

**Reframing the Cathedral:
Opening the Sources of Technologies and Cultural Assumptions**
Sara Diamond, The Banff Centre
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Technologies embody assumptions about the designer and audience. As designers and artists from diverse communities begin to construct virtual spaces, they seek expression for the cultural differences that they live. These expressions require that technologies be available and that tools and design methods must be adaptable in culturally specific ways.

Many challenges confound the use of current creative tools by culturally diverse users. Mark Green, a computer scientist and tool designer lays out the problem:

Most artists do not deal with the underlying technology of digital media, but instead use some form of authoring tool to produce the digital content for their pieces. While authoring tools are of great assistance in the development of digital content, there is a price to be paid for their use. An authoring tool makes part of a technology accessible to the content designer. The amount of coverage varies from tool to tool, but it rarely covers all of the technology and in many cases it misses significant parts of it. In this way, the authoring tool introduces its own bias into the creative process by making certain types of content easier to produce and not supporting the production of other types of content. ¹

The visual aesthetics of tools tend towards binary, linear, rectangular aesthetics. Music tools employ MIDI, in turn based on the Western keyboard. The Western bias is not intention, rather a result of where tools are designed. There is little incentive for commercial tool producers to make culturally specific tools since their largest market is North America and Western Europe. Designers using these tools can either unconsciously express a cultural bias that is far different from their own aesthetics or reprogram the tool? At the recent Dak'Art Biennale of African Contemporary Art there were a number of cross disciplinary projects by young African artists (Senegal, Nigeria, and Ivory Coast) all of whom worked from traditional and contemporary music including hip-hop, which they authored, combined with graphics that they generated. While the work was engaging, the artists struggled to make it within the rhythmic structures and instrumentation created by MIDI. Even MAX, a physical interface technology that is highly responsive is based on MIDI.

Tools enable classical perspective, not rich planar perspectives or connotation of time and space that requires many transparent layers. It is hard to “make mistakes” as part of a digital aesthetic that then refers to history or craft, or have a sense of hand tooling on the part of the artist—digital tools are meant to be clean and without artefact. Tools favour

¹ Mark Green. Bridges II. (2002) Cultural Implications of Authoring Tools, An Opportunity for Collaboration Research and Development, School of Creative Media, City University of Hong Kong

symmetry over asymmetry. Tools are not easily accessible to the learner. Designers often need to be able to program in order to shift aesthetics. On the other hand, some tools are almost impossible or illegal to reprogram and adjust. Tools are often designed for individual use and the results of their applications for individual experience, yet many cultures favour collaborative forms of expression. Finally, there is little ability to constrain access to knowledge for different groups, or create levels of security, for example around sacred histories that a community needs to access but outsiders should not.

This said there are benefits and apertures within the space of technology. Not all tools work against the aesthetics of difference. Hyper text and game making software fits more accurately within Aboriginal Australian world views argues Christine Morris.² Internet security tools, a result of commercial needs and the homelands security push might help communities protect their intellectual property and still permit access from within. Extreme programming is becoming a norm in the corporate software sector and open source has become mainstream, allowing more collaborative technologies and processes to emerge. Open source remains biased towards the West but by its very nature permits tools to be adapted to context. Localization efforts of large-scale new media products are not always a success. Some manufacturers such as Hewlett Packard and Samsung are beginning to understand that they need to create from the culture up in order to seed products into these markets. HP has invested significantly into India to support indigenous graphics centers and new community-based printing technologies.³

The challenge of representing indigenous aesthetics in the context of the design bias of tools is evident in art works by Aboriginal new media makers. It is also present in the aesthetics that artists from developing nations bring to new media design. There are productive tensions of adaptation and design as artists and designers from a culturally diverse background challenge assumptions about perspective, navigation, form and time. Globalization provides technologies, locales of training and access. Youth music cultures are already hybrid, valuing influences from all over the world. There is a strong sense of visual culture and identity that many entering the creative digital world bring with them. As more and more cultures are on-line, digitized and in communication, the pressures on tool makers in the West to include open ended aesthetics and the competition from makers all over the world who will create tools that allow a diversity of beauty within digital culture is already occurring. As well, new cultural forms challenge a new media aesthetics that tend towards coolness, or an appropriation aesthetics that quotes from original cultures but does not integrate these into the production equation.

These challenges exist in designing from an African or Aboriginal perspective, from a Brazilian, Japanese, Chinese, Indian perspective. Some of these domains have experienced a significant penetration of technology and have programming capacity. Brazilians, for example, have designed their own software, teach programming and contribute to an international dialogue, but with some frustration. They have dealt with

² Bridges Conference II, Banff, AB, October, 2002.

³ The Sims was a failure when introduced into Asian markets.

economic disparities by creating “pocket caves” that are portable and cheap venues for virtual reality work.⁴

Certainly artists all over the world have become toolmakers as well, in an attempt to address the inadequacies of mass produced software tools. Digital artists such as Elizabeth VanderZaag, Andre Ktori, Mary Flanagan, Sher Duff, Simon Pope, Hermani Diamante, and David Rokeby have developed tools, as a form and force for sociality. This is different from previous avant gardes. Olga Goriunova, a spokeswoman for code art would argue that software is a culture in its own right. And that code, as a language system, reflects at least two cultures, that of software and that of the coder’s context.

At the Bridges Conference of 2002 in Banff, artists, designers and technologists from Hong Kong discussed the problem of traditional Chinese aesthetics and calligraphy and the lack of graphics tools capable of rendering these approaches into visual images. Teams of programmers working with traditional and contemporary artists lead incursions into graphics difference. Mark Green states the challenge:

A good example of this is the impending disappearance of Chinese animation. Over the past 40 years a Chinese animation style has been developed, but it is in danger of disappearing since it isn’t supported by modern animation software. The only way of producing this animation style on a computer is to produce it frame-by-frame using tools like Photoshop. Young animators in China are learning North American 3D animation packages, and are largely unaware of the animations that have been produced in their own country. If there were reasonable tools for producing Chinese style animation this might not be the case.⁵

China has the capacity to create its own technologies as demonstrated by the creation of its unique wireless standard and its capacity of ten million programmers and engineers, why not graphics software? The Beijing Millennium Project of 2004-5 which began this May and ends next July, is precisely this initiative, bringing together all Chinese art and design schools, computer science faculties and international new media centres and schools.⁶

Lawrence Paul Yuxweluptun is a graduate of the Emily Carr Institute of Art and Design. Yuxweluptun documents and promotes change in contemporary Canadian history in large-scale paintings, using Coast Salish cosmology, Northwest Coast formal design elements, and the Western landscape tradition. His painted works explore political, environmental, and cultural issues. His personal and socio-political experiences enhance this practice of documentation.⁷ Shaman dancing in the Sunset provides insight into Yuxweluptun’s style—he draws from myths, cultural forms and landscape to comment

⁴ Diana Domingues, (2003) Carbon Versus Silicon: Thinking Small, Thinking Fast, Banff.

⁵ Green, *ibid*.

⁶ This massive initiative included an exhibition in 2004 of all the schools and institutions, including Pratt, Banff, V2, ZKM, and many others, culminating in a symposium, and massive show as part of the Beijing Biennial in 2005.

⁷ Canadian Museum of Civilization, (1993) Ed. *In the Shadow of the Sun: Perspectives on Contemporary Native Art*. Hull, Québec: The Museum.

on the ongoing value of those histories.⁸ Other works graphically cartoon the political and social crisis of the white/aboriginal encounter, including the devastating and celebratory experiences of reservation life. His work resonates with respect for the environment and for his culture. Work in the last five years is moving towards abstraction, away from explicit narrative or characters. “Most recently, he has been transforming the abstract ovoids that are traditional northwest coastal imagery into colour field compositions that fit right into the new millennium's revived appetite for smart abstraction.”⁹

Petra Watson curated a retrospective of his work. She says the following:

Colour Zone presents an inquiry into the limits and myths of modernist painting and aesthetic 'primitivism'. Lawrence Paul Yuxweluptun's figurative and abstract paintings, and etchings construct a modern/'primitive' encounter, that is as much a means of inscribing a new aesthetic concept of form and space, as it is an inquiry into colonial imperialism. Yuxweluptun has referred to his work as "history painting." The power to colonize is therefore positioned within these works as a partial, but unfinished, extension of modernism. Conditions reside as a 'zone' with both aesthetic and political meaning.¹⁰

In 1991-3 Lawrence Paul Yuxweluptun created "Inherent Rights, Vision Rights" at The Banff Centre, a PC platform virtual reality work. It was revived for exhibition in the late fall of 2003 at The Banff Centre, having shown in Paris at the Pompidou Centre and the National Gallery of Canada and will travel to Beijing in 2005.¹¹ Lawrence Paul Yuxweluptun provided new insights into the limits and potentials of computer generated imagery. His vivid, colourful paintings loaned themselves to three-dimensional navigation. The challenge was to construct the images as graphics images (wire frames and then graphics) and then to create the appropriate ceremonial dance movements through the sacred space of the long house. The long house was inhabited by powerful figures that hovered, emitting sounds. The movement in the long house needed to be circular, from the formal values of the figures to the seating of the guests.

The second challenge was how to structure levels of access to the images through paths of movement that kept the viewer at a culturally appropriate distance from the spirit figures and respected protocol. Lawrence Paul Yuxweluptun assumed that the audience would be non-Aboriginal viewers who were not party to the traditions of his people and would not have permission to approach the spirits. The manipulation of distance, the physics of apprenticeship and hierarchy were not easily available in the tool sets.

He described virtual reality technology as “a very primitive technology” compared to Aboriginal science and art.¹² This said Vision Rights remains a haunting and immersive

⁸ <http://www.galleriescanada.com/vancouver/van01815.htm>,

<http://www.galleriescanada.com/vancouver/van01808.htm>

⁹ http://www.nowtoronto.com/issues/2001-12-06/art_reviews.html

¹⁰ Colour Zone Curated by **Petra Watson**, Plug In ICA, Traveling Exhibition

¹¹ <http://www3.bc.sympatico.ca/artist/virtual.htm>

¹² Television Interview (2005) Bravo.

piece of virtual reality art, despite its decade long longevity, precisely because the issues of approach, graphic representation and navigation were solved through careful programming.

A larger question about the larger role of language in structuring culture is fundamental to this case study. Aboriginal practitioners such as Cheryl L'Hirondelle, Candice Hopkins and Luanne Neal underscore the ways that language shapes the telling of the story, its mode of expression as well as its content. To tell Aboriginal stories in contemporary cultural forms, the work needs to remain embedded in its language of origin with all its richness, nuance and modality.¹³ Cree for e.g., a language spoken across the West, and used for trading amongst different banks has sixty words for love and sixty words for suffering. According to Aboriginal cultural practitioners, keeping language alive is fundamental to keeping culture alive. This provides a direct challenge for artists, writers, and others from Aboriginal communities who wish to use digital tools to express culture. As well, many languages, such as Cree, Inuktitut, use visual syllabic forms of expression, which offers an exciting connection to other visual languages.

The CREE ++ project was conceived at the Skinning Our Tools Designing for Culture and Context summit at BNMI. It links Aboriginal artists, linguists, and computer scientists and designers from various cultures who are interesting in rebuilding tools from the linguistic concepts of Aboriginal and other languages which remain alive today. After L'Hirondelle, Hopkins and I worked in Dakar this summer, the project expanded to include non-Canadian Aboriginal languages, such as Wolof from French Africa. Wolof is the trading language that bridges across French Africa and is rooted in the original languages of Senegal, Cote d'Ivoire and other West African nations. The BNMI, Dak'Art Lab, Aboriginal Arts at The Banff Centre and UC Irvine are currently developing strategies and alliances to launch this research program.

African artists, in particular those from Senegal, Cote D'Ivoire, South Africa, Nigeria, Algeria and Morocco are beginning to design virtual spaces. The aesthetics of Senegalese design are visually rich, layered, with flat perspective. In bringing their specific aesthetics forward, artists reject the notion of a national culture, preferring to peak for subcultures and specific histories. One of the goals of this practice is for African artists to speak to Africans. The active trading up the West Coast of Africa amongst tribal groups ended by the 19th century and traditional religion and culture was layered with Islamic traditions and then those of France, Spain and Portugal. This shifted many dynamics, including gender, as the previous equity of sexes was then layered with patriarchy. Africans had little control over the technology or its implementation and little effective science education. Technology remained mystified and activists rejected rather than embraced it. This is beginning to shift and a new generation of artists and designers who are a "geek corps", often female, who work in collaborative ways with the new tools, bringing forward their aesthetics.¹⁴

¹³ Check Tell, Issue 17 of www.Horizonzsero.ca for a discussion of narrative, Aboriginal story telling and language with comparative studies of other language based expressions.

¹⁴ Fatoumata Kande Senghor, Collaboration is a Language and Report on Bridges II, An African Perspective.

Taki E'Bwenge, a Senegalese art historian, describes new media art as a rite or instrument of "passage", a state of being, conscience, knowing and development, holding the past and the future in a shared space. He says, "This is to say that passage, means metamorphosis, evolution and transformation and above all that the qualities are recognized, their power of transformation recognized and the power of transformation is without doubt the characteristic fundamental of artistic expression that is intercultural and African." He argues that technology redefines African experience at both the local and global level, opening up the potential to sustain a relationship with current practice and the future. He sees "passage" as the movement from one full state of being to another, from a traditional aesthetic to a modern one, from the artisan to high technology, from fabrication to conceptual. The challenge is to sustain these past states or characteristic of the culture within the new forms of expression. He states:

The important aspect of work is the idea of the passage of time, the idea of evolution, not a rupture, but a set of continuities that are part of the future. A movement, a stable state that is a way of being, of development already accomplished. This is like traditional musical instruments that allow for development within the culture, that include pieces made with new technologies—rites of passage from one culture to another, a place of bridges and of fusion between different aesthetics and artistic practices.¹⁵

His own project is to create a virtual museum of traditional African masks, within a three dimensional architecture that carries the aesthetic values of Western Africa. He feels that the mask is the ideal portal because it is a reality in its own right, one that contains the energy of the organism that is represented, that of the wearer and their transformation into one entity.

Ahasiw Maskegon-Iskwew is a Cree Metis artist who took early aesthetic strides forward in creating Aboriginal new media works that made use of the capacities of the technology of the time, 1996-7, using graphics, text and audio as an envelop for a story cycle form. *Speaking the Language of Spiders* engaged fourteen Aboriginal artists, writers, and composers in the development of a time cycle that stretches from the beginning of time to infinity and then goes back to the beginning.¹⁶ The powerful work speaks of the life cycle and different ways of living through experiences, immersed, contemplative, suffering, and filled with hope. It is a beautiful, multi-layered interactive experience that sustains its power many years later.

Christine Morris stresses the relationship between new media experience, respect for elders and the land, as she calls it *The Law*. She says that we must, "fully comprehend that technology is subordinate to the culture and especially the Law. If you do not see the

¹⁵ Presentation at Bridges Two, The Banff Centre, 2002.

¹⁶ First produced at the Banff Centre this very visual site has been presented at the Canadian Cultural Centre in Paris and is now hosted by the St. Norbert Arts Centre in Winnipeg and the Dunlop Gallery in Regina. <http://www.snacc.mb.ca/projects/spiderlanguage/>

power of the culture you will never understand the place of technology.”¹⁷ Access to traditional information requires that the participant earn the right to the information through their behaviours within a larger physical community. On the other hand, it is imperative that Aboriginal people represent themselves with the new tools, “In one of the most remote regions of the Australian continent and the world, Pitjantjatjara Yankunytjatjara [PY] Media faces the day-to-day challenge of using the latest tools and techniques of communication to preserve and enhance the culture of the people of the Pitjantjatjara Lands so that that culture may endure and continue to grow as a vital part of the global community.”¹⁸

Morris argues that hypertext, with its level playing field of association and fluid movement of time, provides an ample place for Aboriginal artists and producers. Games structures and visual language are more appropriate to Aboriginal cultural forms than written English, opening up creative territories for Aboriginal artists and learners. David Vadeloo is a convergent media artist who works in Alice Springs, Australia with Aboriginal youth who design tangible objects like bicycles and interactive graphics and video environments that afford dialogue and play acting. What emerge are powerful hybrid images that hover between the spaces and historical time zones of Australia.

Collaborative Culture

Collective cultural identity is built on the basis of a shared archive, which requires the development of databases that incorporate our histories and tools that allow navigation. Databases are deep repositories or encyclopaedia of knowledge, written on silicon. How do navigators make decisions? In response to this problem and to their own observations, artists have made local data navigation tools, or search engines, dedicated to picking out cultural references. For example, Mongrel has created a tool that finds signs of “blackness” within the vast sentience of the Web and Net. Search engines are hierarchical, structured through an economy of use and positioning, with contingent meanings, identities drawn through associations. The database is levelled without the hierarchy of story; it is in actuality, never neutral. Participants author from given sources, the story is re-authored again through each threading; the narrative is collective by its very nature.¹⁹ To allow this, Mongrel’s authoring solution is a software system entitled Linker that allowed the easy structuring of a key words database by communities of interest, and ease of assembly. Music and its phrasing could be used to link visual imagery.

A later extension of this work was the ambitious Container Project now in its fourth year, led by Mervin Jarman and Camille Turner. Mervin and his team ship a basic computer learning/creation facility into a community, train a local group and community, either leave the technology there, shipping out an empty container, or find a local source of technology. The learning and creation and presentation situations are structured as

¹⁷ Christine Morris ABORIGINAL COLLABORATIONS- Within and Between NATIONS, within and Between CULTURES, “Indigenising the effects of Media Globalization” (2002) Bridges II.

¹⁸ Morris, *ibid.*

¹⁹ Manovich, Lev. (2001) **The Language of New Media**. Boston: MIT Press.

community experiences. Rather than individual towers, groups gather to work and experience the results. They finance their ongoing work by training users in the technology, the design systems and basic programming.

The **LINCOS** project is a remarkable collaboration between scientists and engineers, educators, government, health care providers, computer companies, indigenous leaders and communities and content developers.²⁰ It is a mobile, wireless dwelling or centre. It contains fundamental tools and infrastructure in a physical architecture that encourages community use of all sorts. The community decides the level of outside access that it wants and the form. The structure is built to withstand tropical conditions. Key to LINCOS is the development of community media literacy and adaptation of the LINCOS world.

When LINCOS was first tested in Costa Rica (its birthplace), families undermined the individual seating at desktops and forced organizers to let them sit in self-teaching groups.²¹ One of the most intriguing elements of the LINCOS environment is a bicycle that peddles through the village daily, with cellular phone capacity. Villagers take turns calling their relations, etc. The shared cost of the telephone by the entire village makes the service possible. As well, villagers can plan when they receive calls from outsiders. Of course, LINCOS also provides new markets for games, information, and services and brings global culture to non-first world contexts. However, communities control the influx of these media through group decision-making. It also allows local farmers to leave and monitor their crops while away, creating physical mobility and a stronger economy.

For Aboriginal groups in Canada, wireless and Internet technologies have been the key way to communicate their issues in confrontational contexts. Internet Radio has helped to create a virtual sense of community.²² These movements are part of a fabric of local interventions. At times, technology development becomes a necessary companion to content and context creation. During the last decade, Radio 90 developed at The Banff Centre. It concentrated at first on issues of work place organization as well as the development of an alternate music culture. For “Net Congestion” in Amsterdam, Radio 90 commissioned pieces from all over the world, including Croatia, Latvia and other sources in the former Eastern Europe. They also provided Aboriginal Arts training in Internet radio, helping to create a station in Morley. They collaborated with Shane

²⁰ LINCOS is led by **Franklin Hernandez-Castro**. This remarkable scientist researches the ways that, “the evolutionary process and brain architecture influence the perception of beauty.” He has applied this research in the design of tropical architectures appropriate to the culture and climate of Costa Rica, yet able to house sensitive computer technology.

²¹ Hernandez-Castro underscored the division of labor on their team when he spoke at Banff. Anthropologists and indigenous people were responsible for the tough critique of the systems’ impact on local life, not the engineering team.

²² Examples of artists whose work reinforces these tendencies: Blast Theory Kidnap and Matt Locke’s work with interactive dramaturgy.

In Canada—GPS environments, as well as cell coverage, map of communications
Mexican earth quake, versus NYC—ability to find people ASAP, instead of two weeks

Breaker, from Siksika First Nations to create a Blackfoot channel. They provide community news and entertainment. With the Internet, they can program for more hours of the day, allowing a connection with Aboriginal stations around the world. They worked with Aboriginal Arts to create "Sleeping Buffalo," a Banff indigenous station. In order to better share programs, they created a piece of technology, a scheduling program and the World Service Scheduler.

In 2001, Radio 90, with their Aboriginal companions, attended an event organized by eLab in the forest of Latvia at a former Soviet Space station. They created audio pieces for the space transmitter that considered globalization on earth. They trained former Soviet army personnel, abandoned in these remote forests of Latvia, in basic computer communications and net radio so that they could renew their link to their families and the world. Radio 90 concentrates on work in areas where there is little or no radio access. The group consists of Susan Kennard, Cindy Schatkoski, Yvonne Faught and Heath Bunting.

Carlota Brito's background is as an architect and artist. She also studied anthropology. She is from Belém (Pará), Brazil, and works at the Museu Paraense Emílio Goeldi. Of Aboriginal descent, she created a remarkable CD-ROM about the Ticuna Indians (Magüta Arü Inü) that was made with the indigenous group, carefully guarded access to their sacred information and clearly communicating the process and duration of ritual. A beautiful, accessible and ornate design work; it will be used within the community as a learning tool and in the museum. . She is also the technical coordinator of a CD-ROM about Goeldi Museum's scientific research (Museu Paraense Emílio Goeldi: An Amazonian Museum). As VRML has become open source, it had re-emerged as software that artists could employ to convey depth and multiple perspectives. Brito is now involved in an artistic project in Virtual Reality Modeling Language (VRML) based on the indigenous codices and symbols based on the collection of indigenous art at the museum.

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The fundamental design proposal, one user: one machine was antithetical to the ways that all of these communities related to technology. Fatoumata Kande noted a similar issue in Senegal where communities insist on group access and group sharing of information. Rather than individuate into individualistic consumer culture, these collective societies are pressing technology to be redesigned for collaboration.

Different cultures engage notions of symmetry and asymmetry in nature. Western science embraces symmetry, balance and perspective as fundamental values. Walter Karl Heisenberg in "Across the Frontier,"²³ states, 'Beauty is the proper conformity of the parts to one another and to the whole.' Some population scientists even pose relationships between evolution and symmetry. Complexity theorists on the other hand, state that symmetry is a simple state; it is only when symmetrical forms break into a morphological cascade that the development of complex systems and their understanding can occur.

²³ Harper, 1974, p. 183

This process moves beyond historical lineages and considers generative forms as a source. “Ordered complexity emerges through a self-stabilizing cascade of symmetry breaking bifurcations, through spatial detail...”²⁴ Some cultures have embraced complexity, discontinuity and asymmetry as organizing principles. “The radical unpredictability in the dynamics of non-linear systems leaves the possibility of unexpected novelty.”

For example, traditional Japanese aesthetics bias towards a beauty includes incompleteness and imperfection or imbalance. Beauty focuses on beginnings and endings, not the climactic moment. Kenko states “uniformity is undesirable. Leaving something incomplete makes it seem interesting.”²⁵ The viewer completes the perfection. Painters and sculptors embrace this notion of asymmetry encouraging engagement. Henry Moore chose to work with biomorphic forms that were asymmetrical, noting that the initial symmetries of nature were shifted by environment and gravity. This argument works well with interactive media that requires audience participation, and with work that does not resolve, but rather poses possibilities or questions. Social symmetries are reshaped by context. These problems offer design challenges in software that is made to erase “artefacts”, ruptures and to work quickly and best when symmetrical. How can software systems adapt to express these values?

Those living within the richness of post-modern culture in Senegal, for example, speak of the specificity of their representational systems, the depth of these, and the lack of access to technology, as well as the idealization of technology. Theorists such as Fatoumata Kande are aware of the gift that their culture carries, but she and many others want to consolidate the discourse within the context of African representation. They need the tools to produce new media works—they want to learn how to program as well as design in order to carry their aesthetics forward. This is a delicate negotiation—the recognition of cultures that have maintained a continuity with a natural science that speaks to dimensions beyond four, that sees time as a complex navigable object, that use circular forms and narrative in where scientists close their eyes and imagine models beyond our perception—a space perhaps linked to ritual, prayer rugs, mosaics. This space of invention, of imagination, is a space shared by art, non-Western mathematics and science. It is a space surrounded by our imaginings of Nature West and East. North and South.

The moon is an optical illusion, created by the atmosphere, the lens of our eyes, the speed of light and time. The moon expresses the pulls of gravity, the power of that which we cannot see, but feel. Some of the most dynamic work in new media calls on visualization and simulation -- the methods that scientists, computer scientists and designers use to make visual that which we cannot see, that which we see within the limits of human capacities and the models that we imagine. This science is rooted in manipulating the large-scale data sets of planetary systems. How can discourse be opened up to allow the simulation of the unseen, whether of emotion, natural processes, psychic states, the semantics of natural structures and systems that have been outside of the dialogues of

²⁴ Brian Goodwin, *Why the Leopard Lost His Spots*.

²⁵ Kenko. “Japanese Aesthetics”, *The Pleasures of Japanese literature*. New York: Columbia University Press, 1988.

science. Nanotechnology researchers who bring together biological and digital forms speak about the lack of metaphor and their need to rely on spiritual and language systems outside of Western culture in order to express the potentials of their discoveries. Mathematicians refer to mathematical systems and systems of visual representation that stem from North Africa, the Moorish tradition, from India, China. It is probable that forms of science and mathematics research share the demands of graphic arts computing for non-Western aesthetics.

Like her former student Carla Brito, Tania Fraga is a Brazilian architect and artist who specialize in the creation of interactive poetics based on 3D modeling, animation and VRML environments. Fraga has a Ph.D. from the Communication and Semiotics program at the Catholic University of São Paulo (1999). Fraga is Adjunct Professor of the Visual Arts Department at the University of Brasilia and Associated Researcher at the Polytechnic School of Engineering at the University of São Paulo in Brazil. Tania Fraga works in the domain of interdisciplinary collaboration between contemporary scientific studies with ancient knowledge systems for the creation of art works. This type of collaboration could stimulate the development of productive communication among artists, scientists and engineers, in particular pressing science towards considering other forms of scientific discovery. Fraga sees the need for,

“...An extended debate on identifying possibilities for poetic explorations through the superposition of scientific concepts re-elaborated by ancient techniques for the production of artworks. This convergence aims to explore possibilities for the creation of inter-disciplinary approaches integrating fields apparently antagonistic. The overlay of analytical methods, utilized by science, with analogical modes, used by shamans, brings forth practical methods for artists. It permits new structures to surface generating useful strategies. This attitude engenders skills and permits the construction of artworks, which weave and expand non-linear processes for their creation and establishes multiple treads towards structures successively more complexes.

Fraga created the spectacular Aurora 2001: Fire in the Sky and Hekuras. These works meld the scientific visualization of astrophysics phenomena into a dream-like aesthetic. Journeys are made either into the vortices of plasma ejected by the sun, or into scientific concepts such as “magnetosphere”, “solar wind”, “serapilheira” and “metabolism of the forest”, or, further, into the domain of mystical beings, represented within the artwork. Tania Fraga’s background positions her capabilities to bridge science and art, develop and then program her own tools, and create a work that is both critique and expression. . Fraga is currently creating, The Xmantic Web, “a sensitive "place" where the fluctuations of the impermanent process of becoming unfold. Within this multidimensional reality, people will interact, connect, and “transform this poetic space-time manifold. Inside the Xmantic Web, virtuality, the process of coming into being, and reality are complementary notions that may be expressed as visual experiences either in the form of images or mental perceptions”.²⁶ At a recent conference in Brazil, Arte y Tecnologia, Fraga discussed her frustration with the world of computer programming and her many

²⁶ <http://www.caiia-star.net/production/ConRef/Abstracts/FRAGA.html>

years of struggle to learn the tools herself and direct programmers to open their minds and VRML to her bold aesthetics.

Ahasiw Maskegon-Iskwew parallels both of the above discussions in his call for aesthetics of magic realism in new media, one that would include access the technologies of its realisation in virtual reality:

Magic realism as a cultural force that inhabits and creates literature, visual art and performance has, in virtual reality, a new and vital mode of expression, one that can accommodate Nehiyawewin and the Nehiyawewin and the expression of its visions. Cultures out of which magic realism arises are excluded from the sphere of virtual reality by its economics and its ownership by an inaccessible, industrially developed world, an academically focused hierarchy. The forces of post-modern critical discourse may be the most culpable agents in this since they have both failed and refused to recognize the crucial relevance of magic realism theory and practice to the most obvious parameters of new media, never mind the more subtle potentialities. The art, literature and oratory of magic realism flow and intersect in a manner that sting and corrode the monolith of re-colonization. Even on a static page or in a still image, works in this genre dig into the surging currents of the indeterminate and shifting forces of our ancestors. Examine the contemporary discourses of time-based, interactive media art. How are metaphor and metonymy constructed? How does time visit, how does space welcome you and what does it say?²⁷

What are the bridges and barriers between Western and non-Western understandings of culture and science? How do humans recognize and make use of visual patterns in other language forms, in other words, when is pattern recognized and how is it meaningful? Are abstract patterns as emotionally resonant as those we recognize? Can we learn a history through pattern generation for topics, individuals, and power relationships in chat? Will people change their behaviours to produce certain patterns, to be allowed to join groups, play games?

Agency is the fundamental construct of collectivist, of building a sense of participation. In a sense collaboration and collective action is a performance, whether writing, speaking, remixing, moving. We construct our identities through roles and transactions; new technologies implicate us into a network of pre-existing structures. These assume, if thinly those identities are ways of being in the world. So much new media is a speech act, rules based and contingent. How can these nuances cross cultural space and barriers? So much new media is exchange based. Whose currency defines the standard? If software is the means of exchange, what roles does software afford us? This is a very exciting and challenging terrain for collective creation, one that recognizes complexity, self-organization and unpredictability. Collective forms are equally strong across a variety of cultures.

²⁷ <http://www.reg.trilabs.ca/artists/ahasiw/index.htm>

Mark Green has issued a call to arms, “An ambitious scheme would be to develop a core package for each type of media that could be customized for the local culture. For each culture a team of artists and programmers can work together to define the interface and tool features required to support media development for that culture. This could be done in an open source fashion, or some other collaborative scheme could be used”²⁸

The Banff New Media Institute co created a new media laboratory with the Dak’Art Biennale in June of this year. The lab ran on the Linux platform. At a meeting about creating ongoing new media research, young computer programmers spoke about their skills as hackers and open source programmers. The lack of resources, combined with the need and cultural commitment to improvisation (cars are belted together with old parts, engines re-fabricated, music melded from the old and the new) had already created a positive attitude about engineering from machine language up, if needed. All software was pirated, downloaded thanks to Hotwire and shared amongst colleagues. Skipping continents, this open source friendliness has been formalized in Brazil by Lulu, who has made Linux the new official language of Brazil, running all the civil service on open source. Linux still draws from traditional computer science. However, the ATTITUDE of supporting collaborative, open source technological invention is what is needed to build ground up technologies. One of my ongoing goals is to suture together alliances of programmers, institutions and cultural producers who can create methods to invent technologies across these continental divides.

This text demonstrates the small steps that have been made in this direction and the incredible richness of possibility before us if tools can enable the aesthetic principles of artists from a wide array of cultures.

²⁸ Green, Bridges II.