

# A COMMENT ON CRITIQUES OF THE ARTICLE *AGE- AND EDUCATION-RELATED EFFECTS ON COGNITIVE FUNCTIONING IN COLORED SOUTH AFRICAN WOMEN*

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## ABSTRACT

A recently published article on the cognitive functioning of coloured women, authored by five Stellenbosch University academics received much criticism from those in the academy and those outside. The public outcry focused mainly on racial essentialism evident in the article. But, there were also other criticisms, which focused on the scientific merit of the article, the peer-review process and ethical regulation at Stellenbosch University. In this article, I revisit some of the criticisms levelled against the research reported in the article, which was published in the journal *Aging, Neuropsychology and Cognition*, and argue that criticisms raised in the wake of the publication should be contextualised within broader debates. I aver that our response to racism in science should not concern merely exorcising racism from science content but that modern western science needs to be decolonised. Furthermore, an analysis of peer-review and ethical regulation in the Nieuwoudt et al. (2019) case should not focus simply on whether reviewers did their work or not, but that the dominant systems of peer-review and ethics creep in the neoliberal university should come under scrutiny.

**Keywords:** decolonisation; modern-western science; peer-review; race science; research ethics

## INTRODUCTION

There has been justified outrage about a recently published article entitled *Age- and education-related effects on cognitive functioning in Colored South African women*, authored by five academics associated with the Department of Sport Science at Stellenbosch University. The authors, Nieuwoudt, Dickie, Coetsee, Engelbrecht and Terblanche (2019), argue that “colored women in South Africa have an increased risk for low cognitive functioning as they present with low education levels and unhealthy lifestyles”. Based on public outcry, including a petition signed by thousands, the article was retracted by the journal, *Aging, Neuropsychology and Cognition* (<https://www.tandfonline.com/doi/abs/10.1080/13825585.2019.1598538>).

A myriad of articles have been written that criticise the authors’ work and symposia have been held to debate issues that arise from the article. Some of the criticisms include: that the

research depicted in the article smacks of racial essentialism; that the authors commit a perennial error evident in biomedical sciences research to connect race with medical conditions (Jansen, 2019a); that the research has methodological flaws, including its sample size (Shange, 2019); that the findings of the research is painful to women who were designated Coloured during apartheid and has elicited anger (Kassen, 2019); that the research is a product of an institution that has a long history of producing racial science, and that there is an enduring racism in science (Kuljian, 2019); that serious questions should be asked about the peer-review processes that the research was subjected to, including the work of the Research Ethics Committee (REC) at Stellenbosch University (Dano, 2019); and so forth. I support much of the criticism levelled against the research produced by Nieuwoudt et al. (2019). However, there are some matters invoked by critics on which I shall provide critical comment. These issues are evident in some of the articles written by critics and/or surfaced in a recently held symposium entitled *Restructuring Science and Research at SU on the basis of justice, inclusion and ethical integrity at Stellenbosch University* (<https://www.youtube.com/watch?v=YkdmIZqR3oY>). The four matters I shall specifically comment on are: the invocation of “race science”; the link between race science and (de)colonisation; peer-review in science; and research ethics.

## **RACE SCIENCE**

One of the themes that has emerged from criticisms levelled against the Nieuwoudt et al. (2019) article is “race science”. Variations of the term were used by panelists at the Stellenbosch University symposium I mentioned earlier: “racial science” (Jonathan Jansen); “scientific racism” (Handri Walters); and “race-based science” (Babara Boswell). There might be nuanced differences in meanings among these variations, but all refer to a particular category of modern western science (MWS) where race is used in problematic ways: as a variable in science that defines certain groups of people in deficit terms; and/or refers to research, which makes flawed links between “race” and medical conditions, for example. However, race science is not a uniquely South African concern and we are witnessing the re-ascendency of race science internationally. When British science journalist Angela Saini (2019, n.p) writes about race science that is on the rise again, she is referring to how science is being manipulated in subtle ways by far-right wing figures/groups to advance their perverse agendas. She writes:

“I have spent the last few years investigating the tumorous growth of this brand of intellectual racism. Not the racist thugs who confront us in plain sight, but the well-educated ones in smart suits, the ones with power .... I’ve encountered tight networks, including academics at the world’s leading universities, who have sought to shape public debates around race and immigration, gently nudging into acceptability the view that ‘foreigners’ are by their very nature a threat because we are fundamentally different.”

Awareness of race science or its variants is important because such awareness enables us to engage the challenges it presents locally and in transnational spaces. But, the invocation of race science might hide a bigger problem, a system of thought, an order of things that I shall call “modern western science” (MWS). I contend that MWS is the system of thought that makes race science possible. Moreover, that if the dominance of MWS remains unchallenged, racism will be an enduring theme in science – its subtle forms will go largely unnoticed and its more overt forms will rear its ugly head from time to time as is evident in the Nieuwoudt et al. (2019) article, which elicited public outrage.

By MWS I mean the Eurocentrism (and we can add androcentrism and egocentrism) entrenched in what is commonly referred to as science in the English language. I am referring to a local knowledge that was coproduced with industrial capitalism in north-Western Europe in the 17<sup>th</sup> century. Moreover, that its internationalization into what we call MWS was enabled by the colonisation of other places in which the conditions of its formation were reproduced (Gough 2003). It is for this reason only that MWS has the appearance of universality and seemingly lacks the cultural fingerprints that might be more obvious in other ways of knowing such as to what is commonly referred to as indigenous knowledge (Gough 1998; Le Grange 2000). In short, without colonisation MWS would not have existed, we would have had a radically different conception of science and there might not have been a conversation about race and science.

Given its original site of production, MWS is necessarily imbricated in European history, including the humanism that European Enlightenment produced. Humanism espouses a particular connotation of human, first formulated by Protagoras as, “man the measure of all things”, but later renewed during the Italian Renaissance as a universal model, which is depicted in Leonardo da Vinci’s Vitruvian Man (Braidotti 2013, 13). According to Braidotti (2013, 15) in the nineteenth and twentieth centuries Europe announced itself as the origin and site of critical reason and self-reflexivity based on the Humanistic norm. Moreover, resting on this norm was the belief that Europe was not only the seat of universal consciousness but that this consciousness transcended its locatedness – that humanistic universalism was Europe’s particularity. Humanism became the impetus for European imperialism and colonialism that was aided and abetted by the use of military power. But it also produced what Braidotti (2013, 15) terms, the “dialectics of self and other” where difference has a pejorative connotation. In other words, European identity (embodying consciousness, universal rationality and autonomy) became the mirror against which others were declared different and therefore inferior. Eurocentric knowledge of the natural world was deemed to be science whereas other

knowledges of the natural world were viewed as culture. The dialectics of self and other became the justification for sexism, racism and the separation of human and nature (the more-than-human world). It is therefore not surprising that MWS has been implicated in several manifestations of what Levinas (2006) called the “crisis of humanism”: Nazism, atomic and biological warfare, environmental destruction, racism, and so forth (for more detail, see Le Grange 2013).

MWS did of course not develop free from the influence of other knowledges. However, such knowledges were absorbed into a western cultural archive and represented in western terms back to the west and the other-than-west. Smith (1999, 44) points out that Western knowledges, philosophies and definitions of human nature form what Foucault (1972) has referred to as a cultural archive. According to her the archive could also be referred to as a “storehouse” of histories, artifacts, ideas, texts and/or images, which are classified, preserved, arranged and represented back to the West. Smith (1999, 44) argues that although shifts and transformations may occur within Western thinking this happens without changing the archive itself, nor the modes of classification and systems of representation contained within it, being destroyed (Smith 1999, 44). In other words, systems of classification and representation enable different traditions or fragments of traditions to be retrieved and are formulated in different contexts as discourses, and then played out in systems of power and domination, with material consequences for colonised peoples (Smith 1999, 44). She points out that the archive not only contains cultural artifacts, but also is itself an artifact, that is, a construct of Western culture. The upshot of this is that MWS has not paid homage to the influence of other knowledges that it has absorbed and reconfigured.

Therefore, the task confronting us is not merely to exorcise race (racism) from science but to decolonise modern western science. By decolonise I mean to decentre (not destroy) it, by stripping it from the epistemological and methodological privileges it enjoys, placing it on the same plane as other ways of knowing that provides the basis for equitable comparison. In other words, science needs to be democratised. Moreover, that all practices involving inquiry into the natural world should be legitimately viewed as science so that science is by definition multicultural and not universal. Whilst it is hard to deny that MWS has brought some benefits to humanity and is efficacious, many confuse efficacy with truth. Because something works does not mean that it is true. By truth I mean a correspondence between human knowledge and reality. Science has, and will always be the product of human will and intention – scientific knowledge will always be culturally and historically produced. And if we are to speak in any sense about objectivity in science, then it has to be objectivity that is a product of science that is multicultural and not universal.

## DECOLONISATION

This brings me to a second concern, one that emerged in the discussion at the recently held symposium at Stellenbosch University. In response to a member of the audience who asked how the discussion on race and science relates to decolonisation and the students' protests of 2015/2016,<sup>1</sup> Jonathan Jansen answered, "I don't think that decolonisation is the problem that we are dealing with here ... this is straight forward, up and down racism" (<https://www.youtube.com/watch?v=YkdmIZqR3oY>). Jansen (2019b) seems to suggest that we can speak about racism in ahistorical terms, which incidentally contradicts his own presentation that traces some of the history of racism in science at Stellenbosch University, which he then connects to the Nieuwoudt et al. (2019) article. In contrast to Jansen I argue that there is a nexus between race science and decolonisation, which I shall elaborate on briefly.

Decolonial scholars from Latin America such as Quijano (2007) have helped us to understand that even though colonialism as a form of government is no longer with us, a colonial matrix of power remains firmly entrenched. The colonial matrix of power relates to who exercises control over the land, economy, knowledge production and subjectivity. The content of critical conversations that unfolded since the publication of the Nieuwoudt et al. (2019) article, relate directly to questions of who controls the means and processes of knowledge production and who exercises power over subjectivity, and indirectly to power over economy, given the current age of academic capitalism and the ascendancy of neoliberal politics, policies and universities. Le Grange (2019) points out that in an era of knowledge capitalism, we are seeing the relocation of power (in the production of knowledge) away from the academy to the marketplace. The upshot of this are knowledge assemblages comprising multimillion dollar companies such as Thomas Reuters (owner of the Web of Science) and Elsevier Reeds (owner of Scopus), large commercial publishing houses such as Taylor and Francis, Springer, and Elsevier, and governments who measure return on research and development spend by the number of articles published in journals indexed on master lists of the Web of Science and Scopus. Put simply, an ensconced colonial matrix of power, makes decoloniality not only a useful but necessary analytic of racism in science.

Furthermore, indigenous scholars continue to invoke the concept decolonisation in postcolonial times. Māori scholar and activist Linda Tuhiwai Smith (1999) argues that central to the decolonisation project is "interrogating distortions of people's life experiences, negative labelling, deficit theorizing, genetically deficient or culturally deficient models that pathologized the colonized ...". What Smith (1999) describes, captures the essence of the criticisms levelled against the Nieuwoudt et al. (2019) article. So, the conversation on race and

science has everything to do with decolonisation/decoloniality.

## PEER-REVIEW

My third issue relates to critics' concern about the peer review process the Nieuwoudt et al. (2019) article was subjected to, captured in typical questions such as "how did the research pass peer-review?" Peers should certainly have done a better job, but focusing the criticism on the peers suggests that peer-review as a practice/system is unproblematic – the problem rests with the peers and not the system. Firstly, it is important to point out that peer-review is integral to a uniquely western performative mode of knowledge production that involves "forming disciplinary societies, building instruments, standardisation techniques and writing articles" (Turnbull, 1997, 553). In other words, Western modes of knowledge production are particular and not universal because some traditions create knowledge assemblages "through art, ceremony and ritual ...." (Turnbull 1997, 553).

However, even within MWS and its claims to universality, peer-review has never been a fixed system and is fraught with difficulties. In an article published in the journal *Nature*, Csiszar (2016) traces pivotal moments in the history of academic refereeing and points out that its history is recent, that peer review did not develop because of scientists' need to trust one another but as a consequence of political demands for public accountability. In another article published in the journal *Science*, Enserink (2001) argued that the connection between peer-review and quality of research is dubious. Moreover, the ethics of peer-review has come under the spotlight and there are doubts as to the integrity of the current system. In an article, Cawley (2011) identifies several ethical flaws with the peer-review system that currently dominates academic publishing. I shall briefly elucidate only one, as an example. Cawley points out that anonymity completely protects the reviewer from any consequences for an unethical act and also protects the reviewer from being incompetent. Anonymity enables reviewers to steal an author's ideas and results, delay a paper to allow publication of their own, and so forth. To overcome this ethical flaw, Cawley argues for an open peer-review system where the reviewer is known to the author and the public. Other ethical flaws of peer-review that Cawley identifies are: rejecting an article; publication delays; and incompetence and bias. There is no space to elaborate on these issues, suffice to say, the unit of analysis/criticism should not be the peers but the entire peer-review system – or at least the system that currently dominates. What the Nieuwoudt et al. (2019) case has inadvertently shown is the value of post publication review that some including Cawley (2011) argue for. Moreover, that retraction of the article might have been too hasty<sup>2</sup> a decision and that the journal, *Aging, Neuropsychology and Cognition*, might instead have invited post publication reviews of the Nieuwoudt et al. (2019) article.

## ETHICS

My fourth issue relates to criticism levelled against the work of the ethics committee, captured in a comment in an article authored by Dano (2019): “I cannot understand how the university’s ethics committee was so nonchalant to approve such research in the first place” (n.p). Of course, the ethics committee at SU might have been more circumspect and yes, it is unlikely that such a project would have been approved by an ethics committee at the University of the Western Cape, for example.<sup>3</sup> However, focusing only on the quality of the work of an ethics committee conceals a bigger problem vis-à-vis ethics committees in the contemporary university. Sutherland-Smith and Satmarsh (2011) aver that contemporary universities have been reconfigured as engines of economic growth, which has led to the erosion of ethical principles and conduct in universities, and are “now driven by corporate interest, competitive individualism, and the intensification of audit and surveillance regimes”. In the neoliberal university we are witnessing a phenomenon coined by Haggerty (2004), called “ethics creep”. Ethics creep refers to the expansion of ethical regulation from the biomedical sciences to the human and social sciences – referred to by some as the biomedicalisation of the humanities and social sciences. Guta, Nixon and Wilson (2013) argue that what we are witnessing in the contemporary (neoliberal) university is a shift from professional ethics rooted in academic norms to the codification of ethics through ethical regulation by external review bodies. This shift they argue, has created consternation among researchers that relate to some of the following:

- Ethics reviews are often reduced to tick-box exercises;
- Work of reviews boards are not transparent – they are often secretive
- Lack of consistency in interpretation and application of review boards
- Some forms of inquiry are burdened and others are privileged by ethical reviews
- Approaches to ethics are rooted in positivism and a biomedical conception of harm
- Ethics creep has been linked the erosion of academic freedom.

I argue that governance through ethics committees might also shift ethical responsibility from the individual researcher or team of researchers to a committee external to the research. Therefore, critical questions such as the following might not be asked: what does it mean to be an ethical researcher, am I an ethical researcher, what must I do to be an ethical researcher, etc.. My point is that it is not simply the work of the ethics committee (in this instance) that should

come under scrutiny, but ethics creep itself.

The problem with ethical regulation in the neoliberal university is that it is driven by a transcendent ethics – ethics is codified and imposed from the outside through mechanisms of regulation. Hence, unshackling ourselves from the fetters of neoliberal ethical regulation and overcoming the challenges presented by conflicting ethical discourses might be possible through practicing an immanent ethics. Smith (2011) argues that an immanent ethics draws the distinction between ethics and morality. Morality is defined as a set of constraining rules that guide and judge our actions and intentions. Janning (2015, 495) avers that moralistic questioning aims at leading one in the right direction and that the direction has already been defined before the question is asked. He states that in contrast ethics is a set of assisting rules that helps one in evaluating what one is doing, thinking and feeling “according to the immanent existence it implies”. Morality asks, “What ought we to do?” whereas ethics asks, “What might we do?” Therefore, if “ethical” principles serve as beacons for directing us in the right direction then they belong in the realm of morality. However, ethics instead requires all principles and ethical discourses to be put to the test, to be evaluated so that new values can be created – values that liberate us from ethical regulation in the neoliberal university. The Nieuwoudt et al. (2019) case presents opportunities for creating new values.

Furthermore, overcoming a transcendent ethics requires an understanding of how ethics is imbricated with epistemology and ontology. Such an understanding recognizes the agential capacity of those who researchers work with (human and more-than-human), which make possible ethical reciprocity. Feminist scientist Barad (2012:69) articulates the imbrication of ethics, epistemology as follows:

“Ethics is about mattering, about taking account of the entangled materializations of which we are part, including new configurations, new subjectivities, new possibilities .... Responsibility, then, is a matter of the ability to respond. Listening to the response of the other and an obligation to be responsive to the other, who is not separate from what we call the self. This way of thinking ontology, epistemology, and ethics together makes for a world that is always already an ethical matter.”

It is this understanding of ethics that Nieuwoudt et al. (2019) lacks and so will recommendations that might flow from the investigation into this case by Stellenbosch University if the focus is merely on how ethics committee members can improve the exercise of due diligence.

## **SOME PARTING THOUGHTS**

In reviewing criticisms levelled against the Nieuwoudt et al. (2019) article I am not arguing for a relativism where anything can count as science or knowledge – all science/knowledge should



be the product of intellectual and ethical reflection/judgement. However, what counts as science, how science it is legitimated and what it means to be an ethical researcher must be radically rethought in a context where the planet is on the brink of ecological disaster and the world is becoming increasingly unequal. Scientists need to cultivate sensibilities that are attuned to the agency of the humans and the non-humans they work/think with and understand that knowledge is produced in intra-action and not interaction with others (humans and non-human). Had Nieuwoudt et al. (2019) cultivated this sensibility they would have understood that the pain and hardship endured (as a consequence of apartheid and other colonising forces) by the women they did their research on, was also their pain. An Australian Aboriginal woman Lila Watson was purported to have said, “If you have come to help, then you are wasting your time. But, if your liberation is tied up with mine, then let’s work together.” One of the flaws of western empiricism is that it privileges two of the senses: sight (by extension observation) and hearing (by extension listening) – the pains, tastes and hunger of our bodies are largely ignored in western science. Which begs the question: what would be the value of doing cold, heartless research (in the name of science) when there will no longer be a decent planet to put it on?

I shall not conclude by dumping what I have said in a nutshell for the reader. Much more can be said on the issues that I have raised. May the conversation on race science, decolonisation, peer-review and research ethics continue so that we can co-create with all beings, a better world.

## NOTES

1. In contemporary South Africa there is a renewed interest in decolonisation that was spurred on by the student protests of 2015 and 2016, most notably the #RhodesMustFall and #FeesMustFall campaigns. The #RhodesMustFall campaign involved students at the University of Cape Town (South Africa’s oldest university) demanding the removal of the statue of British imperialist, Cecil John Rhodes, from its campus. For students (particularly black students) the Rhodes statue was a symbol of institutional racism and exclusion that they experienced at the university. In the #RhodesMustFall campaign students re-invoked Wa Thiong’o’s expression, which was captured in one of the banners of some protesters, “All Rhodes lead to the decolonisation of the mind”. The #RhodesMustFall campaign was closely followed by the #FeesMustFall campaign, which involved students at several universities in South Africa (mainly previously white universities) demanding free higher education.
2. Haste not only on the part of the journal, but on all of us who called for it.
3. I wish to point out that at the time of writing this article SU was busy with an investigation into its own processes of granting ethical clearance for the research project that the Nieuwoudt et al. (2019) article forms a part of. So, there is no evidence that the Research Ethics Committee (Human Research) neglected to fulfil its mandate.

## REFERENCES

- Barad, K. 2012. Interview. In *New materialism: Interviews and cartographies*, ed. R. Dolphijn and I. Van der Tuin. Ann Arbor, MI: Open Humanities Press.

- Braidotti, R. 2013. *The posthuman*. Malden, MA: The Polity Press.
- Cawley, V. 2011. An analysis of the ethics of peer review and other traditional academic publishing practices. *International Journal of Social Science and Humanity* 1(3): 205–213.
- Csiszar, A. 2016. Troubled from the start. *Nature* 532: 306–308.
- Dano, Z. 2019. Stellenbosch study on coloured women “draws on colonial stereotypes”. *IOL*. <https://www.iol.co.za/capeargus/news/stellenbosch-study-on-coloured-women-draws-on-colonial-stereotypes-22166233> (Accessed 30 April 2019).
- Enserink, M. 2001. Peer-review and quality: A dubious connection? *Science* 293(5538): 2187–2188.
- Foucault, M. 1972. *Archaeology of knowledge*. New York: Pantheon.
- Gough, N. 1998. All around the world: Science education, constructivism and globalisation. *Education Policy* 12(5): 507–524.
- Gough, N. 2003. Thinking globally in environmental education: Implications for internationalising curriculum inquiry. In *Handbook on curriculum research*, ed. W. F. Pinar. Mahwah: New Jersey.
- Guta, A., S. A. Nixon and M. G. Wilson. 2013. Resisting the seduction of “ethics creep”: Using Foucault to surface complexity and contradiction in research ethics review. *Social Science & Medicine* 98: 301–310.
- Haggerty, K. D. 2004. Ethics creep: Governing social science research in the name of ethics. *Qualitative Sociology* 27: 391–414.
- Janning, F. 2015. Towards an immanent business ethics? *Asian Journal of Humanities and Social Studies* 3: 492–500.
- Jansen, J. D. 2019a. Racist medical myths persist with SA’s diseased apartheid mentality. *TimesLive*. <https://www.timeslive.co.za/ideas/2019-04-25-racist-medical-myths-persist-with-sas-diseased-apartheid-mentality/> (Accessed 26 April 2019).
- Jansen, J. D. 2019b. Panel presentation at the Restructuring Science and Research at SU on the basis of justice, inclusion and ethical integrity symposium. Stellenbosch: Stellenbosch University.
- Kassen, J. 2019. Stellenbosch University report on coloured women hinders progress – ANCYL. *Eyewitness News*. <https://ewn.co.za/2019/04/29/ancwl-outraged-over-stellenbosch-university-report-on-coloured-women> (Accessed 15 May 2019).
- Kuljian, C. 2019. Study signals enduring racism in science. *Mail & Guardian*. <https://mg.co.za/article/2019-05-10-00-scientific-racism-rears-its-head-again> (Accessed 15 May 2019).
- Le Grange, L. 2000. Is there a “space” for enabling disparate knowledge traditions to work together? Challenges for science (education) in an African context. *South African Journal of Education* 20(2): 114–117.
- Le Grange, L. 2013. Why we need a language of (environmental) education. In *International handbook of research on environmental education*, ed. R. B. Stevenson, M. Brody, J. Dillon and A. E. J. Wals, 108–114. New York: AERA & Routledge.
- Le Grange, L. 2019. On “predatory” publishing: A reply to Maistry. *Journal of Education* 75: 19–32.
- Levinas, E. 2006. *Humanism of the other*, trans. Nidra Poller. Urbana and Chicago: University of Illinois Press.
- Nieuwoudt, S., K. E. Dickie, C. Coetsee, L. Engelbrecht and E. Terblanche. 2019. Age- and education-related effects on cognitive functioning in Colored South African women. *Aging, Neuropsychology, and Cognition*. <https://doi.org/10.1080/13825585.2019.1598538>. Published online 28 March 2019.
- Quijano, A. 2007. Coloniality and modernity/rationality. *Cultural Studies* 21(2–3): 168–178.
- Saini, A. 2019. Why raise science is on the rise. *The Guardian*. [https://www.theguardian.com/books/2019/may/18/race-science-on-the-rise-angela-saini?CMP=Share\\_AndroidApp\\_Email](https://www.theguardian.com/books/2019/may/18/race-science-on-the-rise-angela-saini?CMP=Share_AndroidApp_Email) (Accessed 20 May 2019).
- Shange, N. 2019. Study on coloured women’s intelligence scientifically flawed, says professor.

*TimesLive*. <https://www.timeslive.co.za/news/south-africa/2019-04-25-study-on-coloured-womens-intelligence-scientifically-flawed-says-professor/> (Accessed 26 April 2019).

Smith, L. 1999. *Decolonising methodologies: Research and indigenous peoples*. London, UK: Zed Books.

Smith, D. W. 2011. Deleuze and the question of desire: Towards an immanent theory of ethics. In *Deleuze and ethics*, ed. D. W. Smith and N. Jun, 123–141. Edinburgh: Edinburgh University Press.

Sutherland-Smith, W. and S. Saltmarsh. 2011. Guest Editorial: In search of the ethical university. *Ethics and Education* 6(3): 213–215.

Turnbull, D. 1997. Reframing science and other local knowledge traditions. *Futures* 29(6): 551–562.