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Science communication: fault lines between scientific and indigenous knowledge

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… let me say this: the pursuit of science – the cultivation of rational or theoretical knowledge of the natural world – seems to presuppose an intense desire, at least initially, for knowledge for its own sake, not for the sake of some immediate practical results. It appears that our cultures had very little, if any, conception of knowledge for its own sake. They had a conception of knowledge that was practically orientated. Such an epistemic conception seems to have had a parallel in the African conception of art … this practical or functional conception of art, which dwarfed a conception of art for art's sake, must have infected the African conception of knowledge, including scientific knowledge, for its own sake (Eze, 1997:31)

Abstract

The focus of discussions around scientific knowledge and local (indigenous) knowledge amongst science communicators is usually either from a sociological or from an epistemological point of view. In the sociological field, pseudo-science and the social aspects thereof are often conspicuously in the foreground, while the epistemologists are inclined to rate the degree of order and planning higher in so-called 'modern science' than in local traditional knowledge systems.

Local or traditional knowledge developed throughout the centuries in communities inhabiting specific environments and often exhibiting a variety of cultural attributes. Within such domains, sustained efforts of knowledge production are revealed by the merging of practical know-how (in relation to local needs and practices) with specific belief systems as well as local technological innovation. At more or less the same time, for somewhat different reasons, the global knowledge growth of the natural sciences graduated into distinct disciplines, each with its own methodological and theoretical framework.

The inevitable tension between these diverse approaches in their representation of varied world views impacted on the way and manner that research in Science Communication (SC) and Public Understanding of Science (PUS) developed. Preference for the application and investigation of what is popularly referred to as 'western science' resulted in the neglect and often complete absence of data relating to local knowledge systems in large-scale PUS surveys. One can safely argue that the tension between these 'sciences' characterises not only the SC process that takes place, especially in developing countries such as those in Africa, but it also illustrates the dilemma that is faced by policy makers in their efforts to ensure a fair and democratic uptake and dissemination of scientific findings.

Establishing the specific foundations of these diverse epistemological systems is not always an easy task for SC researchers. This paper will highlight some of the fault lines that impose upon the ability of SC researchers (in an African context) to construct a fully representative and transdisciplinary research approach when communicating science.

Introduction

Though we are all familiar with the geological phrase of 'fault lines' (indicating abnormalities and tensions in the earth's crust), there are additional applications of the expression. 'Fault lines' is also used by the social sciences and humanities in reference to societal fractures, displacement and discontinuity of cultural practices and community worldviews. The meeting ground for these fault lines is embedded within and between communities – often in relation to tensions between political ideologies or socio-economic and cultural differences.

Fault lines occur when changes in social systems become prominent. In order to stabilise and ensure progressive development, all individuals, and ultimately all communities, need to make sense of the complex realities of events that impact on their lives. As a result, individual members of a society often seek collective solutions and concrete answers to what could be perceived as harmful and often puzzling events and situations that might transform the cultural traditions of their specific community. For example, communities often reject the introduction of new products, systems and even knowledge if found superfluous to their specific needs. At the same time, new technologies, pre-dominantly motivated by global economic (capitalist) development, quite often do not facilitate or accredit the societal, political and cultural structures embedded within communities.

According to Vassilis Fouskas (Fouskas & Gokay, 2012) the philosophically-based essentials of "… being free only when we act in accordance with our reason" is embedded in the ability to choose between what is necessary and what is harmful to ourselves and the community we live in. While acknowledging our freedom to choose, we collectively developed a post-Hegelian notion of *global fault lines* that "… does not separate/break the totality into instances (economic, ecological, political, ideological, cultural, ideational), while, at the same time placing class (Marxist) analysis as a core

analytical tool of that totality. Thus, class and social struggle cut across social formations and historical epochs and develop the elements of totality unevenly causing great disruptions, discontinuities and breaks" (Fouskas & Gokay, 2012).

To further explain this notion of a global fault line we can argue that class and social struggle became the rallying cry for imperialism and colonialism in Africa by dividing society according to race and class. Accordingly, race and class developed its own inherent fault lines dictated by the creation of a difference in understanding of the realities faced by the colonised and coloniser (the experience of reality of the coloniser will of necessity differ sharply from the reality experienced by the colonised).These fault lines indicated the existence of different notions and perceptions regarding the origins of reality.

In order to understand the different origins of the 'realisms' these colonised societies faced, communities generally followed two routes: they either pursued a teleological conception of reality or/and they looked at reality in terms of mechanical causation (Teffo 2002:161). A teleological perception will be driven by the belief that events happen because of some (often obscure) external (often intangible) aim while those considering a mechanical causation look at a 'scientific' or 'rational' explanation. Note that this way of dealing with reality happens continuously and not necessary only when (for instance) some new technology is introduced into a community.

Therefore, when attention shifts to countries on the African continent, the notion of a fault line emerges somewhat differently (and more problematically) than will be the case in most modern 'European-harmonised' countries. In the first instance, the epistemological role and function of what constitutes a community takes on a different appearance. Here different races and different tribes often share space within what was accepted as constituting a 'community'. These communities were socially fragmented, displaced and subjugated to a colonial system whereby a loss of identity was acutely felt. The now popular notion of 'speaking to the public(s)' by modern science communicators attests to the complexity encountered when doing research within specific communities. By referring to the 'public(s)' there is recognition of a society comprising of groups of people with a multiple and specific identity. However, little is understood about communities who were colonised and who suffered a loss of identity.

It has been well argued that the notion of an 'identity that constitutes a community' has constantly been shifting and changing. The topology of 'community' has popularly been considered subject to the prevalent modes of economic production, socio-political choices and responses and driven within a specific cultural context. According to D. A. Masolo (2002:558) "… the social science understanding of community has, until recently, tended to regard it as a typical specific (one of a kind) social unit or entity endowed with stable and recognisable features which, like those of its type, are regulated by laws which simultaneously account for their differences and similarities" (2002). Masolo (2002) further argues: "… in both their synchronic structures and diachronic mutations and regenerations, communities were viewed as subject to some 'natural' laws which regulate social phenomena".

Sociologists also attempted to separate communities as units different from each other but, in essence, consider the units as homogeneous social units. Pierre Felix Bourdieu's (1990:14) 'action-response model', as example, places cultural knowledge, such as knowledge of ritual, central to the creation of social units of specific modes of rationality, legitimation, power and social action. The function of all such social units is to maintain a single set of values that is shared and recognised by all concerned.

However, the Bourdieuan system, as critiqued by Masolo (2002:568) "… loses sight of the open-endedness of communities and produces an image of communities as collectable, exhibitable and manageable social units, juxtaposed but unconnected one to the other". To further stress this point Masolo (2002) poses the following: "… according to sociologists, the characteristics of community include commonly shared geographic place, a consciousness of kind, a totality of attitudes, a common lifestyle, a possession of common ends, and local self-sufficiency among others". For practical purposes, this perception of community enables researchers to separate and characterise groups of people according to simplified classifications based on race and class. Community can also be considered as "…a collective which is a repository of knowledge that has been generated through the process of distillation of abstract ideas extracted from experiential episodes" (Raza 2002:59).

For the coloniser, in the historically colonised Africa, the perception of what a community should look like served as a politically motivated framework to fragment society. It provided a useful tool for colonial subjugation and separation between (to start with) white, black and Asian populations through the creation of administrative boundaries and the separate 'preservation' of traditions. The white and Asian population maintained their respective western and Asian citizenships and worldviews. The indigenous black population became secondary citizens with 'inferior' identities. Studies of the indigenous populations were demonstrated by the writings of early anthropologists such as Lévy-Bruhl's (1910) *How Natives Think* and Lévi-Strauss's (1966) *The Savage Mind.* Isidore Okpewho (1992:17) mentions past studies on literature such as that by the British anthropologist, Captain R.S. Rattray's *'Ashanti Proverbs: the Primitive Ethics of a Savage People'* (1916), as a prime example of the racial arrogance that characterised the attitude of colonial administrators and field researchers in the quest of understanding African cultures. These attitudes created damaging and lasting negative perceptions as encountered by the damning declaration at the 2001 United Nation's *Durban declaration of the world conference against racism, racial discrimination, xenophobia and related intolerance:* "… Africans and peoples of African descent, and people of Asian descent and indigenous peoples were victims of colonialism and continue to be victims of its consequences".

The notion of community, in Africa, therefore exists within a framework of what Masolo (2002) refers to as a 'dialogically' rather than an 'ontologically' constitution of communities. African communities, however, are never static and according to Kwame Appiah (1996) African communities evolved through a long and persistent process of cultural hybridization and still continue to do so. Ivan Karp (1992:3–4) further refers to society groupings as the "… institutions of society" and their identity as

community is "… experienced as encounters in which cultures, identities and skills are acquired and used".

When researchers in the field of PUS thus consider their relation with the 'public(s)', the issue might not be as simplistic as following recognition of the distinction between different and differentiated groups within the society. It is, furthermore, evidently clear that communities display a remarkable ability to engage with different levels of reality in their daily lives in order to ensure and sustain socio-political and economic stability against a (most often subconscious) fear of societal (civilizational) collapse. In this regard Basarab Nicolescu (2005:5) [1] warns that:

> "The process of the decline of civilisations is one of enormous complexity and its roots lie deeply buried in the most profound obscurity. Of course one can find multiple after the fact explanations and rationalisations without ever successfully dispelling the feeling that there is an irrational element at work in the very heart of the process. From the great masses to the great decision makers, the actors in a very well-defined civilisation, even if they become more or less aware of the processes of decline, appear powerless to stop the fall of their civilization. One thing is certain: a great unbalance between the mentalities of the actors and the inner needs of the development of a particular type of society always accompanies the fall of a civilization. Although a civilization never stops proliferating new knowledge, it is as if that knowledge can never be integrated within the interior being of those who belong to this civilization. And, after all, it is the human being who must be placed in the centre of any civilization worthy of the name" (Nicolescu 2005:5).

The role of Science Communication

It is generally agreed that science communicators assist in activities related to implementation and uptake of science and technology findings and that PUS researchers are mostly concerned with the assessment of such uptake. We readily acknowledge that current SC activities are embedded in the promotion of modernity and that SC activities are premised upon a western foundational perception of science. However, whatever SC route society follows, we need to understand that people are always influenced by their own conceptual schemes, histories, social circumstances, languages, indigenous belief systems and also their personal emotions. We therefore need to re-visit the inherent complexities of a society that is made up by multiple communities with mixed identities and realities and measure societal change against history.

A good example of the complexities we face at the fault lines between modern society and ancient traditions will be to re-visit depictions of ancient rock art against the current mass slaughter of the rhinoceros in Africa. This serves as an apt illustration of the tension between the sometimes

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1   Also found in the *Manifesto of Transdisciplinarity* by Basarab Nicolescu; translation by Karen-Claire Voss. SUNY Press, USA. http://digitalseance.worldpress.com/2007/04/08/transdisciplinaritybasarab-nicolescu (accessed: 2011/02/15).

supportive (and often conflicting) application of a teleological application and/or following the route of science.

In South Africa we are currently witnessing the mass slaughter, through poaching, of the rhino population.[2] Rhino horn is much sought after in some parts of the world; sometimes for ornamental purposes (i.e. dagger handles in Yemen) but mostly as a natural medicinal potion in south-east Asia. However, the popular line, followed by large numbers of the South African public(s) (and this includes paradoxically enough; many scientist and conservationists), is that "The sustained erroneous belief that rhino horn has aphrodisiac properties continues to hinder efforts to stop the illegal trade in rhino products" (Skinner & Chimimba 2005:527).

The Rhinoceros[3] has been the topic of myths and legends for centuries. In southern Africa evidence of this is found in the rock art[4] of the nomadic San people who were the original inhabitants of the southern regions of Africa. Looking at San depictions of rhinos it is not possible to ignore the detailed knowledge displayed by these artists. More often than not the image of the rhino is in almost perfect correlation with its living double and it is clear that the San possessed a very intimate (scientific) local knowledge of the biology and ecology of these animals. But many symbolic and non-realistic depictions of rhino and other animals (where for instance exaggerated horns or other body parts are added), point to a wide-spread spiritual and metaphoric function of the art.

Often, through visual depictions (and oral tradition), the power and sexual link of the rhino and the human hunter came to the fore. David Lewis-Williams 2002:176) indicate that in the art of the San arousal and penile erections "… are associated with altered states of consciousness and sleep" and notes that in southern African rock art "… a great many figures are ithyphallic." In this regard Patricia Vinnicombe (2001:xviii) refers to the valuable connection between the rock art and mythology and records the words of one of the pioneers of the documentation of this unique art form, Dr Wilhelm Bleek, who wrote some one hundred years ago: "… it gives at once to Bushman art a higher character, and teaches us to look upon its products not as the mere daubing of figures for idle pastime, but as an attempt, however imperfect, at a truly artistic conception of the ideas which most deeply moved the Bushman mind and filled it with religious feeling."

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2   At the start of August 2012 the number of rhino lost to poaching for the last eight months in South Africa alone stands at 281. In 2011 a total of 448 South African rhino were taken by poachers <http://www.news24.com/SouthAfrica/News/Nearly-300-rhino-poached-this-year-20120717> (accessed: 2012/08/11).

3   Family Rhinocerotidae, with two species inhabiting southern Africa: the white rhinoceros (*Ceratotherium simum*) feeds exclusively on grass and is represented by two recognised sub-species. The black rhinoceros (*Diceros bicornis*) is a browser with four recognised sub-species. *Mammals of the Southern African Subregion*; (p527). John D. Skinner and Christian T. Chimimba. 2005. Cape Town: Cambridge University Press.
• According to the International Rhino Foundation (IRF) population numbers for the southern white rhino are now estimated to be around 14 500 with 93 percent of this population occurring within the borders of South Africa. The northern white rhino only survives in captivity <http://www.rhinos.org/irf-programs> (accessed 2012/08/12).
• Up to the start of 1900 the black rhino was the most numerous rhino in Africa with numbers ranging into the hundred of thousands. Hunting and illegal poaching have subsequently reduced their numbers to less than 4 500 by 2010. The western African sub-species of the black rhino was declared extinct in 2011 by the International Union for the Conservation of Nature (IUCN) <http://www.iucn.org/knowledge/tools/databases/> (accessed 2012/08/12).

4   These legendary rock paintings and petroglyphs (or engravings) date back to a period before the written word. The depictions are normally referred to as 'San rock art' and the artefacts they left behind in caves housing the art works are classified as generally dating from the (African) 'Middle Stone Age' (Vinnicombe, 2001:9).

Similar intriguing works of art (engravings and paintings) were made in northern Africa. Jean-Loïc Le Quellec (2004) studied the rock art originating from the northern Sahara region, 'first discovered' on July 5 1850, by Heinrich Barth. Barth was travelling through the Wadi Tellizzaghen, in the Libyan Messak on his way to visit Tumbuktu with a caravan of Tin-Alkum Tuaregs. According to Quellec (2004:14–15), Barth, when coming across these never before recorded art, interpreted the symbolism of these works according to Greek legends peopled by figureheads like Garamante, Apollo and Hermes (Quellec 2004:14). Subsequent scholars such as Amadou Hamp té Bâ (Fulani scholar and ex-ambassador of Mali) produced highly contested interpretations (in the early 1990s) about the meaning of these paintings.

When early European explorers like Dr Felix Jacquot encountered Saharan rock art depicting overt sexual imagery, his European Calvinism overruled any further interpretation when he wrote in 1847:"… as for lewd pictures, they will never emerge from our albums. One can see, in full view and with no secrecy, the unnatural intercourse that brought the storm of fire down on the cities whose names you know well; a hideous coupling which was far from unknown to the Latins…" (Quellec, 2004:33). His words are echoed by the pen of Henri Lhote who repeatedly used words like "indescribable… particularly deprived scenes with figures expressing customs that go beyond wholesome nature" (Quellec, 2004:33).

It is, however, from the rock art at the Wadi Djerat in the Sahara that we encounter the subject closest to our understanding of cultural fault lines; the intentional depiction of a man in a sexual relation to a black rhinoceros. What can be interpreted from these rock art depictions can only be imagined and, aptly stated by Le Quellec (2004:38); "… doubtless we shall never know, because the symbolic associations with sex can affect a wide variety of cultural or natural objects, and take on unforeseeable meanings". However, Henri Lhote (in Le Quellec 2004:37) provides a detailed description that leaves little to the imagination. In an engraving of yet another rhinoceros its tail is touched by a dog-headed ithyphallic figure with "… the phallus pointing towards the rhinoceros, and the hand towards the anus, as if to enter it". This scene of zoophilia seems to be a description of a direct sexual link between man and animal. We can conclude that the information coming from this ancient art work is obscured by time and provides a tantalising communication challenge.

Rhino horn is used to cure a variety of ailments in the traditional medicine systems of many Asian countries (from Malaysia and South Korea to India and China). In traditional Chinese medicine, the horn, which is shaved or ground into a powder and dissolved in boiling water, is used to treat fever, rheumatism, gout, and other disorders. According to the 16th century Chinese pharmacist Li Shi Chen, the horn could also cure snakebites, hallucinations, typhoid, headaches, carbuncles, vomiting, food poisoning, and "devil possession" (it is not, as commonly believed, prescribed as an aphrodisiac). Historical mentions of other uses for the horns date back thousands of years. In Greek mythology, these horns were said to possess the ability to purify water. The ancient Persians of the 5th century BC thought that vessels carved from the horn could be used to detect poisoned liquids,

causing bubbles in the presence of some poisons — a belief that persisted into the 18th and 19th centuries among the royal courts of Europe!

Rhino horn and science

Science is now stepping in to dispel some of the mystery and fiction surrounding the use of rhino horn. It is believed that there may be some truth behind the rhino horn's ability to detect poisons which is linked to the composition of the horn. Rhino horn is composed largely of the protein keratin, also the chief component in hair, fingernails, and animal hooves. Many poisons are strongly alkaline (or basic), and may have reacted chemically with the keratin. Unlike the horns of most animals which have a bony core covered by a relatively thin layer of keratin, rhino horn is keratin all the way through (although the precise chemical composition of the keratin will vary depending on a rhino's diet and geographic location). This fact has allowed ecologist Raj Amin of the Zoological Society of London and his colleagues to take "fingerprints" of horn samples and determine the animal populations they came from, which has helped law enforcement officials target and crack down on poaching.

Rhino horn is not, as once believed, made simply from a clump of compressed or modified hair. Recent studies by researchers at Ohio University using computerized tomography (CT) scans have shown that the horns are, in fact, similar in structure to horses' hooves, turtle beaks, and cockatoo bills. The studies also revealed that the centres of the horns have dense mineral deposits of calcium and melanin — a finding that may explain the curve and sharp tip of the horns. The calcium would strengthen the horn while the melanin would protect the core from being degraded by ultraviolet radiation from the sun. As the softer outer portion was worn away over time by the sun and typical rhino activities (bashing horns with other rhino and animals, or rubbing it on the ground), the inner core would be sharpened into a point (much like a wooden pencil).Overall there isn't much evidence to support the plethora of claims about the healing properties of the horns. In 1990, researchers at the Chinese University in Hong Kong found that large doses of rhino horn extract could slightly lower fever in rats (as could extracts from Saiga antelope and water buffalo horn), but the concentration of horn given by a traditional Chinese medicine specialist are many times lower than used in those experiments. In short, you'd do just as well chewing on your fingernails.

Indigenous Knowledge Systems (IKS)

Per definition 'indigenous knowledge'[5] is local knowledge generated by people living within a particular community – hence it is unique to a particular society or culture. Indigenous knowledge is

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5 Paulin Hountondji reported in 1997 that the term 'endogenous knowledge' was accepted during a seminar organised for masters degree students in Philosophy and Sociology at the Université Nationale du Benin, Cotonou in 1987. For the purpose of this paper I will use the terms 'indigenous knowledge systems' (IKS) despite the conditions attached to this term as having local curiosity value for the foreign observer, hence encompassing a derogatory connotation which refers to "… a specific, historical experience, precisely one of integration of autochthonous cultures into a world-wide 'market' in which these perforce are pushed down to inferior positions"

tacit knowledge and therefore not easily documented. Generating these systems of knowledge is a dynamic process, and is based on innovation, adaptation, experimentation, as well as the 'common sense' survival strategies of a community[6]. The fact that IKS is not generally and widely acknowledged should not deter us from investigating the validity of the knowledge systems that it produces. Nor should the localised nature of these systems of knowledge be used as an ideological excuse to dismiss their scientific nature by being referred to as merely a 'traditional arrangement'. There is sufficient confirmation that a variety of sound scientific knowledge is usually embedded in such systems (Raza, 2002, 2003; Riana and Habib, 2004; Sardar, 1998, 2002).

However, the information available on IKS is still predominantly descriptive, based on case studies and sometimes lacks intellectual consideration. At the same time, science, by definition, is seen as a reflection of a (western) society's level of development and the non-western world is considered to be at a developmental disadvantage. IKS provides the platform for an open system of enquiry since it is based on the 'common sense' survival strategies of a community where scientific knowledge is applied in a specific locale, to cope with specific agro-ecological, economic and socio-cultural environments. Most importantly, it is knowledge that develops from the experience and the humanist 'right to life' of people.

Another important contribution to furthering the understanding of the role of IKS has been made by Edward Said (1978; 1994), when he pointed out that the valorisation and defence of IKS in a world dominated by western science, is ultimately about the affirmation and recognition of the self in relation to the 'other'. Said (1994) uses the term 'culture' (culture as the 'other') to address problematic issues of indigenous knowledge regarding the Eurocentric understanding of IKS. In this regard Said (1994) points out that IKS, as a field of research, has been linked to aesthetic theory and practices of interpretation, in which the relative autonomy of the aesthetic discourse has been separate from, and dogmatically defended against the economic, social, and political discourse. According to Said (1994) IKS has often been represented, in the Kantian sense, as an aesthetic form of judgement whose principally aim is to provide aesthetic pleasure. This Kantian demarcation of the transcendental form of judgement aimed at aesthetic pleasure, has contributed significantly to disciplines such as ethnography, historiography, philology, sociology and literary history, where the cultural 'other' has been reduced to the level of providing aesthetic (exotic) pleasure for the western observer.

IKS versus modernity in science communication: establishing the fault lines

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(Hountondji, 1997:18). As my hypothesis strives to overcome negative perceptions about traditional practices and technological knowledge, I consider it appropriate to use the term IKS in an effort to overcome political constraints.

6   Looking at efforts to succinctly define IKS one can refer to Anthony Starkey's (2001) attempts to capture the complexity of IKS through defining local knowledge as:
"…knowledge generated and transmitted over time, by those who reside in a specific locale, to cope with their agro-ecological, economic and socio-cultural environments. Such knowledge is passed on from generation to generation. It is knowledge that develops from the experience of the people and is influenced, but not dictated to, by specific ideologies. IKS is stored in peoples' memories and quotidian (daily) activities and is expressed in stories, folklore, proverbs, myths, cultural values, belief systems, rituals, metaphors, idioms, local language, artefacts and, above all, in production systems and innovation chains."

Africa too often stays frozen in a traditional state of 'being primitive' as a counter to the western modernity *project* of fluid 'developed capability'. However, African communities are progressively considered being part of a global matrix with "… trans-national contacts and macro-scale linkages" (Steiner, 1994:1). Christopher Steiner (1994) refers to the rebellion against the so called 'primitive isolates' promoted by earlier anthropologists whose studies followed a 'bounded system' whereby, in a single society, one isolated community within one remote village was studied. Today, this 'system of investigation' has been revised to contain 'processes of investigation'; consisting of the history as well as social changes in the given community. This includes the change of old key words such as 'homeostasis, cohesion and balance' to be replaced by new concepts such as 'pluralism, heterogeneity, crisis, conflict and transformation' (Steiner, 1994:1).

We can safely say that the development of IKS not only applies to developing societies, but to all societies as such.[7] This point is made by Appelby (1996) when he makes the claim of his assessment of John Dewey's *Common Sense and Scientific Inquiry* (1938), where the latter claims that the 'common sense world' form the basis for development of all scientific enquiry. For Appleby (1996), scientific inquiry is inconceivable without the prior understanding of the common sense inquiries that inform our daily interaction with our environment. This approach to the understanding of scientific knowledge (as having its origin in common sense inquiries) does, however, require a conceptual distinction between knowledge in the practical sense and knowledge in the theoretical (second order level) sense of scientific reflection and self-criticism. IKS does provide for the theoretical possibility of validating (and invalidating) the knowledge claims that arrive from common sense enquiries.

Considering Dewey's ideas promoted in *Common Sense and Scientific Inquiry* (1938), two distinct orders of scientific thinking becomes prominent. The one order is based on 'common sense' and 'experiential knowledge' where experience developed into science. This order is mostly considered to retain and contain traditional knowledge. The next order is based on so-called 'modern science', which developed a higher order of theoretical models aimed at justification and validation of all knowledge claims. These two orders of knowledge have for the most part been treated as two incommensurable types of knowledge, an argument which I find extremely problematic given the fluid nature of mutual exchanges between these two orders of knowledge (that have invariably characterised the production and understanding of knowledge as a whole).

Ideas on 'common sense' were also explored in the Scottish School by Reid and Steward who saw the "… deliverances of common sense as if they were a body of settled truths" (Appelby, 1996:267). Therefore, common sense was considered as an ultimate authority and arbiter of philosophical questions. However, when *common* sense becomes *general* sense leading to a universal application of common sense, which includes all people, it loses its specific or localised nature. This has often been the case where the western experience of common sense has been imposed on other traditional

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7   The introduction of the phrase 'indigenous knowledge systems' occurred within an ideological vacuum in developing countries (such as in Africa) and is still full of contradictory definitions, conceptual pitfalls and intellectually as well as ideologically unresolved. There are, for instance, calls from academics like Paulin Hountondji (1997) and other African scholars that 'indigenous knowledge' should be changed to 'endogenous knowledge' as being a more representative description.

forms of knowledge. It should be emphasised that knowledge is firstly of a cultural nature, and as such, it arises within specific cultural environments. This 'cultural level knowledge' is synonymous with common sense practices and local sets of meaning. According to Appelby, (1996:268), knowledge as a common set of practises and as localised knowledge is "… so deeply embedded in its customs, occupations, traditions and ways of interpreting its physical environment and group life, that they form the basic categories of the language system by which details are interpreted".

It is, however, somewhat awkward to claim that IKS is exclusively concerned with 'common sense' knowledge or that it focuses only on traditional systems of knowledge. This perception leads to the implication that the validity and field of application of IKS is restricted to the 'embedded common sense' of local traditional communities in the non-western world. Given the popular conceptual differentiation between tradition and modernity, IKS has often been associated with outdated and anachronistic forms of knowledge, characterised essentially by its perceived static and conservative nature. It should be pointed out that the attempt to define tradition already presupposes the possibility of a post-traditional (modern) understanding of tradition from the perspective of modernity. From this perspective definitional accounts of modernity as well as tradition can only be offered from a modern perspective. If modernity is characterised by constant flux and change, it lacks the philosophical recourse to deal with a tradition where the essential characteristic is that of non-change.

Arising from the conceptual difficulties that takes place when the definition of modernity portrays itself as an event of constant flux, Eric Hobsbawn (1983) looks at tradition as an 'invention' or a 'construct'. He uses the term 'invented tradition' as a "… set of practices, normally governed by overtly or tacitly accepted rules and of a ritual or symbolic nature, which seek to inculcate certain values and norms of behaviour by repetition, which automatically implies continuity with the past" (Hobsbawm, 1983:1).

According to Hobsbawm (1983:2), tradition, characterised by invariance, is not to be confused with *custom,* which does not preclude innovation and change, and facilitates change (or even resistance to innovation) to provide

> "… the sanction of precedent, social continuity and, in order to understand the full significance of IKS, we also need to go beyond the current conception opposition between empirical knowledge systems versus rationalist knowledge systems. It needs to be emphasised that these two forms of knowledge do not constitute or represent mutually alternative approaches to knowledge but that they are co-implicative. Furthermore, when we succeed in moving beyond ideological arguments that seek to relegate traditional knowledge system to the sphere of experiential (practical) knowledge, and correspondingly elevate western scientific knowledge to the level of theory, the possibility of communication and dialogue between these two forms of knowledge is made extremely difficult".

In conclusion, IKS is more that the application of a primitive form of technical knowledge; it also seeks to continuously authorise the scientific status and validity of knowledge claims that arise within the context of people's 'right to life' activities.

SC and PUS: creating a framework of inclusivity

Here I will introduce three aspects that are based on existing fault lines that requires our attention in our efforts to construct a continuity between the sciences and IKS: (i) the development of a science communication model that will facilitate what is referred to as the 'cultural distance' between structures of formal science education and local knowledge(s); (ii) and the importance of incorporating the role of the 'aesthetic of knowledge' and (iii) the value towards the development of a theoretical framework provided by a transdisciplinary research approach.

i. The development of a science communication model to facilitate what is referred to as the 'cultural distance' between structures of formal science education and local knowledge(s):
Up to now I have argued that, though there is a perception of a distinction between science and IKS, the reality does not allow for such separation. Most often this perceived, but artificial separation manifest itself in geographically allocated locations occupied by what, as Roger Scruton (2002) states: 'the west and the rest'. We are therefore tasked to explore areas of convergence and localities of neglect between what is called IKS and what is marked as 'science'. For this we can consider the argument by Gauhar Raza (2002) that it is not adequate to consider the knowledge base of a community as the only factor that is influenced by (scientific) intervention. Raza (2002:59) states that the determinants of a community's "… thought complexities need to be investigated" when conducting surveys:

> "… thus, one of the most important exercises before commencing any IKS research project is to identify the factors that might have a direct bearing on the knowledge system of an individual or a group. It is in the course of this 'action' research that the processes involved in the generation, retention and configuration of bits and pieces of information may be understood. However, the broad cognitive framework or worldview in which the acquired knowledge is configured is a socio-cultural construct shaped by quotidian episodes experienced over generations".

Raza (2002) proposes two conditions for the execution of empirical studies: firstly, no study should be divorced from the social, cultural or historical context in which the (knowledge) system operates. By ignoring this we encounter erroneous conclusions. Secondly, to enable the research to feed into policy mechanisms, the study needs to be community centric and take into account the worldview and 'spectrum' of these communities. Exactly what constitutes the 'spectrum' of communities in the developing world is referred to by Raza (2002:59–60) as complicated and ranges from

> "… communities which live in harmony to nature without disturbing the regenerative capabilities of eco-systems and who, for example, practice indigenous systems of medicine developed over centuries. On the other hand there are those artisans who have developed what is often referred to as innovative 'rural or indigenous' technologies. The varied pace of the struggle for survival and the intrinsic human need to innovate have given birth to sub-

social and cultural systems in these communities. These subsystems, especially technology or trade-based structures, more often than not, continually interact with other systems including the 'modern'. This organic link makes the task of developing categories of control as well as of dependent variables quite difficult''.

ii. The importance of incorporating the role of the 'aesthetic of knowledge:
The second area of incorporation to ensure inclusivity is in reference to Jacques Rancière (2006) who speaks of an aesthetic dimension of knowledge. This notion of an aesthetic is not an obligation. It divides the idea from the practice of knowledge and is a historically determined concept designating a specific regime of visibility and intelligibility of art inscribed in the reconfiguration of the categories of sensible experience and interpretation. The aesthetic dimension overrules the Bourdieudian notion of: you know or you do not (*on connaît ou on méconnaît*). As Rancière (2006:3) explains: "… the aesthetic illusion confirms that subjects are subjected to a system because they do not understand how it works. And if they do not understand, it is because the very functioning of the system is misrecognition. The *savat* is the one who understands this identity of systemic reasons and the reasons for its misrecognition".

Rancière (2006) talks of *two* knowledge(s): the configuration of knowledge rests on a simple alternative that tells us that there is a true knowledge (*savoir)* which is aware and a false knowledge (*savoir*) which ignores. Each knowledge (*savoir*) is accompanied by a certain ignorance, and therefore there is a knowledge which represses and an ignorance which liberates. In other words, knowledge is always double: it is an ensemble of knowledge(s) (*connaissances*) and it is also an organised distribution (*partage)* of positions. This argument stems from the individual's ability to take pleasure from within his/her own identity (as, for example being an artisan) towards taking on a different identity (political, social class, race) and thereby become capable of being assigned to a private (individual) condition to one capable of intervening in the affairs of the community. This capability has a profound influence in facilitating the bridging of paradigms from: 'science for society' to 'science and society' to 'science in society'.

iii. The development of a theoretical framework provided by a transdisciplinary research approach:
As a final point, the theoretical framework proposed by Basarab Nicolescu (1996) provides new challenges in the solution it poses in our exploration of the ecology of knowledge. Nicolescu (1996) argued that modern science was born through a violent break with the ancient vision of the world and, in the process we changed the status of the Subject to one of Object. This change is caused by the total separation between the knowing subject and reality. Therefore Nicolescu (1996) promotes a transdisciplinary approach to current global research themes.

Instead of looking at transdisciplinarity as an approach that is promoting continuity, he advises the consideration of discontinuity, since what he calls 'the middle ground' (of knowledge) consists of a vacuum. This vacuum, according to him, is filled with possibilities of the 'unknown'. Reinforced by the ability of mankind to exist and adapt within different layers of reality – the ability that is aptly described

by Nicolescu (1996) as following a methodology of three axioms: (ontological, logical and complexity) we move into a combination/separation of different knowledge spaces. He argues that these axioms are not theorems and cannot be demonstrated; they have their roots in experimental data and theoretical approaches and their validity is judged by the results of their application.

- The 'ontological axiom' refers to what we encounter in nature and in our knowledge of nature: there exist different levels of reality and, correspondingly, different levels of perception.
- The 'logical axiom' refers to the passage from one level of reality to another, ensured by the logic of the included middle.
- The 'complexity axiom' forms the structure of the totality of levels of reality or perception and as complex structure: every level is what it is because all the levels exist at the same time.

The *Charter of Transdisciplinarity* that was drafted during the First World Congress of Transdisciplinarity in 1994 serves as example. This Charter, in reaction against "… 8 530 definable fields of knowledge, was the result of resistance against both increasing specialisation and the growing overlapping of disciplinary knowledge domains". The Transdisciplinarity Article 13 of the 1994 Charter of Transdisciplinarity states:

"The transdisciplinary ethic rejects any attitude which refuses dialogue and discussion, no matter whether the origin of this attitude is ideological, scientist, religious, economic, political or philosophical. Shared knowledge should lead to a shared understanding based on an absolute respect for the collective and individual diversities united by our common life on one and the same Earth" (adopted at the First world Congress of Transdisciplinarity, Convento da Arrábida, Portugal, November 1994).

Conclusion

Reference to 'science' in this paper takes into consideration activities that are essentially reflective and enable the development of an intellectual ecology of knowledge. Through an intellectual ecology of knowledge we endeavour, as Martin Davies (2003:9) argues, to focus on who uses knowledge and in what ways and for what purposes knowledge is needed to expose the automatic habits of thinking and the technocratic nature of current knowledge-production. Though we are good in asking questions about knowledge that we already know and excels in advising society on the knowledge it needs, we seldom stand back and reflect upon the appropriateness and use of such knowledge. For the same purpose we communicate science within frameworks of application, such as in policy development, without considering appropriate measures and models to establish the level of impact of such policies.

The presentation explored of a number of aspects such as what constitutes 'community' as part of the public(s) often mentioned by science communicators, to defining communities' retention and application of traditional knowledge in so far as its contribution to a global lexicon of knowledge. Three

possible focus areas towards the understanding of the fault lines between modern science and IKS was proposed: the constructing of a science communication model, the importance of incorporating the role of the 'aesthetic of knowledge' and the value towards the development of a theoretical framework provided by a transdisciplinary research approach.

The current mass poaching of Rhino for their so-called medicinal value of their horns, served as example of the complexity of understanding and addressing the fault lines that exist between IKS and science.

As conclusion the three possible areas to be added as indicators for a science communication theoretical development lies in: (i) the development of a science communication model that will facilitate what is referred to as the 'cultural distance' between structures of formal science education and local knowledge(s); (ii) and the importance of incorporating the role of the 'aesthetic of knowledge' and (iii) the value towards the development of a theoretical framework provided by a transdisciplinary research approach.

Bibliography

Appelby, 1996. Appelby, J and Covinton, E. 1996. *Knowledge and Postmodernism in Historical Perspective.* London: Routledge.

Appiah, K. 1992. *In my Father's House: Africa in the Philosophy of Culture.* London. Oxford University Press.

Appignanesi, L (ed.). 1989. *Ideas from France: The Legacy of French Theory*. London: Free Association Books.

Bauer, M. 2008. Survey research and the public understanding of science. In: Bucchi, M & Trench, B. 2008. Handbook of public communication of science and technology. London: Routledge.

Bourdieu, P. 1990. *The logic of practice.* Stanford: Stanford University Press.

Cassidy, A. 2008. Communicating the social sciences. In: Bucchi, M & Trench, B. 2008. *Handbook of public communication of science and technology*. London: Routledge.

Cilliers, P. 1998. *Complexity and Postmodernism.* London: Routledge.

Davies, M & Meskimmon, M. 2003. Breaking the disciplines: reconceptions in knowledge, art & culture. London: I B. Taurus.

Fouskas, V. & Gokay, B. 2012. A definition of global faultlines. In: Globalfaultlines. A great wordPress.com site. http://globalfaultlines.org/a-definition-of-global-faultlines/ (accessed: 2012/08/02).

Hobsbawm, 1983:1 Hobsbawm, E. and Ranger, T. 1983. *The Invention of Tradition.* Cambridge: Cambridge University Press.

Honderich, T 1995. *The Oxford companion to philosophy*. Oxford: Oxford University Press. Honderich, T. 1995, *The Oxford Companion to Philosophy.* Oxford: Oxford University Press.

Hountondji, P. 1997. *Endogenous Knowledge: Research Trails*. Senegal: CODESRIA.

Lévi-Strauss, C. 1966. *The Savage Mind.* London: Weidenfeld & Nicholson.

Lévy-Bruhl, L. 1910 [1985]. *How Natives Think*. Princeton: Princeton University Press.

Lewenstein, B. & Brossard, D. 2006. Assessing models of public understanding in ELSI outreach materials. Report. Cornell University.

Lewenstein, B. 2003. Models of public communication of science and technology. www.dgdc.unam.mx/assets/pdfs_feb04.pdf. Accessed: 4 June 2012

Lewis-Williams, D. 2002. *The mind in the cave: consciousness and the origins of art.* London: Thames & Hudson.

Le Quellec, J. 2004. *Rock art in Africa: Mythology and legend.* Paris: Flammarion.

Masolo, D. A. 2002. Rethinking communities in a global context. In: Coetzee, P. H.& Roux, A. P. J. 2002. *Philosophy from Africa*. Cape Town: Oxford University Press.

Nicolescu, B (1996) *La Transdisciplinarité*. Paris: Rocher.

Nicolescu, B. 2002. *Manifesto of Transdisciplinarity.* New York: SUNY Press. (translated from the French by Karen-Claire Voss).

Nicolescu, B. 2005. Towards transdisciplinary education. In: The Journal for Transdisciplinary Research in Southern Africa. Vol. 1. Nr. 1. December 2005. Pp: 5 – 16.

Nicolescu, B (ed.) (2008) *Transdisciplinarity: Theory and Practice*. New Jersey: Hampton Press.

Okpewho, I. 1992. *African Oral literature. Backgrounds, character and continuity.* Bloomington and Indinapolis. Indiana University Press.

Rancière, J. 2005. (first edition 1983). *The Philosopher and his Poor*. Edited by Parker, A. 2005. Durham: Duke University Press.

Rancière, J. 2006. Thinking between disciplines: an aesthetics of knowledge. Parrhesia. Number 1. Pp: 1 – 12.

Raza, G & du Plessis, H. 2002. *Science, Craft and Knowledge*. Pretoria: Protea Book House.

Raza, G. & du Plessis, H. 2003. Science and indigenous knowledge in a culturally diverse world. In: *Africa Insight*, vol. 33, no 3, September.

Riana, D. & Habib, I. 2004. *Domesticating Modern Science.* New Delhi: Tulika Books.

Said, E. 1978. *Orientalism*. London: Penguin Books.

Said, E. 1994. *Culture and Imperialism*. London: Vintage.

Said, Edward. 1995. *Peace and its discontents. Gaza – Jericho 1993 – 1995*.London. Vintage.

Sardar, Z. 1998. *Postmodernism and the Other. The New Imperialism of Western Culture.* Washington: Pluto Press.

Sardar, Z. 1999. Orientalism. Buckingham. Open University Press.

Sardar. 2002. *Introducing Science*. Cambridge: Icon Books.

Scruton, R. 2002. *The west and the rest: globalisation and the terrorist threat*. New York: Continuum.

Skinner J. D. & Chimimba, C. 2005. *Mammals of the Southern African Subregion*;. Cape Town: Cambridge University Press.

Starkey, A. 2001 . Unpublished article on IKS. Durban. Technikon Natal.

Steiner, C. 1994. *African Art in Transit*. Cambridge: Cambridge University Press.

Teffo, L. 2002. Themes in African metaphysics. In: Coetzee, P. H. & Roux, A. P. J. Philosophy from Africa: a text with readings. Cape Town: Oxford University Press.

Trench, B. (2008). Towards an analytical framework of science communication models. In: Cheng, D. and Claessens, M. and Gascoigne, T. and Metcalfe, J. and Schiele, B. and Shi, S., (eds.) *Communicating science in social contexts: new models, new practices*. Springer Netherlands

Torgovnick, 1990:20). Torgovnick, M. 1990. *Gone Primitive; Savage Intellects, Modern Lives*. Chicago: University of Chicago Press.

Vinnicombe, P. 2001. *People of the Eland. Rock paintings of the Drakensberg Bushmen as a reflection of their life and thought.* Johannesburg: WITS University Press.