Cultural Knowledge Systems: Synthesizing our knowledge of knowledge using grounded theory

by

Katreena Baker

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Many applied academics, within and outside anthropology, have called for the incorporation of cultural knowledge in public policy and decision-making, and for the "bridging" of knowledge systems in knowledge coproduction. Yet critiques of the academic treatment of cultural knowledge have indicated that research has focused on the content not the epistemologies of cultural knowledge systems. To what extent does the social science literature characterize knowledge systems as systems? Does the literature on cultural knowledge systems provide us with tools for translating cultural knowledge? Conclusions derived from this thesis research (a grounded theory approach to an academic literature sample) indicate that substantial work has been done to characterize cultural knowledge epistemologies. However, language used to describe knowledge systems is inconsistent, and analyses of social structures are patchily developed. In an effort to synthesize the literature, I have compiled the best practices and methods used by academics in hopes of influencing future cultural knowledge systems research.

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1.1 Who uses the "knowledge system" concept, and when do they apply it?

The knowledge system concept is certainly a slippery one – if one asks a librarian, a corporate manager, a computer scientist, a philosopher, and a social scientist, "what is a knowledge system?" they will give you very different answers. The knowledge system concept has come to mean many different things to many different people, and has received increasing usage within and outside academia to describe a variety of phenomena: from the knowledge-based/organization/management-systems of computer science and business fields, to cognitive science principles, to questions of indigenous knowledge and rights. For the purpose of this study, the knowledge system concept will be analyzed as it has been used in social sciences literature to explain the organization, structure, and epistemology of cultural knowledge, with an emphasis on cross-cultural research[1].

Two groups of people commonly employ the knowledge system concept when talking about cultural knowledge: academic researchers and policymakers. Academics and policymakers are often posed as the participants in models of social and cultural knowledge application: researchers produce social and cultural knowledge and policymakers use that knowledge to inform decision-making. However, this commonly referenced polemic fails to account for the social and cultural knowledge of other peoples who have, traditionally, made up the subject-participants of social research (Boggs 1992:29-30). A few problems associated with this false binary will be explored later in this chapter, but for now, I will focus on academics and policymakers as they commonly employ the knowledge system concept in scholarly literature and governing documents.

[1] While this is the established constraint for this study, the knowledge system concept as it manifests in areas such as business organization can be analyzed from an anthropological perspective (see Banerjee et al. 2009 for examples).

1.1.1 Academia

In an academic context, the knowledge system concept has come to be used by a number of scholars in various disciplines. Disciplines such as anthropology, sociology, and development studies dominate the academic literature on culturally-based knowledge systems, but a number of other fields make important and interesting contributions, including, as noted by Warren et al., "ecology, soil science, veterinary medicine, forestry, human health, aquatic science, management, botany, zoology, agronomy, agricultural economics, rural sociology, mathematics… fisheries, range management, information science, wildlife management, and water resource management" (1993:2). However, with so many divergent fields and academic voices exploring the knowledge system concept as it relates to their areas of interest, there are some areas of contention. Scholars use the term knowledge system in conjunction with a number of other complementary concepts such as ways of knowing, indigenous knowledge, traditional knowledge, western knowledge, western science, local knowledge, etc. In some cases these terms are used interchangeably, while other times they are pointedly distinguished from one another. The problem of defining these concepts will be addressed in chapter 2.

While the delineation of a specific definition for the knowledge system concept and the various permutations of it may be a muddled issue, it is easier to determine when academics employ the knowledge system concept. One area of preoccupation is the comparison and contrast of indigenous knowledge and western science – a preoccupation which has been criticized repeatedly, yet somehow persists in the literature (Agrawal 1995; Briggs 2005; Berkes 2009). A more meaningful contribution to the analysis of knowledge systems comes out of the need or desire for co-production of knowledge between academic researchers and peoples whose cultural knowledge is related to a particular area of study – in Canada, Aboriginal groups have co-produced research with academics in a number of fields such as natural resource management and environment, community health, and development impacts, to name a few (Berkes 2009).

At the same time, scholars are questioning what social structures and processes entrench knowledge in society – what constitutes valid or authoritative knowledge – and the power dynamics of whose knowledge becomes institutionalized within and outside the academy (Dei et al. 2000). A number of theoretical underpinnings characterize contemporary scholars' interpretations of cultural knowledge systems, including the sociology of knowledge, development theory, the anthropology of knowledge, and ethnoscience. Some academics have focused on creating abstract constructions of the social structures and processes of knowledge systems generally, but many more academics have

provided culture-specific descriptions of particular knowledge systems. Moreover, research on particular knowledge systems is often applied research, undertaken together with government agencies, NGOs, and indigenous groups. The published findings from these research initiatives make up the body of texts from which this study's sample was drawn. Further explanation of the methods and sampling techniques used in the study are explained later in chapter 3.

1.1.2 Policymaking

In Canadian and in international contexts, the knowledge system concept has gained a foothold in public policy, especially in reference to indigenous and traditional knowledge. The notion of protecting traditional knowledge – either as a humanitarian concern (e.g. the right or property of knowledge holders), or as a scientific concern (e.g. the "key" to understanding natural processes) – has concerned many international organizations, including the UN Commission on Human Rights, the UN Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the World Intellectual Property Organization (WIPO), and the Convention on Biological Diversity (CBD) among others (Nakata 2002:282, Twarog and Kapoor 2004:xiii). Concerns about the collective intellectual property rights of indigenous groups and the preservation of diversity – both cultural and biological diversity – especially in reference to indigenous peoples' knowledge of natural environments, biological resources, and genetic materials have arisen on the international stage, particularly in light of the TRIPS agreement (Coombe 2009:252). The most recent and definitive use of the knowledge system concept in policy is the acknowledgement of the cultural knowledge systems of indigenous peoples, as they are now protected under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP):

> Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies, and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions. (art. 31:i)

The right to protect and develop cultural knowledge is reserved for the Indigenous peoples whose countries have ratified UNDRIP, and the signing states are responsible for recognizing and protecting those rights. Although Canada did not ratify UNDRIP when it was initially adopted by the UN General Assembly in 2007, the Government of Canada issued a statement of support for the declaration on November 12, 2010 (INAC 2010).

Canada has a few governing documents provisioning the use of cultural knowledge, especially indigenous knowledges, in policy-making decisions. Legislation in both the Canadian Environmental Assessment Act and Species at Risk Act require Aboriginal traditional knowledge and Aboriginal peoples' involvement in environmental assessment and species at risk designation (SARA 2002, Chretien and Murphy 2009:14). However, there is a lack of government mandates (at different levels of government and in many sectors) to encourage the value of cultural knowledge for creating new programs in areas such as education and health, to name two important areas.

Many scholars, including Aboriginal Canadian scholars, and government advisory councils have reported the need to incorporate Aboriginal knowledges in a number of areas of Canadian policy (Chretien and Murphy 2009:20). Moreover, the need for public participation in domestic and international policy, planning, and development strategies is increasingly claimed by local communities, and this provides an opportunity for applied social scientists to re-orient the production and dissemination of social knowledge toward public participation in decision making (Boggs 1992). Further recommendations for research on cultural knowledge and critiques of past work appear in the following section.

1.2 Critiques and the need for future scholarship

Although the prospective areas of application for cultural knowledge systems research appear to be broad and promising, many people critique the knowledge system concept as an analytical concept and cultural knowledge as area of research.

Many scholars have noted that, across research areas such as agriculture, natural resource and wildlife management, and conservation, researchers have focused on the *content* of indigenous and local knowledge systems (e.g. taxonomy or technology), whereas the *epistemologies* and *structures* of knowledge systems are largely ignored (Briggs 2005:101, Nakata 2002:284). From this observation it has been assumed that indigenous and local knowledges have been studied only to the extent that

their content can be easily understood and converted into the frameworks of Western knowledge systems (often Western science) (Simpson 2004:374); moreover, this leads to the question of whose interests are really being satisfied when Western-trained researchers study other peoples' knowledge systems in this content-based manner (Nakata 2002:282). Research in cross-cultural knowledge exchange and application is rife with difficulties, as noted by Purcell: "differential class and community interests; contested interpretations of knowledge; inability of particular knowledge domains to address specific problems; communicational difficulties; duration of research allowed by development agencies; unpredictability of outcome; and ethical dilemmas" (1998:267). Giving researchers the benefit of the doubt – assuming that their interests are also the best interests of the people whose knowledge systems they study – the neglect of knowledge system epistemologies and structures could be attributed to a lack of theoretical and methodological support for this kind of research (Chretien and Murphy 2009:15).

The various critiques presented in the literature often point toward methods and areas of inquiry that scholars encourage one another to pursue in order to improve upon past works. A few scholars have suggested that improvements upon the knowledge system concept as an analytical concept would lead to more productive academic work, academic work which would inform better policy and decision making, and improve cross-cultural research. Shifting research foci toward the processes of knowledge and away from the taxonomies of knowledge has been suggested, and proposed to generate more full and dynamic understandings of knowledge systems change (Briggs 2005:108). Fredrik Barth posits that the role of an anthropological study of knowledge is a concentration on "general insights, language, and concepts" (2000:2) and the development of a "framework of concepts and questions with which to explore the comparative ethnography of knowledge" and indicates that the first necessary step in doing so is an attempt to "lay out how these traditions of knowledge are configured and how they are variously reproduced and changed" (2000:3). Moreover, further development of the knowledge system concept would benefit more interested parties than just anthropologists. Martin Nakata asserts that indigenous peoples require "meta-knowledge – knowledge about knowledge," and a schema with which to explain the social aspects of knowledge systems: a schema that can interpret the truth claims and uncover the situated and self-interested aspects of a knowledge system, but can also encourage the maintenance of culturally-divergent knowledge systems in the face of more dominant systems (2002:286-287). This is a very tall order for an analytical concept to fill, but it is clear that there are a number of areas of conceptual development that can, and should be explored.

Future developments of the knowledge system concept should follow the recommendations of Barth and Nakata by working to create frameworks of meaning that evaluate the social structures that produce and reproduce knowledge, assert the validity and/or dominance of ideas, and translate meaning from one knowledge system to another. In describing and interpreting the social structures that underlie knowledge systems, anthropologists will develop language that enables them (and other interested parties) to communicate knowledge about knowledge and to better translate ideas from one knowledge system to another. If the knowledge system as an analytical concept develops in this way, it could be employed to gain insight in a number of areas, especially for cross-cultural co-production of knowledge, cross-cultural generalization of ideas and communication, and reciprocal knowledge exchange – all areas where improvement has been encouraged by scholars (Barnhardt and Kawagley 2005, Berkes 2009, Crawford 2009).

1.3 Aims of the "Cultural Knowledge Systems: Synthesizing our knowledge of knowledge using grounded theory" project

The research program herein described intends to follow the recommendations of Barth and Nakata by gathering the scholarship on culturally-based knowledge systems and creating a new theoretical model which may be used by researchers and knowledge holders to more adequately understand cultural knowledge systems as systems – not as static bodies of knowledge or "endangered" ways of knowing. The major aim of the project is to delineate a language of the knowledge processes, types, and qualities embedded in knowledge systems so that people may mutually understand and collaborate using cultural knowledge.

Employing the methods of grounded theory, the author has compiled and interpreted a selection of academic literature on cultural knowledge systems to synthesize a framework of knowledge systems traits: the social processes constructing bodies of knowledge, the types of knowledge, and the qualities that those types of knowledge possess, as they are described in the scholarly literature. In order to illustrate the relationships between the components and structures of a knowledge system, many visual representations and models have been constructed (see appendices). Ideally, these visual representations, consisting in large part of flow charts, tables, and matrices, would assemble into a useful ethnographic field tool for constructing new descriptions of knowledge systems.

Before an attempt to synthesize the academic literature on cultural knowledge systems can begin, I first outline the variable and confusing definitions of the term knowledge system and related terms like indigenous knowledge, traditional knowledge and local knowledge (chapter 2). Then the methodology, sample body of texts, and methods of theoretical model representation are outlined (chapter 3). In chapter 4, the results of the literature review are explained and the knowledge system framework is described. Finally, chapter 5 includes an analysis of the results of the whole research project, an exploration of the value of the knowledge system framework, and suggestions for how future research could build upon the findings of the cultural knowledge systems project.

Chapter 2: Defining knowledge systems and related concepts

2.1 What is a knowledge system? Culture, knowledge, and theoretical concepts

As was briefly mentioned in chapter 1, consensus on the definition of the term knowledge system, or on the utility of the knowledge system concept, is not found in the academic literature. In many cases, knowledge is presented as a product (or process) of a cultural system without an initial definition stating what constitutes knowledge or a knowledge system. Maybe these terms are considered so self-evident that defining them would bore or insult the reader, the rationale being "why waste valuable literary space on concepts that are common knowledge?" But the knowledge system concept is not an obvious one – it is a theoretical concept that has been adopted by many disciplines in academia for a number of divergent scholastic goals.

One concern brought up specifically in anthropological circles is the distinction between the concepts knowledge system and culture. In the tradition of cognitive anthropology, Keesing (1979) insists on using culture "in a cognitive sense" to mean "a system of knowledge, a composite of the cognitive systems more or less shared by members of a society. It is not, in this view, a way of life; it is not a system of behavior" (15). This is a less conventional approach, since culture is typically extended to describe a full spectrum of behaviours, values, and beliefs of people. But Keesing is an anomaly among anthropologists who study cultural knowledge systems, since knowledge is usually considered only one aspect of culture. Purcell defines knowledge as more delimited than culture – it is only relevant to the cultural forms necessary for long-term survival. This definition levels the epistemological playing field between knowledge systems cross-culturally (Purcell 1998:260). But this definition neither explains what knowledge is or does nor explains how knowledge can be an informative area of study to understand culture more generally. Barth (2000:1) notes a conversation with Clifford Geertz surrounding the distinction of knowledge from culture. Barth asserted that an analytical focus on knowledge requires anthropologists to think differently than they would with a focus on culture: knowledge encourages thought on a number of issues such as the differential distribution of knowledge through a community, cooperation and communication between people with different knowledge, and understanding people's knowledge about the social structures of

society (an area which has been difficult to understand from other analytical foci) (Barth 2000). As an analytical term, knowledge is a placeholder for a number of related concepts and processes that have developed through academic dialogue over time – like terms such as 'family' and 'tradition,' knowledge enables scholars to communicate their ideas and research findings without having to contextualize them endlessly (Simpson 2000:14).

When academics define knowledge and knowledge systems, their definitions vary: elements such as bodies of knowledge; social organization, context, and worldview; methods or processes; truth claims, authority, and validity; and social actors and knowledge holders may be included in defining what knowledge and knowledge systems are. Chretien and Murphy assert that commonly used definitions of traditional knowledge systems emphasize the substantive and methodological elements of knowledge systems and neglect the epistemological ones (2009:14-15). In this case, and in the case of defining knowledge systems labeled with monikers like "indigenous knowledge," "western science," "local knowledge," etc. the defining parameters of knowledge systems mirror the disciplinary and political agendas that influence scholars' points of view and methods of analysis. The following sections of this chapter outline these issues in more detail, so in the present section I will consider definitions as they appear with little attention to the contexts within which each definition is asserted.

While many texts do not define the knowledge system concept, the texts that do contain definitions provide a variety of perspectives on what the important or necessary components of a knowledge system are. Roling and Jiggins use the definition:

> A knowledge system (KS) is a mental construct. People develop a KS because they find it useful for effective action. KSs may be described as stable actor networks which support agricultural innovation and learning, comprising, for example, researchers, extensionists and progressive farmers… But a KS may also be seen as a coherent set of cognitions, cosmologies and practices, as for example, some indigenous knowledge systems... (1996:242)

This definition emphasizes that knowledge systems can be seen from two different points of view: as not latent but as overt social structures developed by social groups, and as rational epistemologies with complementary methods. These points of view are certainly not mutually exclusive. They merely denote two aspects of knowledge that can be examined. Elsewhere, Roling and Jiggins elaborate further on the knowledge system concept: "the knowledge system perspective looks at the institutional actors, within the arbitrary boundary of what can be considered the theatre of innovation,

as potentially forming a soft system. A soft system is a social construct in the sense that it does not 'exist'" (Roling and Jiggins 1998:286). In this sense, the knowledge system concept is a theoretical construct which may be used to understand and explain the social structures and relationships among people that create and use knowledge. The knowledge system can be scaled as small or large, depending on the ambitions of the researcher, as long as the boundary of the system is properly defined.

Another perspective is structure and process oriented: "the knowledge system can be seen as social arrangements clustering around the processes of knowledge production, organization and storage, distribution, and use" (Holzner and Marx 1979:13). This mechanistic definition ignores elements such as the roles of knowledge holders, context, and epistemology, but it provides a useful construct with which to consider the interconnection between methods of discovery, invention, learning, and application.

Yet another definition focuses on context:

> A 'cultural knowledge system,' as the term is used here, is any set of ideas, prevailing in a given culture or subculture, which provides a way of organizing information about the world or about any aspect of it. Cultural knowledge systems may be identified at different levels of generality; thus Christianity is one such system, and each of the various competing theologies which offers a distinctive interpretation of Christianity is also such a system" (Richter 1972:43).

Using this definition enables the researcher to delineate the culture or subculture that employs the knowledge system in question; moreover, the researcher is able to examine knowledge cross-culturally, both across different systems and between closely related systems.

If a researcher hopes to understand practices in terms of validity, the following definition could be applied: "We define a knowledge system as a body of propositions actually adhered to (whether formal or otherwise) that are routinely used to claim truth" (Reid *et al.* 2006:11). This definition distinguishes a knowledge system as comprised of truth claims derived from subscribed ideas and practices that are "actually adhered to." This definition is problematic: are not the idealized qualities of a knowledge system (for example, objectivity or universality) integral to that system's epistemology? The relationships between truth claims and epistemology and other social structures such as authority and power definitely have real effects. With that said, Reid *et al.* and other scholars

may use the distinction between ideal and real practices to interrogate relationships of knowledge to power. In any case, validity is certainly an important characteristic of knowledge systems.

One final definition offers knowledge holders as the focus of a knowledge system: a knowledge system

> … consists of knowledge (implicit and explicit, unconscious and conscious), [and] its loci are the minds/brains of individuals... At the same time, cultural knowledge is distributed and transmitted within communities and hence must be learnable and broadly shared, although individuals command variant and partial versions of the community's pool of knowledge (Keesing 1979:16).

Here, unlike the other definitions previously presented, knowledge is explained as it manifests in the minds of individual people, groups, and whole communities. Aspects such as learning, differential knowledge bases between people, and the notion of personal versus shared knowledge are all considered integral to an understanding of a knowledge system.

Taken together, these variable definitions of the knowledge system concept demonstrate the breadth of components and considerations that are relevant to studies of knowledge systems. None of these definitions individually is truly explanatory of the knowledge system concept as a whole, but they each provide a piece of the puzzle. Based on the academic literature, and the findings of the cultural knowledge systems project (which are presented in chapter 4), I would venture to define a cultural knowledge system in the following way: a cultural knowledge system is a social institution based in the activities of creating, teaching, and applying knowledge through the interrelated system components of substantive body, methodology, medium, epistemology, and social structure. Essentially, what can be concluded from this exercise is that the knowledge system concept has not yet been explored and explained in all of its facets by any one scholar. As Rolings and Jiggins explained, a knowledge system is a "soft system" (1998:286) without strictly delimited boundaries. Looking at knowledge systems as flexible entities gives a researcher room to conceptualize and analyze observations without strict guidelines. However, this does not free academia from the need to be clear and consistent when using a theoretical concept. One area where clarity and consistency has lacked is in the labeling of knowledge systems.

2.2 Confounding labels: scientific, indigenous, local, folk, and traditional knowledges

Knowledge systems must be attributed to the people who create and use them; however, terms used in the academic literature like Western science, indigenous knowledge, local knowledge, folk knowledge, and traditional knowledge are habitually confused or conflated, and often do not help in establishing whose knowledge is being studied. Moreover, when these labels are used to compare knowledge systems they can lead to gross overgeneralizations. The delineations between systems that are most problematic and yet popular are markers of scale (e.g. local and global), time (e.g. traditional and modern), and politics and authority (e.g. indigenous, western, scientific, folk). Oftentimes labels get used interchangeably or together – like "modern western science" – even though these terms do not mean the same thing (Agrawal 1995:414). One example from a development manual, claiming to explain indigenous knowledge, gives a good illustration of the problem:

> Indigenous knowledge is the knowledge that people in a given community have developed over time, and continue to develop… Indigenous knowledge is not confined to tribal groups or the original inhabitants of an area… It is not even confined to rural people. Rather, any community possesses indigenous knowledge – rural and urban, settled and nomadic, original inhabitants and migrants. Other names for indigenous knowledge (or closely related concepts) are 'local knowledge,' indigenous technical knowledge' and 'traditional knowledge.' (Mathias 1996:7)

This definition completely ignores the political connotation of indigeneity, and instead makes it a proxy for "undeveloped" or "non-Western." It also implies that indigenous knowledge is also necessarily traditional and local, and that these three categories of politics, time, and scale are inherently linked. Lauer and Aswani critique the use of the term local knowledge, claiming that in many cases it has come to be used in lieu of the term indigenous. In this case, local actually reinforces the assumption that non-industrial or non-Western societies are spatially isolated and have static knowledge (2009:322). Compounded labels occur fairly frequently, and the overall effect is a loss of academic rigor and the neutralization of analysis and discourse. How can studies of knowledge systems be understood, valued, and compared when the subjects of analysis are not made clear?

While on one hand many scholars have labeled knowledge systems in confusing and sometimes contradictory ways, on the other hand there are scholars who have specifically labeled knowledge systems in productive ways. Productive labels specify whose knowledge is being studied and state the

lens with which the scholar views and analyzes knowledge. Many scholars studying traditional, traditional ecological, scientific, and indigenous knowledge systems very carefully explain the context of the knowledge systems that they study and justify the labels that they use (e.g. Berkes et al. 2000, Menzies and Butler 2006, and Sillitoe 2007). Aikenhead and Ogawa explain their interpretation of science as

> 'a rational perceiving of reality,' by which we mean: a rational empirically based way of knowing nature that yields, in part, descriptions and explanations of nature. This superordinate concept subsumes the Euro-American cultural perspective (Eurocentric science) and various non-Eurocentric perspectives (Aikenhead and Ogawa 2007:544).

Using this qualification of science as a "superordinate concept" allows for cross-cultural comparison of knowledge about nature without privileging one knowledge system over another, and generally posits Aikenhead and Ogawa's approach to understanding science cross-culturally.

As argued by Agrawal (1995) and reaffirmed by Nakata (2002), reified notions of categories like indigenous knowledge and western knowledge simply do not reflect reality, instead they reflect attempts to crystallize bodies of knowledge as static in time and space. Careful consideration of knowledge systems reveals that they change through contact, exchange, learning and transformation (Nakata 2002:284). Where labels fail to account for these processes of change we can come to a final realization that they are truly problematic. A case posited by Purcell interrogates many conventional knowledge system labels, especially indigenous knowledge:

> [Some] people, as with specific groups of Africans in the diaspora (e.g., Saramaka Maroons and Gullah people of the Carolinas), may retain a more coherent body of ancestral knowledge than, for example, some relatively assimilated native Central or South American campesinos who are indeed indigenous by the criterion of territory. The definition also suggests that while there is clearly indigenous knowledge in the Western world across many ethnic groups, the body of Western knowledge that is judged to be founded on scientific criteria may be too abstracted from any specific cultural genesis… to be considered indigenous (Purcell 1998:260).

Thus, when labels such as tradition and indigenous are assumed to work hand-in-hand, many people's knowledge systems do not fit within the mold made by academic conventions. Knowledge held by people in areas of diaspora or colonization defies the usual convention. Traditional knowledge held by westerners defies the usual convention. Science is no longer considered western and defies the

usual convention. The labeling of knowledge systems using terms like indigenous, western, and local all create problems when context is lost and convention is held without justification. In essence, labeling a knowledge system is a political act, whether consciously or unconsciously performed.

2.3 The politics of defining knowledge

The politics of defining and labeling knowledge systems can be approached from a number of vantage points, but I will only address one case here to illustrate the effects of power on studies of knowledge: the construction of indigenous knowledge. Using the UN model for defining indigeneity, there are three categories of peoples who are considered indigenous: "those whose colonial settlers/invaders have become numerically dominant;" "those in Third World contexts whose colonial settlers/invaders never reached a majority but left a legacy of colonization;" and "those who have been displaced from the locality from which they once drew their cultural self-identity" (Aikenhead and Ogawa 2007:554-555). The typical conceptualization of indigenous knowledge is problematic in two ways: the majority of academic literature on the subject frames it as a distinct body of self-contained folk knowledge (Briggs 2005:11), and the application of the term indigenous has been so loosely defined that it is ambiguous and often extended to groups of people whose knowledge is not indisputably "indigenous" (Yarrow 2008:225). Since the 1980's, indigenous knowledge systems have been attributed to various groups of people in less developed countries (Purcell 1998:260), and as asserted by Nakata, indigenous knowledge "has become an umbrella term" for the knowledge systems of all peoples in developing countries, regardless of their histories with colonization, autochthony, or migration (2002:282).

At the same time, the label indigenous knowledge erases distinctions previously elaborated for knowledge systems such as traditional ecological knowledge, aboriginal traditional knowledge, *Inuit Qaujimajituganquit*, and Métis indigenous knowledge (Chretien and Murphy 2009:14). The labels indigenous knowledge and western science "exist to create boundaries and are used to police them" but simultaneously are used widely in research aimed at understanding marginalized peoples' knowledge (Agrawal 2009:157). Increasingly, indigenous knowledge has become commoditized: "something of value, something that can be value-added, something that can be exchanged, traded, appropriated, preserved, something that can be excavated and mined" (Nakata 2002:283).

Despite these negative developments, indigenous knowledge has, according to Lauer and Aswani, "proven to be a potent and effective signifier. By organizing under the banner of indigenousness, many marginalized and disempowered people have positioned themselves politically and demanded rights" (2009:322). So effectively, the label indigenous knowledge has been employed to serve a number of different agendas. This point is acknowledged by Agrawal, who argues

> for the recognition of a basic political truism: anchored unavoidably in institutional origins and moorings, knowledge can only be useful. But it is useful to particular peoples. Specific strategies for protecting, systematizing and disseminating knowledge will differentially benefit different social groups and individuals. The recognition of this simple truism is obscured by the confounding labels of 'indigenous' and 'western' (1995:433).

The power struggles surrounding indigenous knowledge involve issues of autonomy, ownership, and rights of colonized or otherwise disadvantaged social groups, and academics do play a role in these struggles when they employ terms like indigenous knowledge in their writing.

Any definitions or labels employing the term indigenous should acknowledge that "its political status, that is, its asymmetrical location within the international, intercultural, and interclass relations of power [defines] and legitimize[s] social, political, ideological and economic practice" (Purcell 1998:260). At the same time, the ideal goal of academic studies of knowledge systems is a relativistic one: "to be able to discover and be surprised by other lives… all of the traditions, bodies of knowledge, and ways of knowing practiced by people are recognized for our comparative and analytic purposes as coeval and sustainable, each on its own premises" (Barth 2000:4). The tension between political power or ownership of knowledge and the relativist's goal of fair cross-cultural comparison make it very difficult to label, categorize, or define knowledge systems with terms like indigeneity.

Keeping this in mind, the sample body of texts drawn for the cultural knowledge systems project is not confined to texts examining knowledge systems of any one scale, history, political position, or label. Instead, texts have been selected for their range of analytic frameworks and consideration for cross-cultural comparison. All of the knowledge systems described in the sample body of texts, be they labeled indigenous, western, local, global, folk, scientific, etc., are considered on a level playing field – they are not analyzed here along the delineations of convention, but are synthesized in order to provide an overall picture of the knowledge system concept as it appears in the body of literature. Further explanation of sampling and methodology for the project appears in the next chapter.

Chapter 3: Methodology: using grounded theory and model building with visual representations

3.1 Using grounded theory

The primary methodology for the cultural knowledge systems project is grounded theory: a method of data analysis and interpretation that relies on the researcher's ability to identify and relate themes, categories, and concepts within a body of texts. Instruction for undertaking research using grounded theory came primarily from three sources: Dey (1999), Charmaz (2006), and Bernard (2000). As outlined by Bernard,

> the mechanics of grounded theory are deceptively simple: (1) Produce transcripts of interviews and read through a small sample of text. (2) Identify potential analytic categories – that is, potential themes – that arise. (3) As the categories emerge, pull all the data from those categories together and compare them. (4) Think about how categories are linked together. (5) Use the relations among categories to build theoretical models, constantly checking the models against the data – particularly against negative cases. (6) Present the results of the analysis using exemplars, that is, quotes from interviews that illuminate the theory (2000:492).

The six steps outlined by Bernard have been followed throughout the cultural knowledge systems research project, and the methods and results are presented herein (chapters 3 and 4). Grounded theory enables the researcher to make strong analytical arguments and develop theoretical models that are based upon a deeply understood and broadly based empirical sample (Charmaz 2006:151). For this reason, grounded theory methodology was very appropriate for the cultural knowledge systems project. Any theoretical implications or judgments put forward in this paper about academics' characterizations of cultural knowledge systems should reflect a comprehensive analysis of the sample body of literature as a whole.

The following sections of this chapter outline the methods of sampling, coding, data analysis, and theoretical model building undertaken for the cultural knowledge systems project.

3.2 Sample generation: creating a body of texts

Since grounded theory requires iterative data collection and analysis, the generation of a sample is different than many other methods of research. The traditional method of collecting a body of data then analyzing that data is intentionally transformed so that early data analysis can inform later data collection (Charmaz 2006:187-188). So the initial stage of data collection is the determination of a sampling site – to start "with a general subject or problem conceived only in terms of a general disciplinary perspective[,] … having identified a problem or topic in very general terms[,] and selected a site where that problem could be studied" (Dey 1999:3-4). The research questions and site for the cultural knowledge systems project are born out of insights gleaned from earlier literature reviews on cultural knowledge: academics suggested that future work on the knowledge system concept should focus on epistemologies, processes and structures, academic language, and a framework of concepts and questions (see chapter 1). These suggestions brought to mind the questions "to what extent are these areas of research already addressed in the academic literature?" and "can individual texts contribute ideas which may be synthesized to create a more comprehensive understanding of the knowledge system concept?" Thus, the site of the study was determined to be the academic literature on cultural knowledge systems.

However, the sample body of texts does not include all academic literature on cultural knowledge systems – such a sample would require years to collect and analyze, and would not necessarily result in productive research. Glaser and Strauss (1967) suggest that grounded theory methodology requires theoretical sampling: a "flexible and dialectical process of determining data collection in the light of the emerging analysis" (Dey 1999:4). Theoretical sampling is a very advantageous method for the cultural knowledge systems project: it allows for the academic literature to be culled and managed so that the most useful and relational texts inform the theoretical model. For example, in the earliest stage of data collection, many books and articles using the knowledge system concept in a business organization context were found, and it was unclear at first whether or not these texts should be included in the cultural knowledge systems project. After some exploration in this area of the literature was done, it became apparent that this direction of inquiry would be a difficult one to pursue. When articles speak of knowledge management systems (both computerized and non-computerized) as repositories or banks of institutional knowledge, and people as vehicles of knowledge, it is not obvious that these articles would contribute to a project attempting to understand cultural knowledge epistemology and process. Perhaps another researcher could venture into this

area, but for the cultural knowledge system project, this area of the academic literature was eliminated from the prospective sample body of texts early on in the data selection process.

Other specifically targeted areas of the literature were explored, especially anthropological, sociological, and development studies literature. These areas were targeted because these disciplines examine and analyze peoples' ways of doing and knowing things as socio-cultural processes. What is being studied are the social sciences' perspectives on and analyses of cultural knowledge systems. This research site is a theoretically valuable one – it contains a variety of sources that provide interesting comparisons of knowledge system epistemologies and processes – and these attributes (variety and comparison) are critical for grounded theory methods of analysis (Dey 1999).

A few successive rounds of data collection led to a sample body of texts comprising of 49 articles, books, and book chapters written by over 60 authors published between 1971 and 2009. A full list of the sample appears in the appendices (Appendix I). The sample includes texts that propose formal theoretical conceptions of knowledge systems as general entities, detail substantive empirical studies of specific knowledge systems, or do both of those things. All texts were found using conventional literature review mechanisms: the Trellis library system (cataloging the libraries of the University of Waterloo, University of Guelph, and Wilfrid Laurier University), Google Scholar, Jstor, Web of Knowledge, and Anthrosource search engines were explored using primary keywords "knowledge system" and "cultural knowledge" and references within many texts led to other important sources. All texts that appear within the sample are published materials.

Since sampling decisions in grounded theory must be theoretically informed (Dey 1999:4), the first round of data collection and analysis included texts that contribute more formal, theoretical ideas about knowledge systems, as well as texts critiquing other academics' conceptions of the concept. These texts were specifically targeted to represent early and later publications across disciplines. The second round of data collection and analysis drew upon the ideas, critiques, and references made in the first round sample texts, and targeted more substantive texts outlining the characteristics of particular knowledge systems. At this point, a sampling decision was made to include texts concerning (the Western categories of) agricultural, medical, and ecological knowledge systems. As was mentioned in chapters 1 and 2, these topics are integral to policymaking and have shaped social scientific notions of what knowledge is and how it can be defined. Also, scholars across the social sciences and beyond broach these topics, making them good for cross-discipline comparison. Future knowledge systems research (using grounded theory or other methods) could definitely explore other

substantive topics such as education, language, the arts and media, etc. and that would shed new light on cultural knowledge systems; however, one researcher can only scale her project to a manageable size, in this case a size large enough to be deemed theoretically valuable, yet focused enough to provide a clear picture of a sub-section of academia's literature on cultural knowledge systems. Ideally, the grounded theory approach requires sampling to continue until the point when the emergent theory achieves "theoretical saturation." This concept, and whether or not theoretical saturation has been achieved by the cultural knowledge systems project will be explored later in chapter 5.

3.3 Coding data: recognizing and making meaningful concepts and categories

Throughout the sampling process, data is also simultaneously being coded and analyzed. There are a variety of types of coding in grounded theory, and they belong to different phases of the research process. On the first reading of a text, open coding – staying close to the data (Bouma *et al.* 2009:253) and generating numerous possible concepts, categories, and themes (Dey 1999:10), can start with "just reading the texts and underlining or highlighting things as you go… some of the words and phrases you highlight will turn into names for themes" (Bernard 2000:493). The ideas and phrases recognized by the researcher are coded (labeled, essentially) as theoretical concepts representing significant trends in the data. As open coding progresses across texts, more abstract, higher-order categories can be determined from relating concepts to one another (Bouma *et al.* 2009:254). Open coded concepts represent the substantive first order concepts of the research (Dey 1999:10), whereas second order categories can be discovered through focused coding that is "more directed, selective, and conceptual than word-by-word, line-by-line, and incident-by-incident coding" (Charmaz 2006:57). Selective coding leads to the creation of core categories, the variables that establish the emerging theory of the research (Dey 1999:10). Core categories are then related to other categories, refined, validated, and integrated to form, as coined by Strauss and Corbin, the storyline of the emergent theory (Bouma *et al.* 2009:253). This process is called theoretical coding and it enables the researcher to analyze the data not just as it represents a number of discreet texts, but as it conceptualizes the collective message of a body of texts (Charmaz 2006:63).

One variety of coding, *in vivo* coding, is particularly important to explain, since it is especially useful for the cultural knowledge systems project. In vivo codes are created during the open coding

process. They are the "words of real people" that are explicitly used within the text (Bernard 2000:493). Charmaz notes that preserving the actual words within texts can be analytically useful if they represent one of three kinds of language: the "general terms that everyone 'knows';" a particular person's "innovative term that captures meanings or experience;" or "insider shorthand terms specific to a particular group that reflect their perspective" (2006:55). The researcher should keep this kind of language within the analysis by using it to name concepts and categories – even core categories – because these terms represent how the people being studied conceive of the research topic.

Particularly for a grounded theory study of academic literature, the use of *in vivo* coding ensures that academics' voices are maintained within the analysis and subsequent theoretical models. Since academics carefully consider their language, draw upon conventional or discipline-specific vocabularies, and often coin new terms in their publications, their terms are certainly valuable during the coding process. Moreover, examining the relationships between terminology used across disciplines and over time within disciplines definitely promotes analysis of the academic discourse, and the production of a theoretical model.

3.4 Data analysis: developing relationships among categories

As the coding of data progresses toward the definition and relation of core categories, the analysis process is well under way. The integrated process of data collection, coding, and analysis is a strength of grounded theory: "you act upon your data rather than passively read them. Through your actions, new threads for analysis become apparent… focused coding checks your preconceptions about the topic" (Charmaz 2006:59). One method of ensuring that analysis is incorporated in the research process is constant comparison, a method that "enjoins the researcher to continually compare phenomena being coded under a certain category so that a theoretical elaboration of that category can emerge" (Bouma *et al.* 2009:253). Essentially, the researcher has to continually refine what is and is not representative of each category, what properties are essential and non-essential, and determine which categories could become core categories. As each new text is incorporated, it sheds light on the concepts and categories of the sample body of texts. Constant comparison includes finding similarities and differences in the data, making chronological comparisons, and noting when observations about the data do not parallel what is written by the authors of individual texts (Charmaz 2006:54). With constant comparison the researcher builds data analysis through a deep understanding

of the texts and how their messages relate to one another, which ultimately leads to the development of a theoretical model characterizing the sample body of texts as a whole.

The nuts and bolts of grounded theory model building are concepts, categories, and core categories. Discovering how these coded ideas relate to one another is the main focus of data analysis in grounded theory. In order for concepts and categories to aid data analysis, they should be "analytic" and "sensitizing" – both designating characteristics about the data and representing a focused picture of the object of analysis respectively (Dey 1999:7). Once these ideas are organized and fully developed, a theoretical framework can be developed. The theoretical framework "[solidifies] the analysis and delimits the research by differentiating between core and peripheral categories and identifying the scope and boundaries of the theory… the focus could then shift to analysis of the major categories and their relations with efforts to identify underlying uniformities [and] clarifying logical connections" (Dey 1999:8-9).

A number of methodological tools support the grounded theory process. Managing data using computer software, memo-writing observations, recording illustrative quotations, and concept mapping relationships between categories are all strategies that encourage the researcher to organize their data and systematize their research process. For the cultural knowledge systems project, research data and observations were managed using MS Office software (Word, Excel), as well as Inspiration software for concept mapping, and Endnote software for referencing. Although NVivo software was considered for the project, it was ultimately determined that computer-assisted qualitative data analysis software was not necessary. Like Stanley and Temple (1995) suggest, the coding, organization, and data retrieval abilities of NVivo are not novel, so investing in acquiring and learning how to use new software is not as valuable when the researcher already possesses knowledge of other data management strategies.

Regardless of organization methods, one tool for data analysis that is widely accepted and practiced is memo-writing. When memo-writing the researcher consistently writes down thoughts and observations made while reading, coding, and analyzing the data, and this record becomes the first resource for theory development; it is essentially a body of field notes on observations about texts (Bernard 2000:499). Memo-writing is essential because it promotes reflection and analysis throughout the research process and builds analysis toward more abstract and higher-order conceptualizations of the data (Charmaz 2006:72). The memo record for the cultural knowledge systems project is the primary source of explanation and data analysis – it summarizes the

observations made about the texts; it explains when choices are made about concepts, categories, and core categories; and it outlines how theoretical structures came to be realized out of the data. Since the memo record connects the processes of undertaking research and writing up results, much of the memo record will be reflected within chapter 4.

A tool related to memo-writing and *in vivo* coding is the use of illustrative quotations. Keeping record of the verbatim quotations from texts that have led to the creation of concepts and categories (either as *in vivo* codes or within memos) and incorporating those quotations into descriptions of the emergent theory help to qualify the analysis and make it more accessible to the reader. Equally important are quotations that represent the negative cases and exceptions to the emergent theory (Bernard 2000:503). Illustrative quotations will play an integral part in demonstrating the results and analysis of the cultural knowledge systems project in chapter 4.

The process of data analysis benefits from methods of mapping the relationships between categories in concrete, visual ways such as concept mapping (Charmaz 2006:117); in this way, the ideas that are signified by categories can be manipulated (represented by images, moved, and related to one another) to explain thought patterns and hierarchies of meaning and structure. Using different media enables the researcher to understand the data and organize it so that important conclusions may come to light. Combining research resources such as memos, quotations, and visual diagrams of the data provide the researcher with a variety of ways of seeing the data so that comprehensive analysis and theoretical model building may be achieved. Likewise, all of these media can be used to present research findings to readers, and how and why these media are used for presenting the cultural knowledge systems project results (chapter 4) are explained in the next section.

3.5 Theoretical model building: using visual representations to build and explain a knowledge system framework

Ultimately, the goal of grounded theory is to develop and define the emergent theory of the study. The cultural knowledge systems project endeavours to go beyond substantive theory which "relates to theory in a certain *empirical* instance" and develop a formal theory, one that "is at a higher level of abstraction and has applicability to several substantive areas… the generation of formal theory requires data collection in contrasting settings" (Bouma *et al.* 2009:254). Having based the sample body of texts upon works from multiple disciplines and scholars, and abstract as well as more

concrete expressions of the knowledge system concept, the emergent theory of the project, the knowledge systems framework, should represent an emerging formal theory.

Developing and communicating the structure and content of a new theory can be achieved by explaining how the analysis unfolded, showing a picture of what the theory looks like, and demonstrating or postulating how it could be used. Interestingly enough, both grounded theorists and a number of academics working with cultural knowledge have espoused the value of specific kinds of visual representations for presenting research findings. Grounded theorists such as Strauss, Corbin, and Clarke insist that diagrams such as maps, figures, and charts are integral for both doing data analysis and demonstrating theories (Charmaz 2006:117). Bernard asserts that the production of visual displays is an important part of qualitative analysis: "laying out your data in table or matrix form and drawing your theories out in the form of a flow chart or map helps you to understand what you have and helps you communicate your ideas to others" (2000:456-457). Specifically for the grounded theory approach, diagramming is essential for theoretical development (Charmaz 2006:115). Two methodologies manuals for studying cultural knowledge systems edited by Paul Sillitoe, Peter Dixon, and Julian Barr (*Indigenous Knowledge Inquiries: A Methodologies Manual for Development*) and Evelyn Mathias (*Recording and Using Indigenous Knowledge: A Manual*) devote significant sections of those volumes to explaining how using diagrams and visuals to record and interpret cultural knowledge and knowledge systems. Matrices, flow charts, tables, maps, etc. are all important ways of recording, assessing, and presenting cultural knowledge. Since both the method of study and the object of study lend themselves to visual diagramming and representation, a variety of visual media are employed in the emergent theory, the knowledge systems framework, which will be fully explored in the next chapter.

Chapter 4: Findings and analysis: a framework for cultural knowledge

4.1 Research findings: coded data, categories, and core categories

As was explained in the previous chapter, grounded theory methodology involves coding meaningful passages within texts and assigning those codes to groupings called categories. Selective coding of the sample body of texts has led to numerous categories, and many of these categories are incorporated into the core categories that are the organizing principle of the theoretical analysis detailed in the following sections of this chapter.

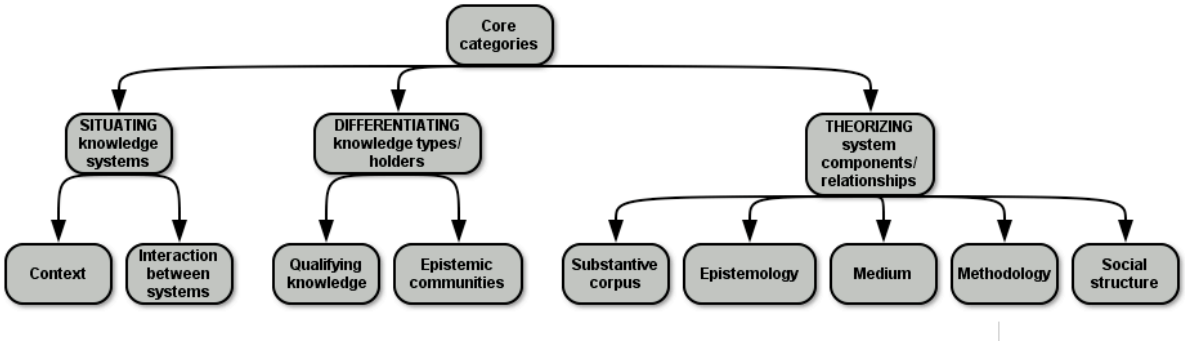
The core categories that have been created and the associations made between categories represent decisions made about the data, but they are decisions made in light of the theoretical assertions (both explicit and implicit) within the data. Three core categories emerged from the data: "SITUATING" knowledge systems; "DIFFERENTIATING" knowledge types and knowledge communities; and "THEORIZING" system components and their interrelationships. These three core categories represent the organizing principle for clustering related ideas in the literature.

While the three categories and their clusters of sub-categories are the basis of this analysis, they do not represent all of the observations and codes created about the sample body of texts. Some categories do not easily integrate with or relate to the major concerns stressed in the literature, while other categories are so ubiquitous across categories that they have to be discussed in each case and cannot be limited to one cluster of ideas. Two examples of the latter case are the categories "VALIDITY" and "AUTHORITY" which appear to be integral concepts to all three clusters of categories. Indeed, if the research question of the cultural knowledge systems project had been to determine how authority and validity are characterized in the knowledge systems literature (as opposed to the proposed areas of study: epistemology, process, and structure) the resulting core concepts would have emphasized very different aspects of the literature. The point I intend to make here is that the categorizations I have attributed to the sample body of literature are not absolute, but they are valuable for organizing important concepts and facilitating analysis in the areas of research.

The cluster of sub-categories stemming from a core category makes up the body of related terms and ideas that are significant for data analysis and the elaboration of an emergent theory. The core category "SITUATING" knowledge systems is comprised of two main sub-categories: context and

interactions between systems. The core category “DIFFERENTIATING” knowledge types and knowledge communities is comprised of a number of related sub-categories: qualifying knowledge, knowledge types, knowledge modes, epistemic communities, common sense, expert/specialized knowledge, and wisdom. The core category “THEORIZING” knowledge system components and their interrelationships is comprised of five sub-categories: substantive body, methods, media, epistemology, and social structure. A concept map of the core categories and their associated sub-categories are represented hierarchically in Figure 1. Overall, the core categories and their clustered categories provide a frame upon which to hang an in-depth analysis of the sample body of texts.

Figure 1. The core categories and their clusters of sub-categories, representing the major findings of the knowledge systems project



4.2 Analysis: trends in the sample body of literature

4.2.1 A critique of a common practice in the literature

Before diving into an analysis of the core categories produced by the cultural knowledge systems project, I would like to take a brief detour to mention a tendency in the academic literature that is largely unproductive for understanding the intricacies of knowledge systems. In a number of cases, knowledge systems are characterized by attaching to them a laundry list of sweeping generalizations. In coding this phenomenon, I called the category “LUMPING CHARACTERISTICS” because the effect of laundry list style description is the conflation of methods, types of knowledge, scale and

place, media, etc. so that the characteristics attributed to a knowledge system appear to mutually determine one another.

In some cases (e.g. Briggs 2005, Mwadime 1999), the instance of lumping characteristics is merely an introduction to the literature on knowledge systems or a brief overview of concepts, while later descriptions in the text provide a more detailed and nuanced explanation of the knowledge system's characteristics. Other scholars use the convention of lumping characteristics in order to distinguish their work from less critical treatments of cultural knowledge. Turnbull does this, stating that

> so-called 'traditional' knowledge systems have frequently been portrayed as closed, pragmatic, utilitarian, value laden, indexical, context dependent, and so on; all of which was held to imply that they cannot have the same authority and credibility as science... Science by contrast was held to be universal, non-indexical, value free, and as a consequence floating, in some mysterious way, above culture. Treating science as local simultaneously puts all knowledge systems on a par and renders vacuous any discussion of their degree of fit with transcendental criteria of scientificity, rationality, and logicality (2000:40).

In this passage Turnbull uses the lumping technique to emphasize that these terms have created artificial boundaries between knowledge systems for the purpose of privileging one system over another; it is an interesting reversal of the conventional purpose and effect of lumping characteristics.

However, the more common case of lumping characteristics is not so carefully considered and the results are much less productive for comparing knowledge systems. For example, the abstract for Gadgil *et al.*'s article claims that indigenous peoples' "knowledge has accumulated through a long series of observations transmitted from generation to generation. Such 'diachronic' observations can be of great value and complement the 'synchronic' observations on which western science is based" and later adds that indigenous peoples' ecological conservation practices are "grounded in a series of rules of thumb which are apparently arrived at through a trial and error process over a long historical time period" and "such knowledge is difficult for western science to understand" (1993:151). Yet these qualifications are never explained later in the article – the terms diachronic and synchronic actually do not appear again in the article, except in the conclusion. A similar case appears in two articles (Barnhardt and Kawagley 2005 and Aikenhead and Ogawa 2007). Both articles reproduce a Venn diagram originating in an education handbook that compares "traditional native knowledge systems" with "western science" and lumps together between 10-13 characteristics under each column with very little justification or explanation. Although Aikenhead and Ogawa do critique the

figure for decontextualizing science from culture (2007:584), they do not critique the unjustified correlation of characteristics within a set. Lumping characteristics has similar effects as the issue of mislabeling knowledge systems (which was discussed in chapter 2), and could easily be discussed at length, but a more in-depth critique of this convention in the literature lies just outside of the aims of this research project. It is worth mentioning briefly just to point out that the cultural knowledge systems literature contains trends that affect how knowledge systems are conceived and analyzed.

4.2.2 Situating knowledge systems

4.2.2.1 Context

In the sample body of literature, discussions of context and interaction between knowledge systems solidify the perspective that knowledge is a cultural product. A number of scholars note that knowledge systems often derive their authority by claiming to be universal, context-free, or beyond culture (Geertz 1975, Prakash 1999:157-158, Turnbull 2000:19, Aikenhead and Ogawa 2007:584). Even certain media such as textbooks, are responsible for erasing the context of knowledge: "such sources lay out knowledge as if it were context-free – a mode that collapses historical time in acquiring knowledge, elaborate taxonomies, and prizes coherence. It simulates a knowledge without knowers" (Barth 2000:2).

Academics studying knowledge systems strive to reveal the social processes and roles of knowledge holders that propel knowledge systems, and describing context is an important starting point. The context of a knowledge system includes the history of the culture, patterns of change, and "particular burdens from the past" (Agrawal 1995:421). Another element of context is space or location – Turnbull calls the context of a knowledge system a "knowledge space":

> though knowledge systems may differ in their epistemologies, methodologies, logics, cognitive structures or in their socio-economic contexts, a characteristic that they all share is their localness. However, knowledge is not simply local, it is located. It is both situated and situating. It has place and creates a space. An assemblage is made up of linked sites, people and activities; in a very important and profound sense, the creation of an assemblage is the creation of a knowledge space (2000:19).

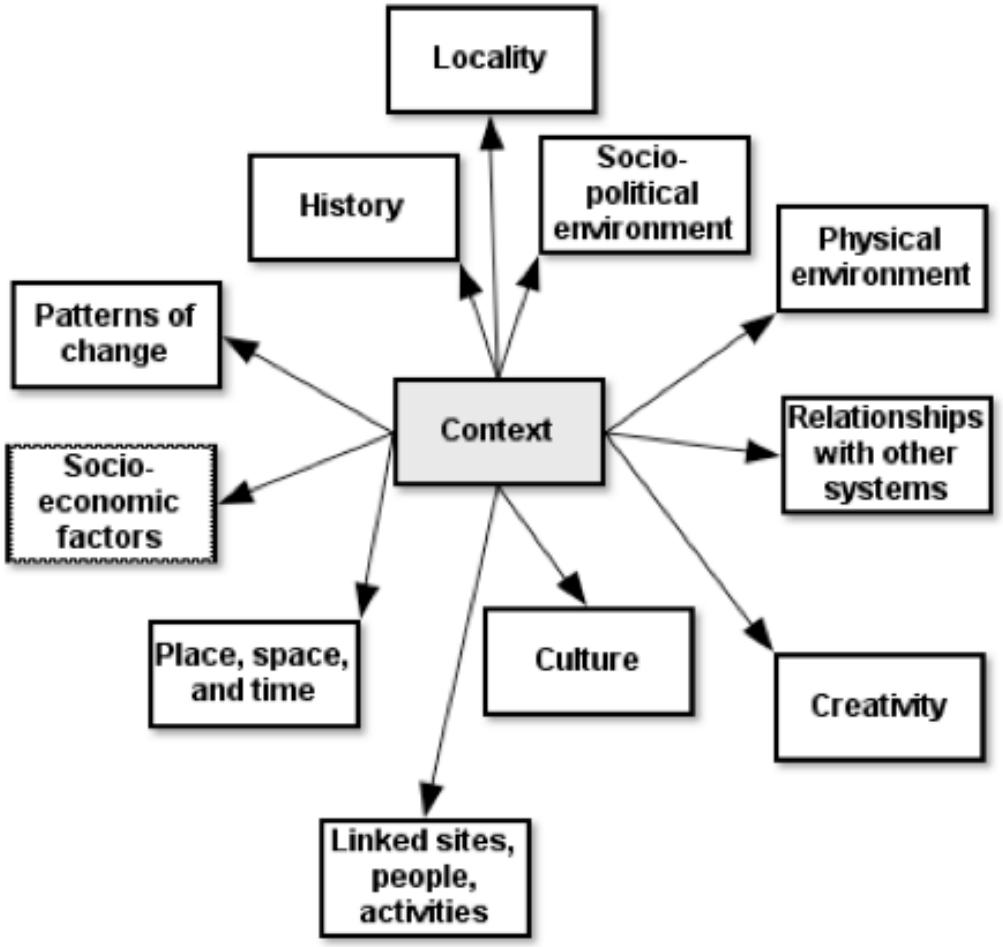
Here a number of aspects of context are described – location is the most prominent, but other aspects such as socio-economic influences, people and activities also factor in. The idea that knowledge is both situated and situating highlights the reciprocal relationship between knowledge and culture: the context of the culture affects how knowledge is developed and used, but the knowledge system also has effects on the culture at large. Sillitoe situates scientific discovery as a process which

> undeniably take[s] place and [is] interpreted within a certain sociocultural and historical context… which has largely been Euro-American capitalist society during the last two centuries that global science has emerged. Scientific research clearly does not take place in some sociopolitically neutral environment… Place, culture and time heavily inform it, particularly interpretation of scientific findings and the uses to which we put them (2007:13).

The broad social and cultural contexts of knowledge systems (comprised of a number of factors as mentioned above, as well as environment, creativity, and influence from other systems (Mwadime 1999)) provide us with a foundation upon which to understand how and why knowledge systems work in the ways that they do.

While many academics make use of context to explain the embedded social relations of cultural knowledge systems, there are others who pointedly choose not to do so. Vayda *et al.* (2004:38) insist that conceptualizations of social and cultural embeddedness are generally vague and do not contribute to the significance or utility of social research on cultural knowledge. I would argue that situating knowledge systems within their cultural context can be as productive or unproductive as one wishes to make it. Considering the elements of cultural context (Figure 2) when analyzing knowledge systems can shed light on important questions. Do the methods of a knowledge system reflect historical practices? Are knowledge holders with authority empowered in other ways (politically, economically, etc.)? Does a system's epistemology include metaphors about the natural environment? Innumerable questions could be posed about a knowledge system's context and that context's impact on the shape of the knowledge system.

Figure 2. Elements of a knowledge system's context, as identified in the sample body of texts



4.2.2.2 Interaction between knowledge systems

The other important sub-category of the core category "SITUATING" knowledge systems is the issue of interaction between knowledge systems. Early research on knowledge systems often characterize systems as either "open" or "closed" to new ideas from other systems, but more recent studies characterize a range of attitudes toward knowledge diffusion (Agrawal 1995:425). Barth asserts that in studying any knowledge system, one must consider the "relations of power that arise outside the local social setting: an environment of non-local others and their knowledge systems, practices, and strengths will always impinge on local worlds from the outside" (2000:4). While it is possible to examine a knowledge system (or the knowledge system concept, as Barth himself does) without

investigating relationships between knowledge systems, it must be acknowledged that no culture or cultural knowledge system exists in a vacuum.

Interactions between knowledge systems can range from rejection and disbelief to synthesis, integration, or assimilation. Berkes et al. (2000:1257) note that ecological knowledge diffusion has been observed by numerous scholars across diverse topics such as rangeland management, traditional fishing practices, and reef and lagoon tenure systems. But limitations to knowledge sharing can arise from a number of complications such as status differences or misunderstanding of bodies of knowledge (Ramana 2008:164); skepticism about data collection and the intentions of other peoples (Fabricus et al. 2006:168); or the need to invent or discover methods for mutual understanding (Bielawski 1996:226). The case of the Kadar community's response to competing medical systems illustrates a range of concerns and outcomes that arise from interactions between knowledge systems:

> Thus more than one type of medical system came into practice in the tribal universe. This new innovation created numerous problems in the Kadar community. The philosophy of practice of modern medicine was alien to them. The policy of government to uplift the health condition of tribals through the introduction of modern medicine has a number of good as well as bad impacts on the tribals. Many of them first rejected this new system of medicine. But with the passage of time, they have slowly started accepting it for the treatment of certain diseases. But the modern medicine often could not satisfy all their needs. So, most of the Kadar are now using the more efficacious elements of both systems of medicine. They select a particular kind of medicine according to the nature and seriousness of their illness (Ramana 2008:164).

Situating knowledge systems as mutable entities subject to influence from outside sources of knowledge complicates the task of delineating the social structures, processes, and epistemologies of cultural knowledge systems, but it certainly should lead to more realistic and representative analyses of cultural knowledge systems as they appear on the ground. Generally, consideration for context and interaction between knowledge systems adds a layer of depth and breadth to our understanding of what knowledge systems are.

4.2.3 Differentiating knowledge types and knowledge communities

4.2.3.1 Qualifying types and forms of knowledge

Different types of knowledge are attributed to cultural knowledge systems. In the sample body of literature, the most explicit and detailed discussion about the kinds of knowledge people possess is derived from Gurvitch's elaboration on types of knowledge and forms of knowledge (1971). Other texts in the sample do delineate types or attributes of knowledge, but they mostly fit within the scope of Gurvitch's models, so the terms "types" and "forms" will provide the basic language and nomenclature for this section (Figure 3).

Figure 3. Types and forms of knowledge derived from Gurvitch's (1971) model

Types of knowledge	Forms of knowledge
Perceptual	Mystical—Rational
Of social groups	Empirical—Conceptual
Common sense	Positive—Speculative
Technical	Symbolic—Concrete
Political	Collective—Individual
Scientific	
Philosophical	

Gurvitch's (1971) knowledge types include perceptual knowledge, knowledge about social groups (which he termed "knowledge of the Other, the We, groups, classes, and societies" (Gurvitch 1971:26) and is termed "self-other" knowledge elsewhere (Spindler 1999:467)), common sense knowledge, technical knowledge, political knowledge, scientific knowledge, and philosophical knowledge. These terms, or equivalents, are commonly employed in other texts within the sample of literature on knowledge systems, and a couple of these types require elaboration. Types of knowledge reflect different methods and contexts, and contribute to different bodies of knowledge. Gurvitch's conception of common sense knowledge as "a combination of knowledge of [social groups]; of perceptual knowledge[;] certain simple forms of technical knowledge – physical techniques; polite manners, and maintaining reserve and distance" (1971:27-28) is mirrored in Spindler's description of mundane knowledge

> The kind of knowledge that we use to get along in everyday situations: how to put on one's pants or one's brassiere, how to get through a revolving door… how to recognize a scam… It is the kind of knowledge that we use to get through the day and that we do not think about very much (1999:467).

As a type of knowledge, common or mundane knowledge represents the body of ideas and practices that we use on a regular basis to make choices about how to go about our lives. Although it is ever-present, common sense is hardly consistent across different cultures; more detail about theories of common sense knowledge is included later in the epistemic communities portion of this section.

Machlup (1980) puts forward a different set of types of knowledge: mundane knowledge, scientific knowledge, humanistic knowledge, social science knowledge, and artistic knowledge. But these categories do not appear to be as salient cross-culturally or as distinct as Gurvitch's types. Gurvitch's types encompass a range of bodies of knowledge, whereas Machlup's types focus on disciplines within Western formal education. But the artistic knowledge type does fill a gap in Gurvitch's formulation. Could technical knowledge include artistic skills such as woodworking, painting, or dance? I would argue alongside Machlup that artistic knowledge is a distinct style of knowledge.

Another type of knowledge that benefits from further explanation is knowledge about social groups. Gurvitch identifies knowledge about social groups as "real and verified by conscious judgment… one cannot imagine any social framework (microsocial, groupal, global) where this perception and knowledge would not be produced, because they are a constitutive element of social reality" (1971:26). A similar definition of self-other knowledge by Spindler emphasizes the self-reflective aspects of knowledge of social groups: "self-other cultural knowledge is something we use constantly to place ourselves in relation to others, and it directly affects our self-expression, as well as our feelings about ourselves" (1999:467). Knowledge about social groups allows an individual to construct conceptions of self, us, and other, and codifies behaviour in relation to those social groups.

Gurvitch's forms of knowledge describe dichotomies of characteristics that reflect how knowledge is gathered and qualified. The dichotomies represent poles of spectrums: mystical—rational, empirical—conceptual, positive—speculative, symbolic—concrete, and collective—individual (Gurvitch 1971). Other texts in the sample body of texts provide interpretations of a number of forms. The symbolic—concrete dichotomy is emphasized often to explain the distinction between literal and figurative data, information, and modes of explanation. Gurvitch distinguishes between symbolic

forms of knowledge that "tend to create concepts or schematic ideas of the contents" and concrete modes of explanation "in which contents clearly predominate over symbols" (Gurvitch 1971:40-41). Symbolic or abstract modes of knowledge differentiate the contents of knowledge from the organization and communication of that knowledge, so that "the most general propositions of the system pertain to principles or laws to be applied under hypothetical circumstances, rather than to concrete factual situations" (Richter 1972:47). An interesting example illustrates the usefulness of the symbolic—concrete dichotomy by explaining the oscillation between concrete and symbolic modes when building and testing scientific theory

> The distinction between myth and science is not structural, but procedural. Myth, in a narrow and derogatory sense, is the dogmatic application of constituent metaphors as literal truths. There is myth, in this sense, in all science. At the same time, no science can embrace the world except through the creative extension of metaphors to emergent experience. We rework our metaphors as our models address particular contexts of experience. Myths in a broader, paradigmatic sense are condensed expressions of root metaphors that reflect the genius of particular knowledge traditions" (Scott 1996:74).

The symbolic mode (here expressed as myth) is particularly important for communicating formulated theories by presenting them in metaphoric terms, whereas the concrete mode presents experiential knowledge that test the theoretical hypotheses. The forms of knowledge do not describe bodies of knowledge, but the processes and methods that characterize knowledge. Each mode dichotomy represents a dialectical relationship between different methods of knowledge production and communication.

The sample body of literature also points to additional forms that are not described by Gurvitch. I propose to add two further dichotomies, based on common features identified in the literature: informal—formal and tradition—invention. The informal—formal dichotomy describes the modes of knowledge transmission, or learning. Formal knowledge is communicated purposefully as knowledge (e.g. education) whereas informal knowledge is "unintentionally absorbed and distilled… what people have 'picked up,' without much effort" (Machlup 1980:60). But this distinction does not mean that formal knowledge is always explicit – as noted by Fabricus et al. (2006:174), 'expert opinions' of scientists and managers with formal training and authority are largely undocumented and difficult to explain except in informal terms. The distinctions between formal and informal knowledge are not absolute, and ultimately the rules of validity for both forms will correspond to the prescribed methods

and epistemology of a knowledge system (Fabricus et al. 2006:166). The other form dichotomy I would like to add, tradition—invention is very prominent in the sample body of literature. Traditional knowledge is widely discussed as a system of knowledge, but that interpretation is a much wider scope than the notion of a mode of knowledge. In this sense traditional knowledge is often compared with modern knowledge. But the value judgment of whose knowledge is considered 'traditional' and whose is knowledge is considered 'modern" does not provide us with a tool to understand the processes of knowledge systems. In a stricter sense, the mode of traditional knowledge is the passing down of knowledge from one generation to another over time (Castellano 2000:23). I propose to place invention in juxtaposition with tradition for the purpose of understanding modes of knowledge generation and communication. Invention, as a mode of knowledge, refers to the creation or discovery of novel information which then becomes integrated into the knowledge system. Overall, the sample body of texts adds a few contributions to Gurvitch's model of types and modes (Figure 4).

Figure 4. Types and forms of knowledge extended beyond Gurvitch's (1971) model

Types of knowledge	Forms of knowledge
Perceptual	Mystical—Rational
Of social groups	Empirical—Conceptual
Common sense	Positive—Speculative
Technical	Symbolic—Concrete
Political	Collective—Individual
Scientific	Informal—Formal
Philosophical	Tradition—Invention
Artistic	

An important distinction to take away from the differentiation of knowledge types and forms is that while certain types and forms may tend to occur together, these groupings are not universal: types do not entail particular forms, and forms do not entail particular types. Moreover, the forms and types of knowledge observed within a knowledge system cannot be extrapolated to characterize the knowledge system as a whole (Gurvitch 1971:41). A knowledge system itself is not completely symbolic, for example. It may be the case that concrete forms of knowledge carry less prestige, or are only considered valid evidence in certain cases, or simply are not emphasized in discussions about

knowledge. In any of these cases, a knowledge system is not without concrete knowledge. Where the distinctions of type and form are valuable for understanding knowledge systems is for comparing knowledge across cultural systems and between groups of people who participate in overlapping or sub-systems. I propose that the application of knowledge types and forms in a consistent way has the potential to clarify a scholar's observations about knowledge systems. For instance, using matrices of knowledge types and forms (see Appendices II and III for two prototypes) when observing knowledge practices or analyzing interview transcripts could ease the burden of describing or qualifying observations. The language or nomenclature of knowledge types and forms has the potential to help us understand the boundaries of bodies of knowledge and the relationships between epistemic communities.

4.2.3.2 Epistemic communities

In the sample body of literature, the term epistemic community is coined by Holzner and Marx (1979) but is not used by any other scholars. Epistemic communities are

> knowledge-oriented work communities in which cultural standards and social arrangements interpenetrate around a primary commitment to epistemic criteria in knowledge production and application… Any special way of knowing, whose development and elaboration requires the establishment of an autonomous social space, will tend toward the structure of an epistemic community (Holzner and Marx 1979:108-109).

Thus, a knowledge system itself could constitute an epistemic community, but it could also contain a number of interrelated epistemic communities.

Many texts in the sample do describe interrelated epistemic communities of a knowledge system without using the specific term. Mwadime (1999:252) identifies three bodies of knowledge: common knowledge that is held by most or all members of society; shared knowledge that belongs to or is used mainly by a particular group; and specialized knowledge that is held by skilled people of a certain profession. Other distinctions between individuals and groups (such as age, gender, education, occupation, class, and personal aptitude and ability) can determine or affect the bodies of knowledge to which one may have access or claim authority (Howes and Chambers 1980:334, Mathias 1996:10). The notion of an epistemic community leads us to question how knowledge flows across communities. Barth recognizes three questions about the social distribution of knowledge:

> the nature of subdivisions in the total body of what people know, that is, the separate branches of knowledge that coexist in the population; the degree of standardization and sharing of knowledge that is produced within each branch; and the form and degree of ideational precision, coherence, and generality that is developed and maintained in each branch (Barth 2000: 6).

These questions can be parsed down. What are the epistemic communities of a knowledge system? To what extent is knowledge shared and consistent within and across epistemic communities? How is an epistemic community's body of knowledge constructed and what form does it take? These parameters of inquiry are important ones. Knowing the specifics about epistemic communities and how they relate to one another gives insight on how social structures and relations are associated with the methods and processes of knowledge creation and application.

As an in vivo code, the category epistemic community became very useful for grouping all of the data in the sample body of text regarding the variability of knowledge across a knowledge system. Three categories of epistemic communities emerged from the sample body of literature: people with common sense, people with expert or specialized knowledge, and people with wisdom. Here I will outline some of the features of common sense to illustrate how the epistemic community concept may be used in knowledge system research. Although I found strong findings for specialized/expert knowledge and wisdom to be analyzed as epistemic communities, for brevity's sake I will only detail one illustration of the concept.

Common sense is both a body of knowledge and a community of individuals within a knowledge system who share that body of knowledge. Yet, common knowledge could be considered the antithesis of a knowledge community, since it does not immediately present the hallmarks of purposeful social organization; indeed, the most salient feature of common sense is that it is obvious and arrived at through mere experience (Geertz 1975:7). Geertz's (1975) "Common Sense as a Cultural System" is an analysis of common sense knowledge that describes people within a culture sharing common sense as an epistemic community. Geertz identifies five (although concedes that they are probably more) "stylistic features" of common sense: naturalness, practicalness, thinness, immethodicalness, and accessibleness.

All of Geertz's features represent the social structures, processes, and epistemology shaping the common sense epistemic community. Naturalness in common sense represents the idea that common sense is derived from perceptions of reality, "an air of 'of-courseness,' a sense of 'it figures'… [and]

intrinsic aspects of reality" (Geertz 1975:18). The authority of common sense comes from its claim to knowledge of reality. The feature of practicalness speaks not only to pragmatic knowledge but to the rationality of common sense actions – "to tell someone, 'be sensible,' is less to tell him to cling to the utilitarian, as to tell him, as we say, to wise up: to be prudent, level headed, keep his eye on the ball" etc. (Geertz 1975:20). Judgments of practicality indicate what kinds of knowledge are worth knowing and what applications of knowledge are useful, according to the epistemic community. Thinness refers to the simplicity of common sense knowledge (Geertz 1975:22) – the communication of common sense should not require elaborate theories or intricate stories, but should be easily conveyed from one person to another. Immethodicalness refers to the lack of consistency in the discovery and application of common sense. Geertz calls common sense "shamelessly and unapologetically ad hoc. It comes in epigrams, proverbs, obiter dicta, jokes, anecdotes," etc. (Geertz 1975:23). There is no prescribed method for obtaining common sense. The feature of accessibleness refers to the inclusivity of the epistemic community. Common sense has no experts; "everyone thinks he's an expert. Being common, common sense is open to all" (Geertz 1975:24). The epistemic community is loosely structured – anyone within a given knowledge system, society, or culture has the potential to possess common knowledge. Geertz's characterization of common sense correlates with many of the questions Barth posed and I rephrased (Figure 5). The common sense epistemic community is inclusive, extensively shares knowledge (but that knowledge is not consistent), and draws information from direct experience, though not by any prescribed methods.

Figure 5. Geertz's theory of common sense as an illustration of the epistemic community concept

An epistemic community…	Common sense is…
Is a separate branch of knowledge	Derived from "natural" perceptions of reality
May standardize its knowledge	"Practical" – both pragmatic and rational
May share knowledge across other branches	"Accessible" to all
Constructs a body of knowledge	Created through "immethodical" means
Forms knowledge	"Thin" – simple to communicate and understand

Using the epistemic community concept as an aspect of understanding knowledge systems has the potential to refine analyses and create a common framework and language for research and scholarship. Admittedly, Holzner and Marx (1979) confine the use of the epistemic community concept to postmodern, industrial society; however, I do not see why this concept should be limited to describing Western professions. In many cases the scholarly research on knowledge holders and their bodies of knowledge (e.g. traditional ecological knowledge and wisdom (TEKW) practitioners, ethnomedicine, resource users such as fishers' knowledge, and multicultural science) create analyses that mirror an epistemic community approach (see Corsiglia 2006, Ramana 2008, Lauer and Aswani 2009, and Aikenhead and Ogawa 2007 for examples from above). Indeed, I am not proposing a new approach to research, but a new concept or label with which to situate already prominent methods of describing knowledge systems.

4.2.4 Theorizing system components and their interrelationships

The creation of the core category "THEORIZING" system components and their interrelationships emerged from a popular trend in the literature to talk about the important "faces" (Barth 2000),

"dimensions" (Agrawal 1995), "elements" (Roling and Jiggins 1998), "webs of pathways" (Holzner and Marx 1979:219) or the "complex" (Berkes *et al.* 2000, Berkes 2008) of a knowledge system. The curiously analogous metaphors for the components of knowledge systems, and the consistency among authors to name some combination of the following five structures: substantive body, epistemology, medium, methodology, and social structure as necessary components of a knowledge system led me to synthesize the "THEORIZING" core category and its cluster of sub-categories.

Many texts in the sample body of literature explicitly name the components of a knowledge system and emphasize the interrelatedness of those components. The five necessary components of knowledge systems were uncovered through the coding of categories throughout the open and selective coding phases of research. For example, the category "substantive body" emerged from a number of similar *in vivo* codes such as "body of knowledge," "substantive corpus," and "content." Explanations for each component's inclusion in the cluster of categories and examples of its use in the sample body of literature appear in later sections of this chapter.

Overall, while no single text outlines all five of the knowledge system components that I identified, many texts contain comparable descriptions of two, three, or four of the components. To illustrate, here is an excerpt from Kapoor:

> three terms are closely connected in all discussions of knowledge [in India] – darsana, jnana and vidya. Darsana, philosophy is the 'system,' the point of view, which yields/leads to jnana, knowledge. When knowledge gathered about a particular domain is organized and systematized for purposes of, say, reflection and pedagogy, it is called vidya, 'discipline.' The entire body of organized knowledge is divided into two sets in the Mundakopanisad – para vidya and apara vidya (2005:11-12).

In the excerpt, Kapoor identifies the philosophy of knowledge (epistemology), the organization of knowledge into disciplines (social structure), the body of knowledge (substantive body), and the medium of the Mundakopanisad (medium). In cases such as this, scholars are specifically defining and explaining the components of a knowledge system and how they relate to one another. Texts from the sample body of literature with explicit discussions of the five knowledge system components appear in Figure 6.

Figure 6. Texts (organized by year of publication and author(s)) that explicitly discuss the five knowledge system components (substantive body, methodology, medium, epistemology, and social structure)

Text		Knowledge system components				
Year	Author(s)	Substantive body	Methodology	Medium	Epistemology	Social structure
1979	Holzner and Marx	X	X	X		X
1994	Stehr	X		X		X
1994	Swidler and Arditi			X		X
1995	Agrawal	X	X		X	
1998	Roling and Jiggins		X			X
2000	Barth	X		X		X
2005	Kapoor	X		X	X	X
2007	Aikenhead and Ogawa	X	X		X	
2008	Berkes	X			X	X

But many sources in the literature do not classify or define components in a direct way. When this was the case during the research process I selectively coded texts for examples of instances where one or more of the knowledge system components were implicitly included in the text. To give an example, here is an excerpt from Roling and Jiggins description of the ecological agriculture knowledge system, which I coded under the category "epistemology":

> the nature of the ecologically sound practices makes special demands on learning, which, in turn, places special demands on facilitation, institutional support and a conducive policy context. The ecological knowledge system is fundamentally different from a knowledge system to support conventional agriculture (Roling and Jiggins 1998:304).

Although the subject of the quotation is ecologically sound practice (method), the implication of the statement is that the philosophy of the system – to create, implement, and improve ecologically sound agriculture – is the real force behind the special demands on learning, facilitation, support, etc. that the ecological agriculture knowledge system faces. Quotations such as this one inform us of the nuances of and connections between the knowledge system components in a way that more structural and functional overviews of components do not.

One case that differs from the rest is Agrawal's (1995) distinction of the "chief dimensions" of knowledge systems. Agrawal asserts that the academic literature dichotomizes indigenous and western knowledge systems along three lines of criteria: substantive, methodological and epistemological, and contextual criteria (1995:418). While Agrawal's critique of the literature's trend toward polarizing indigenous and western knowledge systems is very convincing, I do not think that

the dimensions he identified are inherently privileging or biased. The knowledge system components identified (substantive bodies of knowledge, methods, and epistemology), along with the more general principle context, can help us to describe, analyze, and better understand particular knowledge systems and the knowledge system concept more generally.

The question of relatedness between knowledge system components and processes is often integrated into discussions of knowledge system structures (e.g. Holzner and Marx 1979, Kapoor 2005, Berkes 2008); indeed, the moniker "system" implies connection. However, the most explicit claim to interrelation between knowledge system components is put forward by Barth:

> my thesis is that these three faces of knowledge appear together precisely in the particulars of action in every event of the application of knowledge, in every transaction in knowledge, in every performance. Their mutual determination takes place at those specific moments when a particular item of substantive knowledge is cast in a particular communicative medium and applied in an action by an actor positioned in a particular social organization: their systematic interdependence arises by virtue of the constraints in realization that these three aspects impose on each other in the context of every particular application (2000:3).

Presenting the knowledge system concept as a complex of attributes, a web of pathways, or composed of different faces, dimensions, aspects, etc. are all visual and tactile metaphors imploring us to think about a knowledge system as a whole composed of many related parts. While Barth insists that this conceptual metaphor is not an invitation "to take a highly generalized abstract unity… and then progressively break each of these parts down further till we finally arrive at the level of particular human actions" (2000:3), I propose my own metaphor for the analysis of knowledge system components, that of the zooming lens. In order to examine each of the five components special qualities, we must focus our gaze in on them, knowing that beyond our view lie other components, their relationships with one another, and the entire concept as a whole. By oscillating my analytic lens between specificity and generality, I hope that my analysis of knowledge system components does not break the components down into their respective parts, but instead gives snapshots of the specificities that cumulate into a full depiction of the knowledge system components.

4.2.4.1 Substantive body

Probably the most evident component of a knowledge system, the substantive body represents the content of a system: what people actually know. As noted by Stehr, "knowing is a relation to things and facts, but also to rules, laws and programs. Some sort of participation is therefore constitutive for knowing: knowing things, rules, programs, facts is 'appropriating' them in some sense, including them into our field of orientation and competence" (Stehr 1994:93). A body of knowledge is not comprised solely of a knowledge of things, but also of a knowledge of people and the ways things are done. A quotation from one of the sample texts provides a good example:

> fishers have knowledge on fishing sites that they do not use - or rather knowledge that they use for other purposes than fishing. They use this knowledge to maintain social relations in the group of fishers. Thus, knowledge of people is as important for organizing fishing options as is knowledge of fish (Maurstad 2001:161).

The substantive body of a knowledge system includes an understanding of the social conditions of knowledge use and application. A body of knowledge is constructed from within a social domain, and the content of a knowledge system will reflect the epistemic communities, methods of production and communication, and philosophies of knowledge that make up the other dimensions of the knowledge system (Holzner and Marx 1979:218).

As I noted in chapter one, a number of scholars have observed that academics have typically focused on researching the contents of cultural knowledge systems. Many studies have described the variety of types of knowledge that make up the substantive bodies of cultural knowledge systems. From within the sample body of texts, Barnhardt and Kawagley detail the substantive body of indigenous ecological knowledge: "they have studied and know a great deal about the flora and fauna, and they have their own classification systems and versions of meteorology, physics, chemistry, earth science, astronomy, botany, pharmacology, psychology… and the sacred" (2005:11). Similarly, Berkes asserts that traditional ecological knowledge is composed of "local and empirical knowledge of animals, plants, soils, and landscape. This level of knowledge includes information on species identification and taxonomy, life histories, distributions, and behaviour" (2008:17). The substantive body of a cultural knowledge system is often easily accepted cross-culturally (Berkes 2008:17), which is not surprising given that so much of the academic literature has focused on translating bodies of cultural knowledge. The substantive component of a knowledge system answers the

question “what do you know?” whereas the other four components answer questions like “how do you know?” and “who has the authority to know?” or “why is this important to know?”

4.2.4.2 Methodology

The methods described in the sample body of texts concern two major processes in a knowledge system: learning new knowledge and teaching existing knowledge. Since the sample body of literature was selected to include texts on agricultural, medical, and ecological knowledge systems, the methods of learning and teaching detailed within the sample tend to focus on only a few methods: learning by empirical observation and experimentation and teaching by demonstration and apprenticeship.

Nonetheless, examples selected from the sample body of texts give us an idea about the methods component’s place within a knowledge system. Diachronic observation (study over a long period of time) and a variety of forms of experimentation (trial and error, scientific testing of predictions, etc.) dominate discussions of methods. Aikenhead and Ogawa outline an excellent summary of the roles of the scientific method and observation in Eurocentric sciences:

> hypotheses stand or fall on their predictability. When the predictability of a law or theory is challenged by anomalous evidence, a paradigm’s acceptability is threatened. In addition to experimental studies, however, descriptive research studies contribute systematic knowledge to Eurocentric sciences, in some paradigms more than others (Aikenhead and Ogawa 2007:547).

The methods of experimentation and observation are integral to the production of new knowledge in Eurocentric science knowledge systems. Moreover, the qualification of predictive validity for scientific methods indicates the relationship between the methods and epistemology components of Eurocentric sciences. Howes and Chambers name a few other methods: indigenous technical knowledge “cannot be understood independently of the ways in which it changes. Apart from assimilation and synthesis or hybridization [with other peoples’ knowledge], the basic process of accumulation is, as with scientific knowledge, through experiment” (1980:331). Interactions between knowledge systems account for a large portion of new knowledge in a system, and knowledge diffusion can occur through many different methods.

The methods of teaching represented in the literature most often are related to experience, demonstration, and apprenticeship. Indigenous traditional education has been characterized as based in observation, demonstration, and storytelling (Barnhardt and Kawagley 2005:10). Traditional forms of knowledge are taught through "mechanisms for the intergenerational transmission of knowledge [that] are embedded in social systems" (Berkes *et al.* 2000:1257). An interesting illustration of a knowledge system's incorporation of learning and teaching methods is Berkes *et al.*'s description of *milpa* shifting cultivation:

> *milpa* [is] a 'cultural script,' an internalized plan consisting of a series of routine steps with alternative subroutines, decision nodes, and room for experimentation. Ecological knowledge is encoded in the local variation of the *milpa* script, derived from experiences and experiments of farmers over generations (Berkes et al. 2000:1258-1259).

The *milpa* script is embedded with conventional knowledge, so that that knowledge is passed on from season to season and farmer to farmer, yet it also promotes innovation and the incorporation of new observations.

The methods of creating new knowledge and teaching knowledge to others are variable, but they are invariably related to the other components of the knowledge system. The bodies of knowledge to be generated or taught may be best recorded or communicated in a particular medium, or it may be best preserved in a number of different media, depending on the area of application or epistemic community using it.

4.2.4.3 Medium

The medium component of a knowledge system is the vehicle for the processes of knowledge organization, memory, and communication (Holzner and Marx 1979:220-221). Symbolic representation of knowledge allows for shared learning:

> symbolic representation of the content of knowledge eliminates the necessity to get into direct contact with the things themselves… The social significance of language, writing, printing, data storage, etc. is that they represent knowledge symbolically or provide the possibility of objectified knowledge (Stehr 1994:93).

An array of media is attributed to cultural knowledge systems in the sample body of literature: stories, songs, prayers, dances, spiritual ceremonies, drama, proverbs, jokes, poetry (Aikenhead and Ogawa 2007), natural symbols, analogies, rituals (Barth 2000:5), academic conferences, professional meetings, textbooks, journals, newspapers, and television (Holzner and Marx 1979:221) are all media for knowledge, and this list gives us an idea of the range of media that knowledge systems use to communicate different bodies of knowledge.

4.2.4.4 Epistemology

The philosophical underpinnings of a knowledge system indicate how cultural values and worldview affect the system's interpretation of truth, authority, and validity. Texts from the sample body of literature often reference the connection between broad cultural values and specific methods or substantive knowledge. Sillitoe asserts "all cultures accumulate and interpret knowledge rationally according to their value codes, although until we appreciate the latter it may seem otherwise" (2007:3). It is possible to comprehend cultural knowledge without an appreciation of the system's epistemology, but it is more likely that the justification for or importance of cultural knowledge will be lost on someone who does not understand the rationality underlying that knowledge. Every knowledge system contains "rational constraints" that maintain logical consistency and internal coherence, and "empirical constraints" that develop factual plausibility, or explanation for accepted facts (Richter 1972:44).

The constraints on knowledge are based in the values and worldview of a culture, which shape peoples' perceptions and give meaning to their observations; "the concepts supplied by our conceptual order, the worldview, invariably provide the interpretation of our observations of the world around us. [Worldview] includes religion, ethics, and more generally, belief systems" (Berkes 2008:18). The legitimacy of knowledge can be dependent on cultural values. Purcell claims that Western knowledge gains legitimacy if it "carries the attributes of incontrovertibility (although at times probabilistic rather than absolute), objectivity, rationality, testability, and finally, the bedrock of positivist legitimacy, replicability or verifiability" (Purcell 1998:258-259). All of these qualifications for the methods and body of Western knowledge reflect a positivist view of knowledge that values the scientific method. Similarly, Aikenhead and Ogawa note that Eurocentric sciences have an idealized "value aspiration" for universality that is deconstructed and reconstructed according to the context of

science-in-action (2007:548). The universality concept is integral to the operation of science, even though it represents an idealized and unattainable characteristic.

For Eurocentric sciences, universality could be considered a root metaphor, which is coined by Scott to be "situationally elaborated in the course of practical engagement with the world, [and informs] rational explanation and the effective organization of empirical experience" (1996:85). Root metaphors are paradigms for knowledge that integrate literal and figurative, and moral and technical aspects of knowledge (Scott 1996:74). Apffel Marglin's analysis of different medical "modes of thought" concerning small pox in India provides an excellent example of the root metaphor concept:

> the logocentric view of smallpox rests on a particular strand in biomedicine which is based on the assumption of a single necessary and sufficient cause for each disease. It is a strand which was much reinforced by the discovery of the germ theory of disease and which leads to the logic of eradication... This strand competes with another one in epidemiology, medical ecology. Medical ecology is in fact much closer to the [indigenous Indian] non-logocentric mode of thought… In this area of biomedicine there is no clear boundary between health and disease, no exclusive dichotomy. In such a view disease is a process of interaction and adaptation between a host and its environment. Such a view is critical of eradication and instead proposes prevention and control as public health measures (Apffel Marglin 1990:103).

The metaphors for disease created by germ theory and medical ecology entail both the explanation for disease and the appropriate treatment of disease. As a root metaphor, a conception of disease informs a medical knowledge system; it frames the observer's experience, how knowledge is organized and implemented, and relates to the wider values and worldview of a culture.

4.2.4.5 Social structure

In a sense, social structure subsumes all of the other necessary components, and is illustrated, in part, throughout the descriptions of the other components. But it is possible to address the organization of knowledge systems without confounding the social structure of knowledge with its other aspects. Knowledge production and use

> require appropriate social institutions, sets of rules-in-use, norms and codes of social relationships. For a group of interdependent hunters, fishers, or agriculturalists to function effectively, there has to be a social organization for coordination, cooperation, and rule-making...

> Social institutions may include *institutions of knowledge* that frame the processes of social memory, creativity, and learning (Berkes 2008:17-18).

The social organization of a knowledge system includes a variety of components: actors who take roles as authority figures, practitioners, and clients; institutions for training and appointing roles; and the processes of teaching, applying, and changing bodies of knowledge (Barth 2000:6). The social organization of cultural knowledge represents "a hierarchy that proceeds from [bodies of knowledge] to social institutions, to mechanisms for cultural internalization... Institutions, in the sense of rules-in-use, provide the means by which societies can act on their local knowledge" (Berkes *et al.* 2000:1256). Social institutions are critical for the application of knowledge, one example being natural resource management:

> the coordination of appropriate resource use practices is often entrusted with traditional leaders. For example, the collective leadership of stewards of different hunting areas is the key common-property resource management institution among the Cree. A hunting leader may act as the steward of resources on behalf of the community, as well as a social leader (Berkes *et al.* 2000:1258).

The social structures that maintain a knowledge system also maintain other systems, such as resource management systems, and it is not surprising that authority in knowledge co-exists with authority in other areas; "it seems reasonable to believe that the authoritativeness of knowledge is grounded in patterns of social authority. To have authoritative knowledge is to have an institution, group, or person which can settle disputes and establish truth" (Swidler and Arditi 1994:311).

In many ways, the description of the epistemic community concept appearing earlier in this chapter outlines the importance of social structure as it is presented in the sample body of texts. The organization of knowledge in society relates to a number of questions: how is knowledge legitimized, and by whom? When is common knowledge applied versus when is specialized or expert knowledge applied? What institutions promote the creation of new knowledge, or the preservation of old knowledge? Social structure is the foundation for all analyses of cultural knowledge systems.

4.2.5 Creating a framework for cultural knowledge systems studies

The preceding brief descriptions of the five necessary components of a knowledge system are certainly not comprehensive – to fully explore even one of these structures would constitute a whole

other research project. I have merely identified them within the sample body of literature and contend that they are essential components of any cultural knowledge system. Thinking about a knowledge system in terms of its interrelated substantive corpus, methods, media, epistemology, and social structure enables researchers to know what kinds of questions to ask about a knowledge system. For instance, if the aim of a research project is to understand a community's methods of teaching, it may not be *as* important to ask detailed questions about bodies of knowledge until you have already inquired about the media of knowledge communication and the social structures of education programs. Using the necessary components of a knowledge system as a framework for understanding the connections between different areas of inquiry can help clarify the directions to take in acquiring observations and in analyzing the data as well.

Overall, the three core categories "SITUATING" knowledge systems, "DIFFERENTIATING" knowledge types and knowledge communities, and "THEORIZING" system components and their interrelationships represent the major trends I found in the literature sample surrounding knowledge system epistemologies, processes and structures, and academic language. Essentially, I compiled the best practices within the sample in hope of distilling a distinct language and theory for future research on cultural knowledge systems. In the final fifth chapter, I will summarize the conclusions from the cultural knowledge systems project and make suggestions for future research.

Chapter 5: Conclusions about the knowledge system framework and its contribution to prospective research

5.1 What has been learned from the cultural knowledge systems project?

While cultural knowledge systems have been popular subjects for academic research, the rigour of those research projects in investigating knowledge system processes, structures, and epistemologies has been questioned. In fact, there exists no definitive explanation in the literature as to what, specifically, a cultural knowledge system is. The state of the social science literature led to two major research questions: "to what extent are knowledge system processes, structures, and epistemologies already addressed in the academic literature?" and "can individual texts contribute ideas which may be synthesized to create a more comprehensive understanding of the knowledge system concept?"

The methodology I found to be useful in addressing these research questions was grounded theory. In generating a theoretical sample, identifying categories through open and selective coding, and relating categories to one another, I ultimately developed three core categories that characterize the sample body of literature's implicit theory of knowledge system processes, structures, and epistemologies. The academic literature is not without deeply analytical writings on the knowledge system concept – the texts included in the theoretical sample are proof of that; however, these works do not provide consistent uses of language and terminology nor explicit explanations of the analytical process of investigating a knowledge system. These findings certainly justify the task of synthesizing a comprehensive understanding of the knowledge system concept, a task which was embarked upon in chapter 4, and briefly summarized hence.

The sample body of texts shows little consistency in the language used by different scholars. The example mentioned in chapter 4, the category "substantive body" emerged from a number of similar *in vivo* codes such as "body of knowledge," "substantive corpus," and "content." This case is not particularly problematic, since the terms are all fairly synonymous, but other terms like epistemic community and root metaphor have the potential to demarcate specific language for trends in the literature that, until now, have largely been talked around, but not easily compared across texts because of inconsistent language use. The identification of unproductive and productive terminology in the literature not only recognizes the en vogue language of academia in a given discipline or time

period, but has the potential to prevent powerful, analytic terms from relegation to self-evident buzzwords through ambiguous misapplication.

What I believe to be the main contribution of this research project is the suite of core categories synthesized to present the major analytical processes reflected in academic works on knowledge systems, as they have appeared in the sample body of literature. The active terms situating, differentiating, and theorizing represent the work that academics do when they analyze cultural knowledge systems for their social processes, structures, and epistemologies. The academic practice of situating knowledge reflects contextualizing knowledge systems as part of wider cultural systems, and as relating to other knowledge systems. The practice of differentiating knowledge is useful for specifying the qualities of knowledge – what it looks like and how it reproduces the methods of acquisition and the epistemology of rationality or validity – and is also useful for determining whose epistemic community is involved in producing, maintaining, and legitimizing knowledge. When academics have theorized about knowledge systems, they have realised (collectively) the structural components necessary within any cultural knowledge system. Hopefully, the suite of core categories that has emerged from this research project represents the best practices of academics in the literature, and could be used not only for retrospective analyses of academic work but also serve as a framework for future research on cultural knowledge systems.

5.2 Criteria for successful grounded theory studies

The ultimate goal of theory building with grounded theory methodology is to reach the point of theoretical saturation – the point at which no more data collection is necessary, "no further conceptualization of the data is required," and no new concepts, categories, or relationships are emerging from data analysis (Dey 1999:8). I would not venture to assume that this research project has come to the point of theoretical saturation. I mentioned in chapter 3 that the sample body of texts was directed toward specific areas of the academic literature (theories of knowledge systems, and agricultural, medical, and ecological knowledge systems) and I also mentioned that other areas of the literature await further analysis. Also, a more developed understanding of the necessary components of knowledge systems could definitely be produced using observations about the literature sample I

did select; however, I think this task would be better served if each component was looked at individually and more specifically over a larger cross-section of literature.

But theoretical saturation is not the only measure for grounded theory work. Charmaz cites four criteria for successful grounded theory studies: credibility, originality, resonance, and usefulness (Charmaz 2006:182-183). In terms of credibility, I have taken great care to make claims about the literature that are in line with the limited number and range of texts included in the sample, and to ensure that the arguments and analyses I have put forward are strongly supported by the data, and illustrated with ample quotations and diagrams. The originality of the research project should be very strong – not only were the research questions based on issues raised in the literature, but also the iterative grounded theory sampling process should have revealed any published works with similar objectives, and none were found. The findings of the cultural knowledge systems project refine the knowledge system concept, and synthesize the distinct but compatible theoretical conclusions of a variety of texts. The findings presented for the project resonate deeply with the observations made about the texts individually, about relationships between texts, and across the body of texts as a whole, so the study experience should be well portrayed. Hopefully, the work will prove to resonate with academics who have studied cultural knowledge, and become useful to them in the future. The knowledge system framework, comprised of the suite of core categories found in the literature, represents the best practices found in the sample body of literature; also, the grounded theory methodology lent itself to producing a purposeful language and revealing interconnections drawn between the knowledge system processes, structures, and epistemology. Overall, the integrity of the cultural knowledge systems project depends upon validation through future exploration of the findings in new avenues of research.

5.3 Future research: testing the knowledge system framework

One of Charmaz's qualifications for resonance is a consideration for the emergent theory's ability to fuel new research. The construction of the cultural knowledge system framework detailed in the previous chapters represents the inductive "discovery phase" (Bernard 2000:493) of the grounded theory methodology; a theoretical model was developed using the data collected from the sample body of texts. The deductive "confirmatory phase" (Bernard 2000:493), where the utility of the

framework is tested, goes beyond the scope of the cultural knowledge systems project. In fact, it has been argued that verification is not a part of grounded theory, but requires a completely different, though complimentary, methodology (Dey 1999:20). As such, I would like to consider here what impact the cultural knowledge systems project could have on future scholarship.

Essentially, researchers hoping to conduct future studies on knowledge systems can ensure that their work examines the structural, procedural, and epistemic aspects of knowledge systems by performing the three practices depicted by the three core categories I identified within the literature. Executing research that (1) situates the system within its cultural context, (2) differentiates the types of knowledge and epistemic communities that exist within the system, and (3) theorizes how the essential components of that knowledge system interact, would result in the kind of research that academics and policymakers need to really understand cultural knowledge systems as socio-cultural institutions. By examining a system with all of these approaches, future researchers will draw upon the techniques and terminology – essentially, the best practices – that I have identified in the academic literature. Operationalizing these approaches by asking questions like "How do cultural values impact what knowledge is important?" or "Do different groups of knowledge holders have exclusive access to some methods or bodies of knowledge?" and "How are the media of knowledge transmission related to methods of knowledge acquisition and application?" leads to research that describes cultural knowledge systems with specific attention to the social nature of knowledge. Hopefully, this kind of work will replace the sweeping, generalizing characterizations of knowledge systems that continue to be produced, even though they are consistently criticized for being imprecise and oversimplifying peoples ways of knowing.

One of the main incentives for undertaking the cultural knowledge systems project was to address Barth's request for an anthropological study of knowledge that concentrates on "general insights, language, and concepts" (2000:2) and the development of a "framework of concepts and questions with which to explore the comparative ethnography of knowledge" and indicates that the first necessary step in doing so is an attempt to "lay out how these traditions of knowledge are configured and how they are variously reproduced and changed" (2000:3). The cultural knowledge system project's approach to studying knowledge systems via academic elaboration represents that first step. Equipped with a refined lexicon and a framework of categories representing the academic practices of situating, differentiating, and theorizing cultural knowledge, anthropologists and other academics studying knowledge systems may adopt a common theory of the knowledge system concept which is

more explicit than is currently available in the literature. In this way, the cultural knowledge system project may also contribute to the areas of improvement suggested by Nakata – meta-knowledge and a schema for explaining and uncovering the social aspects of knowledge systems (2002:286-287). Academics may better communicate with one another, and play the part of mediator or participant in cross-cultural co-production of knowledge – an improvement that is widely needed and encouraged in the literature. The cultural knowledge system project has endeavoured to address a few issues and questions brought forward by scholars, synthesize and sharpen the use of the knowledge system concept within academic literature, and provide a refined version of the academic language. The greatest possible success for the project would be to have an impact on future scholarship on cultural knowledge systems.

Appendix A

Texts included in the sample body of literature

Year	Author	Discipline(s) or Subject Area	Knowledge System Described	Edited volumes
1971	Gurvitch	Sociology	Social frameworks of knowledge	
1972	Richter	Sociology	Science	
1975	Geertz	Anthropology	Common sense	
1979	Holzner and Marx	Sociology	Knowledge systems, post-modern knowledge systems	
1979	Kleinman	Social/Cross-cultural Psychiatry	medical knowledge systems	
1979	Keesing	Anthropology	Linguistic knowledge, Cultural knowledge	
1980	Howes and Chambers	Development	Indigenous technical knowledge	in Brokensha et al. (1980)
1980	Machlup	Economics	Knowledge (non-specified)	
1990	Apffel Marglin	Development	Western medicine, non-Modern Indian medicines	in Apffel Marglin and Marglin (1990)
1991	Bebbington	Geography	Indigenous agricultural knowledge systems	
1993	Gadgil et al.	Biodiversity Conservation	Indigenous knowledge, Modern science	
1994	Stehr	Sociology	Science	
1994	Swidler and Arditi	Sociology	knowledge systems	
1995	Agrawal	Development	Indigenous knowledge, Western knowledge	
1995	Alcorn	Development	Ethnobotanical knowledge systems	in Warren et al. (1995)
1996	Scott	Anthropology	James Bay Cree science	in Nader (1996)
1996	Bielawski	Anthropology	Inuit indigenous knowledge, Arctic science	in Nader (1996)
1996	Mathias	Development	Indigenous knowledge	
1997	Pelto and Pelto	Anthropology	cultural knowledge, ethnomedicine	
1998	Purcell	Anthropology	Indigenous knowledge	
1998	Roling and Jiggins	Rural Sociology/Human Ecology	Ecological (farming) knowledge system	in Roling and Wagemakers (1998)
1999	Spindler	Anthropology/Education	cultural knowledge	
1999	Prakash	Education	Science	in Semali and Kincheloe (1999)
1999	Mwadime	Agriculture/Applied Human Nutrition	African indigenous knowledge	in Semali and Kincheloe (1999)
2000	Barth	Anthropology	cultural knowledge	
2000	Berkes et al.	Applied Ecology	traditional ecological knowledge	
2000	Castellano	Native studies	Aboriginal knowledge traditions	in Dei et al. (2000)
2000	Shroff	Social justice/health	Ayurveda	in Dei et al. (2000)
2000	Turnbull	Sociology	Cross-cultural science	
2000	Williams	Anthropology	Competing knowledge bases, Mongolian steppe	
2001	Maurstad	Anthropology	Norwegian fisher knowledge, science	
2004	Ardelt	Sociology	Wisdom, expert knowledge system	
2004	Campbell	Development	Nepalese ecological knowledge	in Bicker et al. (2004)
2004	Vayda et al.	Development	New Guinea, Philippines, Indonesia eco-knowledge	in Bicker et al. (2004)
2005	Barnhardt and Kawagley	Anthropology/Education	Alaska Native ways of knowing, Indigenous knowledge	
2005	Briggs	Development, Geography	Indigenous knowledge	
2005	Kapoor	Indian Studies	Indian knowledge systems	in Kapoor and Singh (2005)
2005	Hegde	Indian Studies	Modern medicine, complementary medicine	in Kapoor and Singh (2005)
2005	Manohar	Indian Studies	Ayurveda	in Kapoor and Singh (2005)
2005	Balasubramanian	Indian Studies	Indian indigenous health traditions	in Kapoor and Singh (2005)
2006	Gergely and Csibra	Anthropology/Primatology	cultural knowledge	
2006	Menzies and Butler	Anthropology	Ecological knowledge	in Menzies (2006)
2006	Corsiglia	Education	traditional ecological knowledge and wisdom	in Menzies (2006)
2006	Fabricus et al.	Ecosystem Assessment, Development	Local ecological knowledge, science	in Reid et al. (2006)
2007	Sillitoe	Development/Anthropology	Local science, global science	in Sillitoe (2007)
2007	Aikenhead and Ogawa	Cultural Studies/Education	Indigenous knowledge, science	
2008	Berkes	Applied Ecology	traditional ecological knowledge, Western science	
2008	Brumot	Anthropology	Kadar medical knowledge	in Subramanyam (2008)
2009	Lauer and Aswani	Anthropology	Western Solomon Islands fishers' knowledge	

Appendix B

Prototype matrix for describing observations about a knowledge system's forms of knowledge

	In everyday conversation/ practice		In interviews about knowledge		In education		In particular epistemic community	
	high	low	high	low	high	low	high	low
Mystical								
Rational								
Empirical								
Conceptual								
Positive								
Speculative								
Symbolic								
Concrete								
Collective								
Individual								
Informal								
Formal								
Tradition								
Invention								

Appendix C

Prototype matrix matching knowledge types with forms

	Perceptual	Social Groups	Common Sense	Technical	Political	Scientific	Philosophical	Artistic
Correlation between types/forms: very low-low-medium-high-very high (0-5)								
Mystical								
Rational								
Empirical								
Conceptual								
Positive								
Speculative								
Symbolic								
Concrete								
Collective								
Individual								
Informal								
Formal								
Tradition								
Invention								

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