

Mundi Machina (Worlds-Generating Machines):**Dynamics of Interactions and Realities**

Keiichi Omura (Osaka University)

1 Introduction: Dialectical Relationship between Interaction and Reality as the Starting Point for Comparative Study of Indigenous Knowledge and Modern Science

In short, animals do not participate with humans qua persons only in a domain of virtual reality, as represented within culturally constructed, intentional worlds, superimposed upon the naturally given substratum of organism—environment interactions. They participate as real-world creatures, endowed with powers of feeling and autonomous action, whose characteristic behaviours, temperaments and sensibilities one gets to know in the very course of one’s everyday practical dealings with them. In this regard, dealing with non-human animals is not fundamentally different from dealing with fellow humans. Indeed the following definition of sociality, originally proposed by Alfred Schutz, could—with the insertions indicated in brackets—apply with equal force to the encounter between human hunters and their prey: “Sociality is constituted by communicative acts in which the I [the hunter] turns to the others [animals], apprehending them as persons who turn to him, and both know of this fact” (Schutz 1970: 163). (Ingold 2000: 52)

Can anyone really, completely understand one’s counterpart in an ongoing interaction, whether that counterpart is human or animal? Can anyone understand what that counterpart is feeling, thinking, and going to do? Since we do not have extrasensory perception (ESP) and cannot directly access the feelings, thoughts, and intentions of others, we cannot know them directly. We can only indirectly understand what others are feeling, thinking, and going to do, on the basis of the observations of motions, reactions, expressions, behaviors, and so on.

Thus, as Ingold states above, the “sociality” defined by Schutz applies to any relationship, whether between humans, between human and animal, between animals, or even between human and thing (consider electronic devices), as long as those in the relationship perform interactions corresponding to communication as defined by Schutz. This is because we have no other means but our observation of their interactions to understand their feelings, thoughts, and intentions. We have no choice but to conclude that communication is established between the parties in an interaction, as long as the parties’ exchanges indicate fulfillment of the conditions laid down by Schutz. Therefore, communication is never restricted to the relationship between humans, and thus sociality constituted by communicative acts can be established not only between humans but also between human and animal, and even between human and thing, as long as the parties exchange communicative acts.

Then, if sociality is established between parties in each interaction, there must appear a local, temporal reality in which they view one another as social persons, resulting in further forceful communicative interactions. On the other hand, if communicative acts are not exchanged between them, they likely never

consider one another as social persons; therefore, their relationship must be something other than sociality, for instance, materiality, animality, or spirituality, with the result that they should interact in some way other than communication. In short, the local, temporal reality enacted depends on the interaction established on the occasion, and vice versa. Thus, the types of reality and interaction are in a dialectical relationship because the type of reality is generated by two actions that constitute the type of interaction.

This solid fact should provide a starting point for the comparative studies of Indigenous Knowledge (IK) and Modern Science (MS). If the type of reality is in a dialectical relationship with that of interaction, we can know what type of reality locally and temporarily arises in each interaction by observing what type of interaction is established. Then, by observing how various types of interactions are organized into a system or network, such as IK or MS, we can elucidate how realities in local interactions are organized into the ontology of the system or network. Thus, by starting from a dialectical relationship between the types of reality and interaction as a common unit for analyzing both IK and MS, we can develop methods for elucidating how IK and MS become differentiated from the common, universal basis of human ability, tracing how the ontologies of IK and MS generate through a process in which various types of interactions are organized into a system or network.

This paper examines this method and demonstrates its potential. First, I review the historical context of the comparative study of IK and MS. This serves to clarify the present requirements for comparative study: As many anthropologists highlight, we should seriously consider the ontologies of both IK and MS, in other words, elucidate the mechanisms through which each is generated and regenerated within each institutional setting. Then, I seriously consider the ontology of Inuit Knowledge (*Inuit Qaujimaqatuqangit* or IQ), demonstrating that to reveal the mechanisms, we can effectively focus on the processes through which interactions and realities are intertwined and organized into knowledge production systems. Based on this analysis, finally, I propose that we should understand both IK and MS as “*Mundi Machina*” (Worlds-Generating Machine), in which life worlds are physically and ideologically generated and regenerated through interactive practices.

2 Historical Backgrounds: From Epistemological Description to Analysis of Ontologies

Currently, various knowledge-practice-belief complexes of indigenous peoples, termed “Indigenous Knowledge” (IK) or “Traditional Environmental (or Ecological) Knowledge” (TEK), attract considerable academic and public attention. This is because many anthropological studies since the 1970s have shown that IK provides deep, precise insights into natural phenomena to sustain intimate relationships with the environment over generations. IK has come to be increasingly recognized as a knowledge-practice-belief complex comparable to modern science. As such, IK is complementary to modern science, and thus has the potential to contribute to the maintenance of biological diversity, sustainable development, and empowerment of indigenous peoples (e.g., Battiste 2000; Berkes 1999; Ellen, Parkes & Bicker, eds. 2000; Maffi, ed. 2001; Sefa Dei, Hall & Rosenberg, eds. 2000; Sillitoe 1998).

The IK of the Inuit living in the Canadian Arctic is no exception. IQ is a knowledge-practice-belief complex, defined as “the Inuit way of doing things: the past, present and future knowledge, experience and values of Inuit Society” (IQ Task Force 2002: 4), that includes Inuktitut (the Inuit language), ecological knowledge about the Arctic environment, subsistence techniques (e.g., hunting, fishing, trapping, gathering,

cooking, cloth making, and constructing dwellings), social norms and values, and the arts of social intercourse.

Until the mid-20th century, although the dominant Western society admired IQ as excellent practical knowledge, IQ was also regarded as the product of “primitive,” irrational thought, that is, a type of pre-science or superstition, inferior to modern science. However, since the 1980s, many anthropological studies have shown that IQ is comparable in accuracy and validity to modern science, although it is founded on an ontology differing from that of modern science, and thus in contrast to modern science has different characteristics (e.g., Dorais, Nagy & Muleer-Wille, eds. 1998; Freeman 1985, 1993; Freeman & Carbyn, eds. 1988; Nakashima 1991; Omura 2005; Stevenson 1996). While modern science is quantitative, rational, analytical, objective, mechanistic, reductionistic, and based on a dualistic ontology, in which nature is regarded as separate from the human realm, IQ is qualitative, intuitive, holistic, subjective, spiritualistic, and based on a monistic ontology, in which humans are viewed as part of nature.

For example, based on IQ’s ontology, in which wildlife is regarded as “nonhuman persons,” species are considered to live social lives in a formed society—similar to humans. Then, the interrelationships among species, including human, are explained as inter-social relationships: for instance, reciprocal relationships, in which the parties help each other, and hostile relationships, in which the parties exclude each other. “*Nuna*,” meaning “Land” in Inuktitut, is their life world, constituted of these intra-social and inter-social relationships among various species. Certainly, from the scientific viewpoint, this explanation of IQ appears as an irrational myth or story, inappropriately mixing human and animal. However, since the 1980s, many anthropological studies have shown that the explanation of IQ accurately reflects the facts of intra- and inter-species relationships.

Thus, until the 1990s, it was suggested that IQ and modern science were complementary although founded on different ontologies and characterized by contrasting traits. Furthermore, since in the 1980s, Inuit societies and federal or provincial governments established wildlife co-management regimes in the Canadian Arctic consequent to land claims agreements, it has even become a policy requirement that IQ be incorporated into environmental management as a basis of decision making, on equal terms with modern science. Not only modern science but also IQ should be used for environmental management, if the co-management regime that requires full participation of the Inuit is to function effectively (e.g., Freeman and Carbyn, eds. 1988; Nadasdy 2003; Omura 2005; Wenzel 1999). Thus, today the discussion concerning IQ has proceeded from advocacy to implementation of incorporating IQ into decision-making processes. (cf. Usher 2000).

Given this academic, social, and political climate, many anthropological investigations have attempted to develop methods for incorporating IQ into environmental management during the last 20 years (e.g., Krupnik and Jolly 2002; Ferguson and Messier 1997; NWMB 1998, 2000). In spite of their efforts, however, little progress has occurred, primarily because IQ has been described as an epistemological paradigm or scheme that eternally freezes and determines how the Inuit understand the world around them—as though the Inuit were in the grip of an unchangeable epistemological paradigm from ancient times to the present (cf. Krupnik and Vakhtin 1997; Omura 2007). As the result, the Inuit have continually been described as essentially intuitive, irrational, and subjective; therefore, they were practically excluded from the decision-making process based on rationality, objectivity, and modern science’s dualistic ontology, in which “human” and “nature” (including animal) are definitely separated (cf. Nadasdy 2003, 2007; Wenzel 2004).

Certainly, any knowledge and its ontology, whether MS or IK, functions as an epistemological paradigm or scheme that patterns how its practitioners understand the world. Certainly also, practitioners continuously produce, reproduce, and change the paradigms or schemes; therefore, the paradigms are never beyond the practitioners’ influence. Moreover, as Latour (1987, 1993) highlighted, any knowledge is generated and validated only through a social system in which the practitioners make decisions, thereby producing and reproducing their world (cf. Agrawal 1995; Nadasdy 2003; Omura 2007). Therefore, both IK and MS must be viewed within the interactional process between practitioners and their knowledge, through which those embedded in each institutional system produce, sustain, and change knowledge for their purposes, simultaneously influenced and oriented by existing knowledge and its ontology.

Nevertheless, most anthropological investigations have overlooked the processes in which IQ is produced and reproduced by the Inuit, thereby overemphasizing IQ as an epistemological paradigm beyond the Inuit’s influence. Thus, differences in form and ontology, between IQ and MS, have been regarded not so much as resulting from differences in knowledge-producing practices as differences in mental ability between the Inuit and scientists. As a result, the Inuit have been described as unable to understand the world objectively to execute rational thinking and decision making. The final result is that the Inuit are practically excluded from the decision-making process, what is still based on rationality, objectivity, and the dualistic ontology of MS.

As a matter of course, however, both Inuit and scientists are human beings—sometimes rational, analytical, and objective, and sometimes irrational, intuitive, and subjective. In this sense, both IQ and MS are based on common, universal human ability. Simultaneously, however, the differences in form and ontology are not fabricated, but based on facts many anthropologists have observed in their fieldwork. Therefore, we must conclude that differences in form and ontology do not indicate differences in mental ability, but are generated through differences in the institutional processes in which each is produced and reproduced. Although both knowledge spring from common human ability, they contrast according to their contexts, that is, the different purposes and institutional settings of knowledge-producing practices.

Therefore, previous studies have so far overlooked the process through which differences between IQ and MS are generated. Certainly, previous studies have entirely revealed and described what the world is for the Inuit and what kind of logic the world follows—the ontology of IQ. However, those studies have not examined the process through which the Inuit produce, reproduce, and change IQ through their institutional system. Therefore, to develop methods for incorporating IQ into the decision-making process on equal terms with modern science, we must understand, analyze, and elucidate the mechanism of Inuit and modern science’s knowledge-producing processes. Then, on the basis of this research, we must recognize both institutional systems’ validity. On the basis of this work, we then develop methods to make them compatible and collaborative. In other words, we now turn from the epistemological description of static ontologies to the epistemological analysis of dynamic ontologies in which the epistemological mechanisms of MS and IQ are elucidated to explain how differences in form and ontology arise.

Thus, as many anthropologists now assert about the ontologies of indigenous peoples (e.g., Nadasdy 2007; Viveiros de Castro 2004a, 2004b; Willerslev 2007), we should seriously consider the ontology of IQ. However, “taking ontology seriously” does not mean “taking it as it is.” Rather, we should seriously consider the epistemological mechanism through which IQ and its ontology are generated and regenerated in their

institutional system, without, according to the ontology of MS, judging it as “irrational” or “anthropomorphic metaphor.” Of course, what we should seriously consider is not restricted to IK including IQ. Just as Latour has done since the inception of Science and Technology Studies, we should seriously deliberate MS’s epistemological mechanism. Only after elucidating the epistemological mechanisms of IK and MS can we develop methods to make them compatible and collaborative.

3 Seriously considering the Ontology of IQ: Mechanism of *Mundi Machina*

The method mentioned in the introduction can provide an effective method of seriously considering the epistemological mechanisms of IK and MS. This method enables us to elucidate how IK and MS are differentiated from the common, universal basis of human ability, tracing how the ontologies of IK and MS generate through the process in which various types of interaction are organized into a system or network.

As mentioned, the types of interaction and reality are in a dialectical relationship. In this relationship, the type of interaction never one-sidedly determines nor is determined by the type of reality. Rather, the types of interaction and reality recursively prescribe one another, in that a specific type of interaction simultaneously causes and is caused by the specific type of reality. For example, if communicative acts are exchanged between parties during an interaction, a certain reality in which they view each other as a social person is enacted. Simultaneously, if the reality in which they think of each other as a social person arises, they must interact in communicative way. A specific type of reality forces parties to interact in a way appropriate to the reality. Simultaneously, a specific type of interaction locally and temporarily enacts the reality corresponding to the type of interaction.

Accordingly, by tracing how various types of interactions, each inevitably accompanying a specific type of reality, are organized into a system or network, we can elucidate what type and how ontology is generated through interactive practices within the system. For example, according to this method, we can show that the IQ ontology, in which the Inuit and a specific species of wildlife, such as seals, are in a reciprocal relationship, generates as the inevitable consequence of the following process. In this process, the specific type of interaction among the Inuit and the specific type of interaction between the Inuit and wildlife are interconnected and organized into a subsistence system as an institutionalized IQ producing system as follows below.

As demonstrated in some papers on the Inuit subsistence system (e.g., Omura 2012, 2013a, 2013b), this can be summarized as a system of circulation: First, when an Inuit hunter uses subsistent techniques such as hunting, fishing, trapping, and gathering to relate with wild animals, both hunter and animals enter a relationship of supplier and recipient. Then, the hunter shares the food received from the animal among other people. Such sharing creates and defines the extended family as a foundation for socio-political relationships among the Inuit, based on trust and collaboration. Within this relationship of trust and collaboration, the Inuit further elaborate subsistence techniques, and this eventually results in catching other individual wild animals. With these newly caught animals, the Inuit also commit to recreate the relationship “provider of food/receiver of food.” As the inevitable consequence of two interconnected relationships (trust among the Inuit and provider/receiver of food between the Inuit and animals), in an infinitely circular subsistence system, the ontology of IQ generates through the following mechanism.

First, to establish a trust relationship by sharing food, the Inuit must share of their own accord, as a norm.

The normalization of food sharing must be executed without any command from an individual Inuit, so that the relationship does not become one of "domination/subordination." Therefore, to escape a domination/subordination relationship, the Inuit must devise a way to make everyone willingly share food. This problem is resolved by utilizing an asymmetrical relationship between the Inuit and wild animal: the animal provides the Inuit with food; the Inuit provides the animal with nothing.

In a sense, this asymmetrical relationship can mean either that the Inuit exploits wild animals or that the wild animals give themselves to the Inuit of their own accord. However, the relationship's meaning is restricted to the latter because in subsistence activities, the Inuit never domesticate or control wild animals, but leave them to live their lives free in the wild. The Inuit, then, always approach wild animals only with devices of enticement or seduction (e.g., trap, lure, weir) by which the animals are lured from their ordinary behavior, that is, running away from the Inuit who represent danger, and instead are trapped into providing themselves to the Inuit hunters.

Thus, in the reality enacted in subsistence activities, the Inuit view wild animals as "social persons," with autonomous will and intention, whose position is superior, and therefore can only be enticed by the Inuit. Furthermore, the restriction of acts toward wild animals to enticement results in uncertain success in subsistence activities. Thus, the relationship of "enticing/giving food" remains out of Inuit control. Whether the relationship will be established on the next occasion (and thus the Inuit's success) remains uncertain.

Under this condition, the trust relationship among the Inuit and the relationship of enticing/giving food between the Inuit and animals are arbitrarily connected in a recursive cause-and-effect relationship through the medium of food sharing practice as follows: 1) the food sharing causing the trust relationship brings about enticing/giving food; 2) the enticing/giving food relationship brings about the sharing of food among people. In other words, food sharing is the minimally necessary condition for establishing these two concurrent relationships. However, even though food sharing leads to a trust relationship, it does not necessarily lead to an enticing/giving food relationship between the Inuit and wild animals; no logical inevitability exists between sharing food and the enticing/giving food relationship. Moreover, the latter relationship's establishment is made uncertain because of the Inuit's restricting their acts toward wild animals.

Paradoxically, this condition forces the Inuit into the situation of necessarily sharing food provided by wild animals to establish these two relationships, and thus obtain food. To establish a trust relationship they must share their food. Moreover, they must also share to establish the enticing/giving food relationship because they find it difficult to reject the proposition that food sharing leads to the latter relationship, especially when the proposition becomes internalized as "the way of the world." In other words, the Inuit induce from experiential facts whether food sharing leads to the relationship with wild animals. Therefore, even if they could reject the proposition on the basis of past facts, they are unlikely to reject it on any future basis because they cannot know what will happen at the next occurrence. In addition, what they lose by rejecting the proposition is the food supply vital to life. Given this condition, the risk-free option is to accept cause and effect between the two relationships.

Critically important is that if establishment of the enticing/providing food relationship is secured, compelling force to share food never works. If the enticing/providing food relationship is always established independently of the sharing practice, no one intends to share food so as to establish the enticing/providing food

relationship to get food, because they always secure a food supply regardless of whether they share or not. Precisely because of uncertainty in the establishment of the enticing/providing food relationship as the result of restriction of acts toward wild animals, the Inuit become afraid they may fail to obtain food the next time. Under this condition, the most safe, risk-free option is to satisfy all conditions considered necessary for success, no matter how uncertain the outcome. Thus, the Inuit “have no choice” but to share the food provided by wild animals if they want to concurrently establish both relationships to maintain the food supply and relationship of trust among them. In this manner, food sharing is normalized among the Inuit.

Now then, if the relationship of trust among the Inuit and the relationship of “enticing/giving food” between the Inuit and wild animals are, respectively, named as human “spirit” (*tagniq* in Inuktitut) and animal “spirit” (*tagniq*), it follows that the Inuit and animal spirits never perish but are eternally reproduced, and sustain as long as this recursive circulation is maintained by sharing food among the Inuit. Thus, the inevitable consequence of two relationships’ recursive connection generates the IQ ontology, which many Arctic anthropologists have described; namely, the Inuit and wild animals are in a reciprocal relationship, in which wild animals help sustain Inuit lives by providing their bodies to be eaten, while the Inuit then share and consume this provided food to help the wild animals reincarnate.

Thus, the IQ ontology reflects nothing about the Inuit’s mental ability, but about the mechanism of an institutionalized subsistence system. In this system, the two types of interaction, that is, 1) the interaction of sharing among the Inuit (accompanying the reality in which others are social persons who ought to be trusted), 2) the interaction of “enticing/giving food” between the Inuit and wild animals (accompanying the reality in which others are social persons who are superior to oneself and thus only enticed into giving food), are recursively connected and organized into the following circulated chain of inevitabilities:

First, the reality in which the Inuit are social persons trusting each other always requires them to practice the interaction of sharing food to continue their trust relationship. Then, the normalization of sharing practices, required for the Inuit always to share food of their own accord, in turn requires them to restrict their acts toward wild animals to enticement, as a result of which the interaction between the Inuit and wild animals are fixed as the interaction of “enticing/giving food.” As a result of this fixed interaction between the Inuit and wild animals, the sharing of food among the Inuit is required as the minimally necessary condition for the establishment of the whole system. Urged by this requirement, the Inuit practice the interaction of sharing food, with the result that the reality, in which the Inuit are social persons trusting each other, is enacted again and thereby reinforced. Thus, a chain of consequences is organized as a closed circuit of logical inevitabilities, which infinitely drive the Inuit ceaselessly to practice two types of interaction with wild animals as well as with their fellow Inuit to sustain the subsistence system.

As a natural consequence of this logically closed circuit of inevitabilities, the more anyone involved has a good sense to follow the course of inevitability, that is, the more rational he or she is, the less he or she can escape from the influence of this infinite chain of logical inevitabilities. In this sense, the Inuit do not, because they are irrational, *believe* in the ontology in which wild animals as social persons give them food of their own accord. Rather, precisely because they are rational enough to follow a course of inevitability, they have no option but to ceaselessly practice subsistence activities, that is, sharing food among them and enticing wild animals to give them food, to *actualize* the ontology generated as an inevitable consequence of the subsistence

system as logically consistent. The IQ ontology is not caused by the Inuit's mental ability as a result of their way of understanding the world but generates as an inevitable consequence of recursively connecting and organizing the two relationships discussed here.

In short, although ontology certainly reflects the world's logic, that reflection is not the world as viewed or understood by people from outside it, but as produced and sustained by them as they live within it. In this sense, ontology is not cosmology constructed on the basis of objective, independent, removed observation of past phenomena. Rather, it is worldview that guides those embedded in that world to fine-tune their relationships with various entities to produce and sustain their future. In an analysis of the process, ontology as worldview generates not only as an inevitable consequence of people's producing their world but also as the guiding principle for fine-tuning their relationships with various entities, thus producing their living in that world. It is this analysis that is seriously considering ontology

Therefore, what is revealed by seriously considering ontology could be named "*mundi machina*" (worlds-generating machines) because what is constructed by organizing various interactions and then generating ontology through its operation is a machine, such as the Inuit's subsistence system, which physically and ideologically generates a life world. This machine is a physical-ideological complex of human and nonhuman (animal and thing), in that it is physically constructed from various interactions and ideologically guided and driven by ontology for fine-tuning the interactions. Then, through its operation, this machine physically generates the ordered interactions among human and nonhumans as their life world, ideologically generating ontology as the guiding principle for reproducing the life world in the future. Thus, through participating in its operation, the people embedded in it simultaneously know and produce their life world. In short, *mundi machina* is the institutionalized knowledge-producing system in which people produce, sustain, and change their life world's knowledge while they are patterned by it.

4 Potential of the *Mundi Machina* Perspective: The Dynamics of Interactions and Realities

In this paper, taking IQ ontology as an extended example, I have outlined a method for analyzing the epistemological process of ontology and demonstrated a glimpse of its potential. Then, following this method, I have elucidated the epistemological mechanism through which interactions accompanying specific realities are organized into a subsistence system as one of the *mundi machina*, with the result that the IQ ontology, for example, generates and regenerates.

Of course, what I have shown here is but a rough sketch, which needs elaboration on the basis of detailed ethnographic data. Then, based on this elaboration, I will demonstrate in detail how various contents of IQ, including Inuktitut, ecological knowledge, subsistence techniques, social norms and values, the arts of social intercourse, and so on, are produced, sustained, and changed in the subsistence system as one *mundi machina*. Moreover, the ontology of MS, the other ontology we must seriously consider, is no exception. We also have to elucidate its epistemological process, in which a dualistic ontology generates not only as an inevitable consequence of scientists' producing and sustaining *mundi machina* as techno-scientific networks but also as the guiding principle for fine-tuning their relationships with various entities, including human and nonhuman, to produce and sustain those networks.

I believe, however, that this paper may suffice to prove the effectiveness and possibility of an approach to

ontologies from the dialectical relationship between the types of reality and interaction. This approach ought to enable us to shed light, at least, on the epistemological mechanism of ontology, which previous comparative studies of IK and MS have overlooked on the assumption that ontology as epistemological paradigm or scheme reflects, and prescribes how people understand the world around them. Moreover, based on this analysis, we would be able to elucidate the process, through which the differences in ontology between IK and MS generate from a common, universal basis of human abilities—as a result of the differences in the dynamics of interaction and reality between them. On the basis of this analysis, we would be able to consider how to make IK and MS compatible and collaborative.

Moreover, the approach I propose here would likely provide a wider ontological perspective, in which not only the ontologies of IK and MS but also those of any entity could be understood on the basis of dynamic interactions and realities. This approach could enable us to understand the ontologies of any species, including those other than human, however silent, by observing and analyzing their interactions with entities around them. There is a possibility that, as Uexküll and Kriszat (1934) highlighted in the term of *Umwelt*, the dynamics of interaction and ontology apply to any type of organism. Then, how do various organisms, including the human, tune their interactions with other entities to produce, sustain, and change the world in which they dwell? What type of ontology generates among them not only as a consequence of each organism’s producing and sustaining their world but also as the guiding principle for fine-tuning their relationships with various entities to produce their life world? In short, in what type of *mundi machina* do they live? The method I propose here ought to provide some means to answer these questions, and thereby make our future understanding of ontology broader and richer.

References cited

- Agrawal, Arun 1995 Dismantling the Divide between Indigenous and Scientific Knowledge. *Development and Change* 26: 413–439.
- Battiste, Marie & James Henderson 2000 *Protecting Indigenous Knowledge and Heritage*. Saskatoon: Purich Publishing Ltd.
- Berkes, Fikret 1999 *Sacred Ecology*. Philadelphia: Taylor and Francis.
- Dorais, Louis-Jacques, Murielle Naggy & Ludger Muller-Wille 1998 *Aboriginal Environmental Knowledge in the North*. Quebec City: GETIC.
- Ellen, Roy, Peter Parkes & Alan Bicker 2000 *Indigenous Environmental Knowledge and Its Transformations: Critical Anthropological Perspectives*. London & New York: Routledge.
- Fergusson, Michael & Messier, Francois 1997 Collection and Analysis of Traditional Ecological Knowledge about a Population of Arctic Tundra Caribou. *Arctic* 50(1): 17–28.
- Freeman, Milton M. R. 1985 Appeal to Tradition. In J. Brosted, J. Dahl, A. Gray, H. C. Gullov, G. Henriksen, J. B. Jorgensen and I. Kleivan (eds.), *Native Power*. Bergen, Oslo, Stavanger, Tromso: Universitetsforlaget as. pp. 265–281.
- Freeman, Milton M. R. 1993 Traditional Land Users as a Legitimate Source of Environmental Expertise. In N. Williams and G. Baines (eds.), *Traditional Ecological Knowledge*. Canberra: Centre for Resource and Environmental Studies, Australian National University. pp. 153–161.

The 1st Workshop at Kagoshima University, 2013.11.30

- Freeman, Milton M. R. & Ludwig N. Carbyn (eds.) 1988 *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton: Boreal Institute for Northern Studies, the University of Alberta
- Ingold, Tim 2000 *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*. Routledge.
- IQ Task Force 2002 *The First Annual Report of the Inuit Qaujimagatuqangit (IQ) Task Force*. Government of Nunavut, Department of Culture, Language, Elders and Youth.
- Krupnik, Igor & Dyanna Jolly (eds.) 2002 *The Earth Is Faster Now*. Fairbanks: Arctic Research Consortium of United States.
- Krupnik, Igor & Vakhtin, Nikolay 1997 Indigenous Knowledge in Modern Culture: Siberian Yupik Ecological Legacy in Transition. *Arctic Anthropology* 34 (1): 236–252.
- Latour, Bruno 1987 *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.
- Latour, Bruno 1993 *We Have Never Been Modern*. New York: Harvester Wheatsheaf.
- Maffi, Luisa ed. 2001 *On Biological Diversity: Linking Language, Knowledge, and the Environment*. Washington & London: Smithsonian Institution Press.
- Nadasdy, Paul 2003 *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon*. Vancouver and Toronto: UBC Press.
- Nadasdy, Paul 2007 The gift in the animal: The ontology of hunting and human–animal sociality. *American Ethnologist* 34 (1): 25–43.
- Nakashima, Douglas 1991 *The Ecological Knowledge of Belcher Island Inuit* (Ph.D. Dissertation). Montreal: Department of Geography, McGill University.
- NWMB (Nunavut Wildlife Management Board) 1998 *A Study of Inuit Knowledge of the Southeast Baffin Beluga*. Iqaluit: Nunavut Wildlife Management Board.
- NWMB 2000 *Final Report of the Inuit Bowhead Knowledge Study*. Iqaluit: Nunavut Wildlife Management Board.
- Omura, K. 2005 Science against Modern Science: The Socio-political Construction of Otherness in Inuit TEK (Traditional Ecological Knowledge). In N. Kishigami and J. Savelle (eds.), *Indigenous Use and Management of Marine Resources* (Senri Ethnological Studies 67). Osaka: National Museum of Ethnology.
- Omura, K. 2007 From Knowledge to Poetics: The Sophia of Anti-essentialistic Essentialism in Inuit Traditional Environmental Knowledge. *Japanese Review of Cultural Anthropology* vol. 7: 27–50.
- Omura, K. 2012 Multiple Worlds by World Poiesis Machines: The Inuits Subsistence System and the Future of Globalization. *A paper presented at Environmental infrastructures, 4S/EASST conference 2012, 2012.10.18.*
- The Inuit's Subsistence System and the Future of Globalization
- Omura, K. 2013a The Ontology of Sociality: ‘Sharing’ and Subsistence Mechanisms. In K. Kawai (ed.) *Groups: Evolution of Human Societies*, Kyoto and Melbourne, Kyoto University Press and Trans Pacific Press. pp. 123–142.
- Omura, K. 2013b A Step to Multiple Worlds: Considering the Potentialities of Indigeneity through an Analysis of the IQ issues in Nunavut Territory, Canada. A paper presented in *INDIGENOUS IDENTITY AND the DISCOURSE of INDIGENEITY FROM COMPARATIVE POINT of VIEW*, AAA 112th Annual Meeting, November 20, 2013.

- Sefa Dei, George, Hall Budd and Dorothy Rosenberg eds. 2000 *Indigenous Knowledge in Global Contexts: Multiple Readings of Our World*. Toronto: University Toronto Press.
- Schutz, A. 1970 *On Phenomenology and Social Relations*. (H. R. Wagner ed.) University of Chicago Press.
- Sillitoe, Paul 1998 The Development of Indigenous Knowledge: A New Applied Anthropology. *Current Anthropology* 39(2): 223–252.
- Stevenson, Marc 1996 Indigenous Knowledge in Environmental Assessment. *Arctic* 49 (3): 278–291.
- Usher, Peter 2000 Traditional Ecological Knowledge in Environmental Assessment and Management. *Arctic* 53(2): 183–193
- Uexküll, J. & Kriszat, G. 1932 *Streifzüge durch die Umwelten von Tieren und Menschen*. Frankfurt am Main: Fischer. (A stroll through the worlds of animals and man, reprinted in J. Schiller ed. *Instinctive Behavior*. New York: International Univ. Press, 1957)
- Viveiros de Castro, E. 2004a Perspectival Anthropology and the Method of Controlled Equivocation. *Tipit’i: Journal of the Society for the Anthropology of Lowland South America* 2 (1): 3–20.
- Viveiros de Castro, E. 2004b Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies. *Common Knowledge* 10 (3): 463–484.
- Wenzel, George 1999 Traditional Ecological Knowledge and Inuit: Reflections on TEK Research and Ethics. *Arctic* 52 (2): 113–124.
- Wenzel, George 2004 From TEK to IQ: Inuit Qaujimagatuqangit and Inuit Cultural Ecology. *Arctic Anthropology* 41(2): 238–250.
- Willerslev, R. 2007 *Soul Hunters: Hunting, Animism, and Personhood among the Siberian Yukaghirs*. University of California Press.