to build a planetary civilization, then what is most needed is the ability to see and deal with problems and opportunities on a planetary level. It is also the ability not only to observe but to truly communicate with the planet as a whole."

Through strengthening Indian science and working together, Elders hope that we will once again help our young "Know What Life Is" and steer our families toward the "Good Life." The key to this approach can be summarized in one word - "NIYE", which is a gentle admonishment of love meaning "my child." It is an honor to be spoken to in this way and it is we, the concerned professional people, to whom the Elders are saying "NIYE", meaning be good to one another and work together on behalf of the children and the good way of life.

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