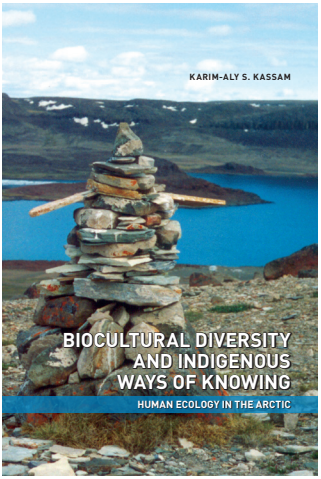

BIOCULTURAL DIVERSITY AND INDIGENOUS WAYS OF KNOWING: HUMAN ECOLOGY IN THE ARCTIC

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CHAPTER 3

Human Ecology Reconceptualized: A Lens for Relations between Biological and Cultural Diversity

To see a World in a Grain of Sand

And a Heaven in a Wild Flower

Hold Infinity in the palm of your hand

And Eternity in an hour (Blake 1991: 333).

3.1. Introduction

A reconceptualization of human ecology provides the path to the complex interconnectivity between the biological and cultural. Considering the division between ecology and human ecology, the biological and cultural, the need for integrating ecological thinking in the social sciences is undoubtedly compelling. The task, however, is fraught with challenges that threaten the foundations of disciplinary thinking and, worse still, rattle the 'iron cages' of academic self-interest. These 'iron cages' of disciplinary myopia

essentially remain the same even as one hegemonic dogma replaces another. William Blake expresses it aptly: "The hand of Vengeance found the bed to which the Purple Tyrant fled; the iron hand crush'd the Tyrant's head and became a Tyrant in his stead" (Blake 1991: 332). The current undertaking for reconceptualization of human ecology does not offer a grand unifying theory. The aims of this work are more modest and practical. First, it seeks to conceptualize indigenous human ecology in the Arctic and sub-Arctic in a way that is relevant to its context. Second, it does so without losing sight of the relations between biological and cultural diversity.

The context of the Arctic and sub-Arctic is important for significant reasons:

- It is culturally and biologically diverse;
- Its cultures have retained the fundamental threads of their traditions despite dramatic social change; in other words, they see, interact, and relate with the world with different socio-cultural premises;
- There is hope through applied and collaborative research with the people of these regions that humanity as a whole may benefit;
- There is an established history of indigenous communities working with and teaching southern researchers;
- The potential for continued mega-project resource development initiatives such as gold, diamonds, natural gas, oil, and fisheries represent the interface between technological industrial thought and needs with another human endeavour founded on values of biological and cultural holism;
- The region is a microcosm of issues that face humanity in the third millennium such as indigenous rights, globalization, impact of chemical pollutants, global climate change, use and abuse of renewable and non-renewable natural resources, militarization, etc.;
- Most of the critical thinking in the social sciences is devoted elsewhere and does not attend to the participatory research this region and its peoples require; and

- There is restructuring of international relations with the decline of the Soviet Empire and the rise to economic hegemony of neo-liberalism.

From such a vantage point the value of reconceptualizing human ecology may be also useful in high latitude alpine as well as other indigenous contexts. At the dawn of the twenty-first century, the Arctic and sub-Arctic and its peoples are not as remote as they may have seemed a hundred years ago. Nor are the social and ecological concerns in the circumpolar north inconsequential. They are, in fact, relevant to all of humanity.

3.2. Human Ecology for the Arctic and Sub-Arctic

In the circumpolar Arctic and sub-Arctic, human ecology describes the relationships between people and their environment. It includes the relations between humans and other animals, plants, and their habitat (Juzek and Mehrtens 1974: 4; Kassam and the Wainwright Traditional Council 2001: 3–4). Human ecology addresses subjects such as population growth, pollution, wildlife management, technological development, and use of non-renewable and renewable resources.

According to Molnar and Molnar (2000: 8–9) there are four central elements to human ecology that are distinct, but not mutually exclusive. These are diet, disease, demography, and development. These categories are necessary for understanding human survival. First, diet relates to dependence on nutrients for energy, growth, and basic preservation. The quality and quantity of food affects factors such as health and lifespan. Second is disease, which is related to nutrition. Detrimental changes in the environment affect human survival. For instance, malnutrition, pathogenic organisms, and exposure to pollutants can affect the health of humans. Equally, the ability to mitigate the effects of disease also impacts human health. Third, demography, the study of the nature of population, its structure and composition from generation to generation, is also affected by diet and disease. Development, the fourth element, links all the previous categories as it uses the various features of the environment including natural resources as a means for human survival and cultural existence.

For instance, the influenza epidemics of 1902 and 1918 illustrate the collective impact of diet, disease, demography, and development. As a result of increasing contact with Euroamericans, influenza significantly reduced Inuvialuit populations in the Canadian western Arctic. Combined with the depletion of coastal caribou herds, the reduction weakened Inuvialuit resilience in the face of dramatic social change. In the 1930s, due to developments in communication technologies and increasing globalization, the Canadian government introduced reindeer herding to the western Arctic, using Siberian reindeer herds stationed in Alaska and Sami reindeer herders from Norway (Robinson and Kassam 1998). For the Canadian government this was a way to 'civilize' hunting and gathering culture by encouraging the Inuvialuit on the 'path of development' to agriculture. For the Inuvialuit it was a matter of survival under the stress of disease, famine, and dramatic change.

The globalizing or expansionary tendency of agro-industrial culture simultaneously linked the Inuvialuit to Siberia at one edge of the circumpolar world and to Norway at the other extremity. As a result of the contact, there has been intermarriage between two indigenous Arctic communities, the Sami and the Inuvialuit, and there has been interbreeding between caribou and reindeer. A reindeer herd remains in the Canadian western Arctic and is maintained by an Inuvialuit-Sami family. The combination of diet, disease, demography, and development has permanently affected the human ecology of the Western Canadian Arctic.

Human ecology is simultaneously a function and a narrative of human beings' developing a socio-cultural system on the foundation of nature. Therefore, social institutions, including political decision making, have a key linkage to human ecology as it has a bearing on human-environmental decisions. It is not a coincidence that the largest global political organization, the United Nations, has an organ, the Secretariat on the Convention on Biological Diversity, devoted to issues related to ecosystems and human ecology world-wide. Thus, human ecology includes the implications of human activities and their cultures on the environment: harnessing energy in all its forms both renewable and fossilized; development and utilization of technology in all its dimensions; and the dynamics and density of population, all of which have an impact on the natural world.

In the context of the circumpolar Arctic and sub-Arctic, indigenous human ecology goes beyond the etiology of diet, disease, demography, and development as described by Molnar and Molnar (2000). Such Cartesian causal mechanisms are not sufficient. Furthermore, unlike the language-species model discussed in chapter 2, a conception of human ecology, which acknowledges that genotype, environment, and phenotype combine to act in a circuit of interactions, is essential (Lewontin 1974; 1982). Such an approach recognizes complex connectivity and avoids the instrumentalism of lineal thinking. Lineal thinking engenders teleological fallacies where a predetermined end dictates the process and ignores all other factors so as to validate the hypothesis or proposition (Bateson 2002). The species-language approach does not reveal the multiplicity of relations between organisms and their environment. When we speak of human ecology, we are not engaging in a linearly determined genealogical notion of *relatedness* (or kinship), but rather the progenerative idea of an all-encompassing connectedness of *relationships* (or kindred).

Subsistence hunting is related to basic needs and these needs are culturally defined (Sahlins 2000). Therefore, subsistence hunting is seen as a social construct based on culturally determined needs. In the Arctic and sub-Arctic, this relationship is reciprocal. Subsistence hunting is not only culturally bounded by needs, but in turn, it also informs the social structures of the indigenous communities that undertake this activity. The relationship between the activity of subsistence hunting and cultural expression is dynamic, intimately interconnected, and symbiotic. For instance, historical sources on the Inuit of Pelly Bay indicate that collaboration in subsistence activities and food distribution was not only a necessity in the strategy of hunting and fishing, but a "recognised behavioural norm." These activities were not only achieved by social cohesion, but were undertaken to reinforce social cohesion (Balicki 1970). With technological change and the introduction of the wage economy, one would expect that social cohesion in subsistence hunting communities would be undermined if it were purely for necessity. However, Stevenson (1997) examined the historical records of the Cumberland Sound Inuit and the Copper Inuit and acknowledged that contact with Euroamericans produced some changes as a result of technology, such as the rifle and the penetration of the market economy.

It encouraged individualizing tendencies among the Inuit, but overall there was not significant change to Inuit social structure and self-identity. In short, subsistence hunting is not only what one lives *on*; rather, it is also what one lives *by*, because it sustains the life of a culture. Brody (2000) uses the seemingly contradictory phrase "individualistic egalitarianism" to describe the behaviour of hunters. On the one hand, people have the right to do their own thing. On the other hand, they have a responsibility to share the success of the hunt. The *Nalukataq* festival after a successful whale hunt is an excellent example of this. In the actions of hunters, this cultural norm of egalitarianism mitigates the potential for social conflict created by market-oriented values with their emphasis on individualism. In essence, difference in an individual's ability does not mean there has to be a difference in well-being of members of the community as a whole (*oikonomia*).

There are five factors in demonstrating the deep connectivity between the biological and cultural that requires explanation:

1. Perception (section 3.3);
2. The notion of relations in hunting and gathering cultures (section 3.4);
3. The role context provides in framing those relations (section 3.5);
4. The development of experiential knowledge, knowing *how*, or practical wisdom (*phronesis*) that informs indigenous human ecology (section 3.6); and
5. An interpretation of human ecology viewed through the prism of indigenous knowledge (section 3.7).

3.3. Diversity and Perception

While culture and nature are betrothed, they may seem unmarriageable (Stewart 1975). Gregory Bateson's *Mind and Nature: A Necessary Unity* (2002) makes it possible to conceive of human ecology as a rigorous science

that embraces humanity's relation to its physical environment and its mental relation to its informational environment.

This insurmountable division simply fades to reveal what has been intuitively obvious to many cultures across the world – the continuous thread between nature and culture.

Diversity is the foundation of sensory perception and is the basis of knowledge. Perception is achieved by recognition of difference. Human sense organs fundamentally perceive by differentiation. This characteristic is shared by human beings with all other organisms. Otherwise perception is not possible. If perception is not possible, there is no knowledge. Sensory organs perceive 'things' to be separate from other 'things.' These 'things' are made *real* by their relationship with other 'things.' The nervous system enables biological reality by allowing an organism to process incoming information about a possible world for use in everyday life (Bateson 2002; Jacob 1982). Diversity is therefore the basis of our consciousness and ultimately makes us human. To corrode diversity implies an alteration in our humanity. "We mold our 'reality' with our words and our sentences in the same way as we mold it with our vision and hearing" (Jacob 1982: 58). In short, sameness does not produce relationships, and without relationships there cannot be understanding.

The notion of diversity asserts a pluralistic world – an earth made up of relations between many interacting things. Conservation of diversity is not just an ideal to strive for, but a practical necessity. In fact, in the twenty-first century it is urgent for the survival of humanity and all life on this planet.

3.4. Relations

Among the indigenous peoples in the Arctic and sub-Arctic, ideas about nature are supported by their social system; conversely, the social system is supported by their ideas of nature. Their view of nature and the social system is doubly guided and interrelated. These relations extend to other organisms. The word 'animal,' is derived from *animus*, meaning "endowed with mind or spirit" (Bateson 2002: 5). Tim Ingold (2000) explains that among subsistence hunting cultures the idea of person is combined with that of

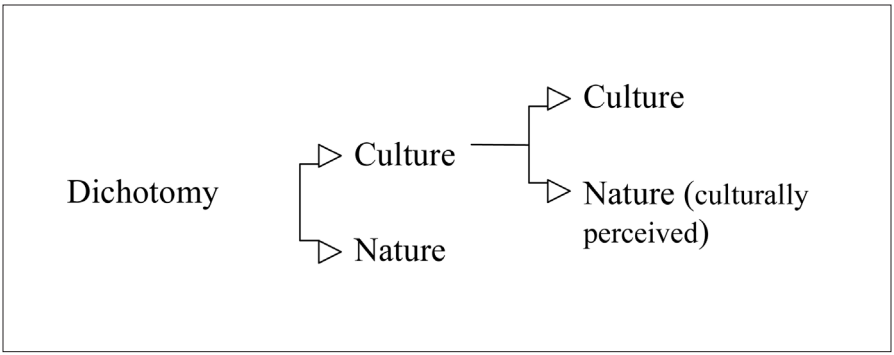

Figure 3.1: The Binary of Nature and Culture.

an organism. Therefore, relational thinking is extended beyond persons as cultural subjects to all organic life. "For if every organism is not so much a discrete entity as a node in a field of relationships, then we have to think in a new way not only about the interdependence of organisms and their environments but also about their evolution" (2000: 4). Therefore, in the hunt, the bodily substance of a caribou or whale is not taken, it is *received* (Bodenhorn 1990; Ingold 2000; Thorpe et al. 2001). This is the context that gives meaning to the direct experience of the hunter.

In such a context the binaries of culture and nature (as represented in figure 3.1) are irrelevant. A dichotomy between culture and nature leads to a perception of nature mediated through culture.

Being hunter and gatherer involves "active, practical and perceptual engagement with the constituents of the dwelt-in world." Ingold continues:

> The contrast, I repeat, is not between the alternative views of the world; it is rather between two ways of apprehending it, only one of which (the Western) may be characterized as the construction of a view, that is as a process of mental representation [figure 3.1]. As for the other, apprehending the world is not a matter of construction but of engagement, not of building but

> of dwelling, not of making a view *of* the world but of taking up a view *in* it (2000: 42).

In such a world, human beings are not composites of body and mind, but undivided beings, what Ingold calls "organism-persons" (2000: 47). The organism-persons relate to other humans, and non-human agencies, as well as inanimate entities in their environment (see figure 3.2). Therefore, in these spheres of connectivity there is no separation, but contextually delimited segments of a single ecological system. This notion of relations in active engagement within the world is the basis of human ecology of indigenous peoples in the Arctic and sub-Arctic.

Ingold argues that plants and animals, human and non-human, are all organisms. Furthermore, the organism should not be thought of as containing life, or expressing it, but as emergent within the life process itself. "As beings, persons *are* organisms, and being organisms, they – or rather we – are not impartial observers of nature but participate from within in the continuum of organic life.… that is, of restoring human beings to the organic lifeworld in a way that does not, at the same time, reduce them to mere objects of nature" (2000: 90). "The notion that persons, as beings in the world, can appear in both human and other-than human forms may sound strange, but it is not half as strange as the notion that to become a person – to be in a position to know and reflect upon the nature of existence – means taking oneself out of the world" (2000: 95). Whether Ingold's description of non-humans as persons is outrageous to an agro-industrial culture is beside the point. The fact remains that in the context of diverse cultures in the circumpolar north, many acknowledge the existence of non-human persons.

A being 'is' not because of a certain property contained within, but by its 'relation' in a continuum of beings. Context is the relational field where the being is experienced (Ingold 2000: 97,105). Experience of the world does not separate mind and nature. A person's total sensory involvement in an environment is intrinsic to the ongoing process of being alive to the world.

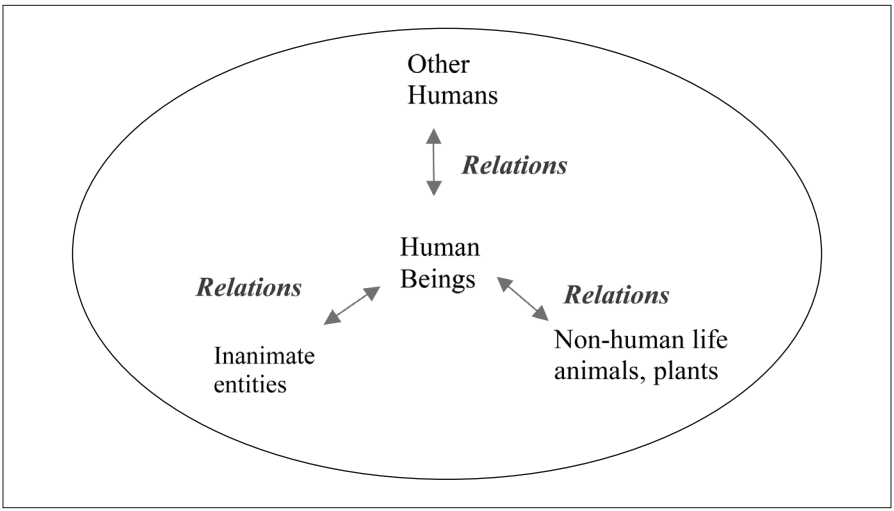

Figure 3.2: The Concept of Human Ecology Illustrated.

3.5. Context Provides Basis for Relations

As noted earlier, perception is achieved by recognition of difference. Diversity is basic to mental perception. Otherwise perception is not possible. There is no objective experience. Experience is mediated through sense organs and is therefore subjective because it is perception. This idea is contained in the root word for knowledge, *gnosis*, meaning knowledge by direct experience. The process of perception is inaccessible, but the product is accessible. We observe actions. The division of the perceived universe into parts and wholes is convenient and may be necessary. But necessity does not determine how it is done. Explanation grows out of description and the description carries arbitrary categories. This explanation is what provides meaning or culture. If perception is not possible, however, there is no explanation, and therefore, there is no such thing as knowledge and no culture.

Learning is achieved in a context. Context is understood in two forms: spatial and temporal. A context provides the basis of narrative – as a pattern which connects. These patterns are dynamic. Context brings out relationships (Bateson 2002: 15). Meaning is revealed through relationships.

The study of culture is less experimental and more interpretive than other sciences. Clifford Geertz (2000) takes a semiotic approach to the study of culture, describing it as an interpretive science dealing with the webs of significance spun by humans. These interworked systems that comprise a culture take place within a context. An ethnographic description of culture is "thick" in its complex specificity and circumstantiality. Context in a pattern of social relations is fundamental to theoretical formulations of culture. Geertz maintains that cultural diversity goes beyond its mere garb, appearance, or setting and defines humanity as various in both its essence and expression.

It is the particularities that reveal the universal in the same way that small facts reveal large issues.

> The aim is to draw large conclusions from small, but densely textured facts; to support broad assertions about the role of culture in the construction of collective life by engaging them exactly with complex specifics (Geertz 2000: 28).

The universal may only be approached through recognition of the particular, which is varied in different contexts. The reverse is not possible, and to argue otherwise is myopic and motivated by an illusory monism. In other words, small facts hint at big truths. This was a characteristic of the development of the theory of evolution when Alfred Russel Wallace and Charles Darwin challenged the notion of special creation. Wallace and Darwin were influenced by specific contexts (namely islands in different parts of the globe) as they developed the concept of evolution. Through fastidious observations of the island milieu Wallace and Darwin arrived at a theory (Darwin 1996; Quammen 1997).

Similar processes preceded the revolution in physics when Galileo challenged Aristotelian modes of thought. The quantitative tendency in modern physics is associated with a desire to achieve a full description of concrete actuality. Aristotelian thinking engages in excessive valuation of the general rather than the particular. In Aristotelian thought the individual event seemed fortuitous and unimportant, whereas in Galilean thought it is significant. In Aristotelian thought lawfulness is determined when

events recur regularly. Frequency determines lawfulness and reveals the essential nature of events. However, in Galilean thought and what became modern physics, lawfulness is not determined by regularity or frequency, but is characteristic of every physical event. The dynamics of a process are derived from the concrete individual to the concrete situation (Lewin 1935). The famous refrain of the English poet William Blake, "To see a World in a Grain of Sand and a Heaven in a Wild Flower," has deep resonance with the idea that the particular provides a glimpse into the universal (Blake 1991).

3.6. Knowing

In many respects, the acknowledgment of indigenous knowledge by scientists working in northern regions or more remote regions of the globe resembles Baconian empiricism, where "truth is found in nature, not books." The recognition of the value and contribution of indigenous knowledge is a breakthrough over the hegemony of the expert much like that of the seventeenth-century craftsmen and artisans who broke through the class system and thus contributed to the intellectual revolution in which Galilean modes of thought prevailed over Aristotelian modes in physics (Berman 1984). Galilean modes of thought are the basis for modern empirical science. They bear a remarkable resemblance to indigenous knowledge. Both knowledge systems are functional and grounded in concrete experience (Lewin 1935).

The foundations of knowledge for hunter-gatherers is through revelation, *gnosis*, direct experience. By the practical act of hunting and gathering, the landscape with its fauna and flora enters directly into the constitution of persons, not only as a source of nourishment, but also as a source of knowledge. Therefore, knowledge from a relational point of view lies not in the heads of predecessors, but in the world that they point out to you. Knowledge is in the salient features of the experiential environment shared between generations. Living in the land ensures the continuity of the language that expresses that knowledge. Removing a community of speakers from the land cuts the language adrift from its generative source of meaning, its ecology (Ingold 2000).

3.6.1. Knowing how and knowing that

Knowing through direct experience is a key concept in philosopher Gilbert Ryle's *The Concept of Mind* (1984), in which he discusses the difference between knowing *how* and knowing *that*. The latter relates to finding out *that* something is the case, such as that the Iñupiaq word for the bowhead whale is *aġviq*. The former relates to finding out *how* to do something, such as the method of walking across thin ice. In the context of understanding whether (knowing *that*) climate change is taking place, we must ask *how* the performance of tasks on sea-ice by the Iñupiat of Wainwright is being affected (see chapter 5). Knowing *how* is embedded in experience – it is contingent. It is gained through performance. In other words, in action intelligence is displayed. In the performance of an act knowing *how* is manifested. An individual who is bodily active is also mentally active. Thought is not separated from action and it is not simply habitual practice; a performance is an intelligent practice because each action is modified by its predecessor. It is reflection-in-action (Schön 1983). As a result an Iñupiat hunter is able to proceed in uncertain and possibly unique situations.

Because learning is involved with each act, activity is tantamount to the movement of the person through the world. In order to understand knowing *how*, a particular type of competence is required. Just as the intelligent performer acts critically, the intelligent spectator must follow critically because learning *how* is not like learning *that*. Knowledge in the case of learning *how* is not imparted; it is experienced. Iñupiat knowledge of sea-ice is experiential. Richard K. Nelson in his *Hunters of the Northern Ice* (1969) expresses the depth of Iñupiat knowledge of sea-ice that practically expresses experiential knowing:

> The Eskimos [Iñupiat] have developed an ability to predict movements from their knowledge of the peculiarities of each type of wind and each flow of current, so that for any combination of the two they can make a reliable forecast of ice safety. This knowledge is very subtle and is difficult to acquire, especially without a full understanding of the Eskimo language [Iñupiaq] and many years of actual daily experience with these phenomena (Nelson 1969: 41).

In light of this and the relational nature of indigenous human ecology, language is not so much what lies within persons, but between them (Brody 2000).

One has to be brought up in a particular language and environment to see the world as the Inuit see. Language is related to daily practice through memory. Memories are formed through the function of the senses. Memories are generated and forged through the movement of persons in the course of day-to-day activities. This is easily conveyed through the Inuit words for ice and snow. These complex words for snow and ice are necessarily nuanced to enable decision making and prediction on when to travel and hunt. The difficulty in understanding these concepts or terms is not an issue of incomprehensibility, but unfamiliarity (Brody 2000). This is because this type of knowledge is experienced on the ground, as it were. It is not learning from books, but learning from the experience of living from and on the land and sea. It is knowing *how* as opposed to knowing *that*. It is knowing how to survive on sea-ice, rather than just knowing *that qaqudluk* is fulmar (Ryle 1984). In other words, it is possible to learn another language. However, there are limits to what translation can achieve. Learning *how*, that is, critically following the teacher by living with the people, is a way to achieve knowledge. Brody recounts his experience learning Inuktitut:

> When I had asked Anaviapik to teach me Inuktitut, and when he said he was eager to do so, I had thought we were talking about words and grammar [knowing *that*] about speaking, while he had supposed we were talking about a way of being [knowing *how*]. He had embarked upon the task of teaching me how to do and to be *Inuk-tituk*, 'in the manner of an Inuk.' Anaviapik had always known what it would mean to learn his language (Brody 2000: 64).

In essence hunter-gatherer knowledge is dependent on an intimate physical connection with the world and the creatures that live in it. This intimacy enables a comprehensive understanding of the local environment. Knowing *how* is inductive and intuitive. It emerges by allowing all that has been learned to process itself. It is more sophisticated than linear logic because

it assigns weight to multiple factors in the act of hunting and gathering. Knowing *how* illustrates the contextual relationship between cultural and biological diversity. It is the human ecology of an area.

3.6.2. Performance

Dreyfus and Dreyfus (1986) developed a model for the learning process. As the title of their work, *Mind over Machine*, suggests, there are aspects of the unity of the human mind-body in action that a machine cannot learn to do. Gilbert Ryle also sought to deal with the "dogma of the Ghost in the machine" (1984: 22), dismissing the idea that the body and mind are separate like a machine. Knowing *how* and knowing *that*, as presented in the previous section, are not real binaries. The two forms of knowing were compared and contrasted in the previous section for the sake of understanding. However, this dichotomy is artificial.

While using the idea of knowing as explained by Gilbert Ryle (1984), Dreyfus and Dreyfus do not acknowledge, nor do they directly link, his contribution to their model of learning (1986: 16–19). Whatever the reason for this oversight, combining the two approaches provides a textured and nuanced understanding of the interrelationships between knowing *how* and knowing *that* in the process of learning. By asking how people acquire knowledge and skill, Bent Flyvbjerg (2001)[1] builds on the work of Dreyfus and Dreyfus in showing how learning is achieved in the social sciences and illustrating the relationship between context and knowledge. The Dreyfus and Dreyfus model consists of five levels of the learning process.

1. The *novice* learns context-independent facts and rules necessary to the performance of action or of a skill. A novice would judge her own performance on the basis of context-free rules. While the rules are necessary to gain experience they quickly become a barrier for the novice to overcome (Dreyfus and Dreyfus 1986: 21–22; Flyvbjerg 2001: 11,20).

2. The *advanced beginner* gains real life experience recognizing its link to the concrete and dependence on context. The beginner learns to interpret on the basis of concrete

experiences by gaining from the situation (Dreyfus and Dreyfus 1986: 22–23; Flyvbjerg 2001: 12,20). These first two stages are characteristic of Gilbert Ryle's (1984) learning *that* and knowing *that*.

3. The *competent performer* has a fluidity that illustrates adaptation to the concrete situation. There is a relationship of involvement between the performer and the context. The performer feels responsible and attached. There is greater consequence for the performer's actions than in the first two stages. Therefore, there is an element of interpretation and judgment exercised by the performer. The competent performer is involved in making a choice of goals and plans for the basis of their actions. The decision making is increasingly context-dependent. From this stage there is a qualitative jump from analytical problem solving to genuine, human expertise as experienced in the last two stages of the learning process. Analytical rationality, while necessary, is slow compared to the bodily involvement, speed, and intimate knowledge which are characteristic of the last two stages (Dreyfus and Dreyfus 1986: 23–27; Flyvbjerg 2001: 13–15, 20–21). This is the transition phase between Gilbert Ryle's (1984) knowing *that* and knowing *how*. It is the stage of learning *how*.

4. The *proficient performer* decides in a more continuous, not sequential, manner, without needing to choose goals or reflect on alternatives. Previous actions inform current performance. Analytical decision making is combined with intuitive involvement (Dreyfus and Dreyfus 1986: 27–30; Flyvbjerg 2001: 16, 20). Intuitive involvement and understanding is synonymous with knowing *how*.

5. The *expert* has reached a level of proficiency where intuitive involvement grows into synchronous and holistic action. Cumulative practice and concrete experience are central

> to the achievement of expertise. Here intuition relates to experience that is, bodily, emotional, and intellectual. It is performance at the point of virtuosity. The expert acts from a holistic understanding, not through forethought. For experts, problems and solutions are not separate categories because their skills are part of themselves; their bodies and the separation between subject and object disappears. The performance is fluid and effortless (Dreyfus and Dreyfus 1986: 30–36; Flyvbjerg 2001: 17–21). This is the end goal of the learning process.

The first three stages are rational in that they relate to calculation or reasoning out of action based on context-independent behaviour. The last two are arational, where context is relevant to knowledge and development of skills; they are situational and experience-based. The Dreyfus and Dreyfus model shows that the rational mode of thinking, because it is rules-oriented and based on formal logic, recreates human characteristics that are close to machines. It is, however, inadequate in explaining the total spectrum of human activity. It is a fallacy to raise rationality and analysis to the supreme level of human activity because this would exclude context, judgment, practice, trial and error, experience, common sense, intuition, and bodily sensation (Flyvbjerg 2001: 22–23).

With respect to the learning process, the use of the ideas of Dreyfus and Dreyfus (1986) as well as Ryle (1984) in tandem provides valuable insights into knowledge generation and consequently into indigenous human ecology in the Arctic and sub-Arctic (see table 3.1). Human ecology is ultimately the process of *living through* relations with biotic and abiotic elements within one's environment. It employs the complete human, body and mind, in an intuitive, knowing *how* to live.

Table 3.1: A Summary and Consolidation of the Models of Knowing

Dreyfus and Dreyfus	Ryle	The Learning Process
Novice	Learning *that*	Knowledge is imparted (context-independent)
Advanced beginner	Knowing *that*	
Competent Performer	Learning *how*	Knowledge is by experience (context-dependent)
Proficient Performer	Knowing *how*	
Expert		

It is important to keep in mind that for the hunter, this process is cumulative and iterative and not a linear progression or an arrow, but more like a feedback loop or circuit building on the experiences of the performer.

3.6.3. Phronesis

Aristotle (2004), in *The Nichomachean Ethics*, identifies three intellectual virtues. Chief among these virtues is *phronesis*, or practical wisdom. The other two are *episteme*, scientific or demonstrative knowledge, that is context-independent; and *techne*, which is context-dependent knowledge that is necessary in order to make things. These three forms of knowledge, while distinct, are not mutually exclusive. Instead they are co-dependent to the learning process.[2]

It should be noted that the earlier criticism of the parametric universalistic and naturalistic Aristotelian mode of thought as compared to Galilean mode of thought in physics is linked to Aristotle's *Physics* and *Metaphysics* (1998) rather than his *Ethics*. The notion of *phronesis* is primarily drawn from his discussion of intellectual virtues in his *Nichomachean Ethics* (2004).

Phroenesis is practical wisdom that is marked by reflexive analysis in which cultural values are contributing factors. It is knowledge of *how* to secure the ends of human life. It involves daily praxis, pragmatic action, context-dependent knowing based on variable factors. This virtue is closely tied to the idea of *oikos*,[3] the root word of both ecology and economics, meaning the management of the household, community, or state (Aristotle 2004: 150). *Phronesis* requires the interaction between the general and the

particular, judgment and choice; it is concrete and related to experience. It takes into account the universal through the particular.

The process of learning viewed as *phronesis* is instructive about the process of knowledge generation, acquisition, and application. In this sense any form of knowledge generation, scientific or indigenous, is ultimately not context-independent. Paul Feyerabend (2002) in *Against Method* argues that events, procedures, and results that constitute science have no common structure; there is not a standardized way. This implies that scientific knowledge or *episteme* is contingent before it is generalized. Furthermore, the 'public' can participate and contribute to the formation and expansion of human knowledge. "Still there are many things we can learn from the sciences. But we can also learn from the humanities, from religion, and from the remnants of ancient traditions that survived the onslaught of Western Civilization" (2002: 249).

Feyerabend elucidates the connection between idea and action, cosmology and empiricism, which is context-dependent. "Creation of a thing and creation plus full understanding of a correct idea of the thing are very often parts of one and the same process and cannot be separated without bringing the process to a stop"(2002: 17). He gives the example of the Copernican point of view, which ran counter to contemporary reason and experience, or Einstein's theory of general relativity. More recently, an example from the Arctic pertaining to research on the phenomena of Aurora Borealis illustrates that a 'pre-existing dogma' may be tested by what seemed like a naïve question from a graduate student. In the 1960s the process of auroral morphology seemed to have reached its limit and it seemed that there was nothing left to be done, much like Aristotelian physics before Galileo. Syun-Ichi Akasofu (2001), then a graduate student, developed a conceptual qualitative model by observation before quantitative analysis to open a new field on auroral substorms. He integrated ground-based and satellite research to topple a theory that was firmly entrenched with some considerable resistance from the established scholars.[4]

We will now briefly return to the idea of human agency through reflexivity and the potential of social change (section 2.6.2). The context-specificity of culture points to the dependence of humanity on extra-genetic mechanisms for governing behaviour. The distinction between generalizations

and explanations when looking at consequences of behaviour needs to be closely examined. There is a diversity of explanations and generalizations based on actions informed by a people's knowledge and beliefs. Human ecologists must be able to move freely between explaining human actions and their non-human consequences. Therefore, a study of consequences can be a guide to behaviour and the study of behaviour can be a guide to consequences. Generalizations and case studies are not divorced from each other. Not only do generalizations need to be supported by case studies, but case studies require the use of generalizations (Vayda 1988).

Therefore, context-dependence does not mean just a more complex form of determinism. It is an open-ended relation between contexts, actions, and interpretations. It is a form of double-loop learning (Argyris, Putnam, and Smith 1985). Flyvbjerg summarizes well when he writes: "The rules of a ritual are not the ritual, a grammar is not a language, the rules for chess are not chess, and traditions are not actual social behaviour" (Flyvbjerg 2001: 43). Sorokin (1962) and Geertz (2000) made a distinction between a cultural system and social structure. The thread between a cultural system and a social structure is reflexivity, the basis of human agency.

We must take into account the interpretations of self-reflecting humans. This is a double hermeneutic where both self-interpretation and the relation to the context studied explain peoples actions. Reflexivity, the ability of an entity to react back upon itself, is essential because it is capable of producing change. Flyvbjerg explains: "Stability cannot be achieved when that phenomenon which is the locus of inquiry (human activity) is both subject and object of science" (2001: 36). Reversibility in human action is possible through reflexivity and action – "Human practice and history … can be unmade, as long as we know how it was that they were made" (2001: 112).[5]

The major point here is that all knowledge generation is context-dependent – even *episteme*, before it is generalized and decontextualized. *Phronesis*, therefore, is not a state of knowledge, but a dynamic process within the framework of human ecological relations. The diagram (figure 3.3) below expresses the iterative process for the performer such as the subsistence hunter. The present articulation of *phronesis* emphasizes praxis or action-orientation. It also illustrates the fundamental role of reflection or deliberation in determining appropriate action. *Phronesis* also has ethical import;[6]

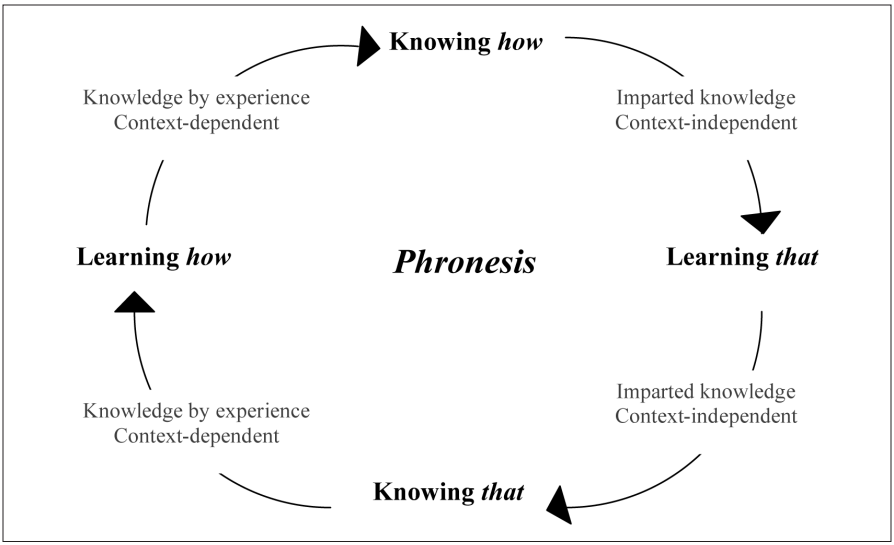

Figure 3.3: *Phronesis* Illustrated.

it is informed by the values which guide and inform action (Eikeland 2006). I will return in chapter 5 to the ways in which ethical values arising from the cultural fabric of the Iñupiaq inform subsistence activities in relation to sea-ice and climate change.

Aristotle maintained that we may grasp the nature of *phronesis* if we consider those who are adept at it (2004). With this humanitarian and participatory conception of knowledge we now turn to the understanding human ecology through indigenous knowledge.

3.7. Understanding Human Ecology through Indigenous Knowledge

In the Arctic and sub-Arctic, humanity has sustained itself over thousands of years because of *phronesis*. The perceptions of indigenous peoples who derive their livelihood and maintain their existence from the fruits of the

land and sea are worthy of reflection and consideration due to their sustainable and therefore successful relationship with their natural environment. While there is debate on the inherent tendencies of Aboriginal people to be environmentally conscious (Howard and Widdowson 1996; Nuttall 1998), the outcome of this discussion does not change the fact that indigenous communities in the Arctic and sub-Arctic have definite relationships with the natural environment. Those relationships contribute to a reconceptualization of human ecology based on the value and techniques of indigenous knowledge.

When engaging indigenous knowledge, the disciplinary boundaries of the biological and social sciences become permeable, requiring an interdisciplinary mindset. Various terms have been used for the knowledge of indigenous peoples. It has been labelled people's science, folk-ecology, rural people's knowledge, ethnoecology, ethnohistory, ethnobiology, ethnobotany, ethnoscience, local knowledge, traditional environmental knowledge, traditional ecological knowledge, simply traditional knowledge, indigenous ecological knowledge, and even indigenous technical knowledge (Agrawal 1995; Chambers 1991; Cruikshank 1998; Ellen and Harris 2000; Grim 2001; Johnson 1992; Kassam and Graham 1999; Kawagley 1995; Sillitoe 1998; Stevenson 1996). This list is by no means exhaustive, but it serves to make the point that there is a diversity of terms for indigenous knowledge. Furthermore, these terms are infused with ecological conceptions indicating the extent of indigenous peoples relations with their habitat. With regard to detailed observations of their habitat, the knowledge of indigenous hunters shares some important characteristics with science (*episteme*).

An understanding of human ecology in the Arctic and sub-Arctic is provided by indigenous communities who share their knowledge with university researchers and policy makers (Battiste and Henderson 2000; Ellen and Harris 2000; Kassam and the Soaring Eagle Friendship Centre 2001; Kassam and Graham 1999; Kassam and the Wainwright Traditional Council 2001; Kawagley et al. 1998; Knudtson and Suzuki 1992; Sillitoe 1998). Indigenous knowledge is best described by its attributes: context specificity, complex connectivity, empirical tendency, cumulative nature, and plurality.

3.7.1. Context specificity

As human ecology relates to a particular ecological region or ecosystem, indigenous knowledge is also context-specific, related to, and contained within, a group of people who live in a defined geographic region. Indigenous knowledge includes a web of relationships between humans, animals, plants, natural forces, spirits, and land forms. Therefore, social, ethical, and spiritual relationships also have an ecological foundation. Even family, clan, or tribal relations are influenced by the ecological system. For instance, the interchange between humans and whales is spiritual for the Iñupiat of Wainwright, Alaska. The emotional connection is highly intimate; suffice it to say, that before, during, and after the hunt prayers are recited for both the whale and the crew.

3.7.2. Complex connectivity

Human ecology is holistic in that it encompasses the interconnectedness within an ecological system and these relationships that form a greater whole. Similarly, indigenous knowledge arises from closeness to the land and the relationships with living things. In this sense, it grows out of a connection to the natural surroundings. It is obtained by the labour of living and experiencing the context, and not through book-learning. Indigenous knowledge is derived from a sense of kinship with or, more accurately, a kindred spirit with other living creatures, the land, the sea, and the spirit worlds. Knowledge in this context is derived fundamentally from the environment. As a result of the kindred spirit there is no separation between the biotic and abiotic or between renewable and non-renewable. These categories simply do not arise as there is an interrelationship between all forces and forms within the natural world. Furthermore, indigenous knowledge informs, and is formed by, the cosmology or world-view of a group of people. In this sense, it is intimately linked to their spiritual and ethical fabric, which has a holistic manifestation in practical day-to-day expressions. The ecological features of indigenous knowledge described above have clear social consequences. For instance, bowhead whale harvesting activities of the Iñupiat influence the relations between the captain of the whaling crew and his wife. Coinciding with the whaling season are numerous household traditions that must be upheld in order to have a successful whale hunt. The

captain's wife ensures the house is clean, as tradition states that a whale will not return to an unkempt house. As well, all food items are kept off the floor in a whaling captain's house for the duration of the hunting season to prevent a whale from going under the ice after being struck. The captain's daughters and other female community members help with the house-cleaning, but the men of the whaling crew – including the captain – are responsible for cleaning the cellar. The contents of the cellar are consumed at *Nalukataq* and Christmas feasts to make space for the anticipated whale. The *Nalukataq* festival is a metaphor of the human ecology of Iñupiat who hunt the bowhead whale. This is a community event, held shortly after a successful hunt. People gather not only to share from the harvest but also to give thanks to both the whale and the whaling crew. Social bonds among community members, and in turn with bowhead whales, are renewed and reinforced at the *Nalukataq*. In an Iñupiat community like Wainwright, Alaska whaling is more than just a major food source; it defines the cultural life of the community (Freeman et al. 1998; Kassam and the Wainwright Traditional Council 2001; Nelson 1982).

There is an important difference between the starting point of indigenous knowledge and the human ecological lens. Complex connectivity in indigenous knowledge is inherent; individuals perceive their system of knowledge as an indivisible whole. Whereas the human ecological lens begins with the separation between culture and nature and as a result of recognizing the interrelationship that comprises complex connectivity between cultural systems, social structures, and ecological contexts, it seeks to reframe itself to a holistic perspective. While this difference is subtle, it is important, because demonstrating the connectivity of cultural systems, social structures, and ecological context is the aim of this work.

3.7.3. Empirical tendency

The paradigmatic characteristic of indigenous knowledge as described in sections 3.7.1 and 3.7.2 is also combined with a practical empirical trait. Indigenous knowledge is observational, analytical, practical, and effective. Rather than exploring the biochemical or physiological makeup of plants and animals, it provides responses to such questions as: where are they found, what methods may be used to harvest them, and how can they be

utilized? Indigenous knowledge provides valuable and detailed insights into the ecosystem such as an understanding of the flora and fauna, climatic changes, and how plants and animals behave and interact with each other and are influenced by climatic or seasonal variations. Indigenous knowledge provides information on harvesting techniques, processing and storage of foods, and nutritional and medicinal value of various plants and animals and their different parts. In this sense, indigenous knowledge shares a common characteristic with scientific knowledge in that both are empirical.

However, the field sciences such as botany or applied chemistry differ from indigenous knowledge in the nature and exposition of this empirical quality. While the field sciences may convey the depth of knowledge in terms of structure of a plant or animal, indigenous knowledge expresses the breadth of relationships among plants, animals, and the environment. When combined they reveal a wider canvas of relationships that make up the human ecology of a region. For instance, current research on sea-ice and climate change in the Iñupiat Village of Wainwright, Alaska, illustrates how both forms of knowledge are contributing to a more comprehensive understanding of changes in the environment. Iñupiat hunters and whalers are in direct contact with sea-ice on a consistent basis. They have an intimate understanding of sea-ice formation, robustness, and breakup. They are able to observe and detect any changes in sea-ice conditions. Sea-ice itself is an important indicator of climate change. Synthetic radar-aperture (SAR) images from satellites provide a macro-perspective exposing information on time of sea-ice formation, break-up, and movements, provided the satellite is passing over the region at that time. When the micro-perspective or context-specific information through indigenous observation is combined with SAR imagery, the indigenous community members and researchers have a greater understanding of what is occurring to the whole (see chapter 5).

3.7.4. Cumulative

While indigenous knowledge is empirical it is also cumulative. It compels the holders of indigenous knowledge to be conscious not only of the wisdom and observations of their generation but of the generations that preceded them. This does not mean that tradition is fixed in a particular time or age. In fact, it is dynamic and adaptive. The holders of the knowledge do not

only have a perception of the pastness of the past, but also its presence. New ideas and approaches are quickly adopted if they are seen to benefit the people. Similarly, field sciences like ecology also have values and traditions which link this knowledge together from generation to generation (i.e., *phronesis*). This edifice is not static, it is an ark on a flowing river adapting to the changing currents and seasons while preserving a common theme. In human ecology and indigenous knowledge the common theme is humanity's relationship with its habitat. In Wainwright, Alaska, subsistence activities are carried in conjunction with both global scientific as well as local indigenous knowledge systems. In the process of hunting the bowhead whale traditional techniques and understanding of sea-ice, currents, and wind patterns are combined with use of aluminium boats, outboard motors, and modern communication systems. They are used together to meet the practical day-to-day needs of the community, such as survival and nutrition (Kassam and the Wainwright Traditional Council 2001; Nelson 1982). Therefore, it would be analytically sterile and factually inaccurate to separate scientific and indigenous knowledge systems. Both co-exist and interact in a finely intertwined web of complex relationships. Furthermore, both systems of knowledge demonstrate heterogeneity within themselves. Binary categorization ends up fixing these knowledge systems in time and place without regard to social context and the dynamic nature of knowledge (Agrawal 1995; Wenzel 1999).

3.7.5. Plurality

Finally, neither the knowledge nor its holders are homogeneous. Indigenous knowledge, like many knowledge systems, is sufficiently complex that it does not lend itself to terse and easy characterizations. This is why one can only speak of certain attributes of indigenous knowledge rather than providing comprehensive definitions. The degree to which an individual within a group may hold this knowledge varies with age, gender, social class, level of experience, linguistic ability, access to oral tradition, and even interest in the subject. Similarly, a field science like ecology is heterogeneous with a diversity of expertise and knowledge across a wide spectrum of issues and concerns.

3.8. Summation

This chapter has argued that human ecology can be reframed by placing it within a northern indigenous context. Even while taking into account criticisms such as the nature-culture dichotomy, the tendency toward balance-of-nature perspectives, and the fetish for averages at the expense of diversity, the potential for social change through human agency implies that reconceptualizing human ecology will further both scientific study and indigenous knowledge. In the Arctic and sub-Arctic context one does not undertake a change of intellectual garments and tools of understanding. Categorizations of Western versus indigenous ways of knowing end up being myopic and facile. Knowing, *phronesis*, is both humanitarian and participatory. It is context-specific and anthropocentric.

The key ideas covered in this chapter may be summarized in the following points.

- Diversity is the basis of sensory perception, and it is this characteristic that unites humans with all other organisms.
- Diversity defines our humanity and moulds our reality.
- The evolutionary development of sensory perception and mental processes within an organism is stochastic. We can predict in terms of the possible and even the probable but never bridge the gap to the actual.
- Human beings (including researchers) are not impartial observers of the natural world but participate within it utilizing mind and body.
- This participation is characterized by relations with other humans, non-human life such as plants and animals, and inanimate entities.
- Context provides the basis for these relations.
- Context is a story, narrative, pattern that connects, revealing meaning through relationship.
- Human ecology is interpretive where the particular speaks to the universal and small facts shed light upon large issues.

- Knowing is embedded in direct experience of the senses and therefore, within a specific contextual relation.
- Relationships become the basis of knowledge.
- Knowing *how* is a dynamic process through action and reflection that is not separate but is a simultaneous performance. It is one *intelligent* act.
- This type of knowing is *phronesis*, reflexivity in action, a double hermeneutic, where self-reflecting humans interpret the consequences of actions.
- *Phronesis* is a dynamic process involving a circuit of knowing *how*, knowing *that*, and learning *how*. It is the iterative movement from context-dependent, experiential knowledge to context-independent, imparted knowledge. It is approaching the universal from the particular and vice versa.
- Humanity has extra-genetic mechanisms for governing behaviour and this agency produces social change.

Paul Feyerabend, in his work *Against Method* (2002), explains that knowledge is contingent and furthermore that *idea* and *action* are combined. This has significant implications for research because it means that cosmological and empirical considerations are not separate. The analytical lens of human ecology informs both the understanding of the relationship between the biological and cultural, as well as the method by which to reveal these relations. It is, by definition, context-specific and therefore, could only be examined on a case-by-case basis. The research sites are the location and locality, situation and situationality, condition and conditionality from which we can understand the relationships between biological and cultural diversity. The elements of this reconceptualized analytical lens include: context, perception, diversity, relationships, and knowledge generation (Bateson 2002; Ingold 2000; Ryle 1984; Turnbull 2000). Most importantly, the process must be participatory to be considered genuine *phronesis*.

The individual case study provides access to context-dependent knowledge and facilitates learning *how*. The case study approach was central to Galileo's experimentation on gravity as well as development of Darwin's and Wallace's contribution to the theory of evolution. The case study is

central to understanding human ecology. In the next three chapters, we will explore different aspects of applied human ecology. Chapter 4 will explore the human ecology of Ulukhaktok (formerly Holman), Northwest Territories, Canada. This chapter will serve as an illustration of indigenous human ecology in the context of an Inuit cultural system functioning within the social structure of the Canadian market economy. Chapter 5 will focus on the process of *phronesis* in dealing with relevant issues of societal concern such as climate change in the Iñupiat community of Wainwright, Alaska, USA. It will show that knowledge is what lies between us and not within us. Chapter 6 will examine the mapping of indigenous human ecology. It will connect the sharing of knowledge to the exercise of power. It will demonstrate that power is not possessed but expressed through human ecological relations.