

As artists and designers we understand that the nature of our experiments and interventions is dynamic and emergent. We are familiar with the experience of project developments that change the pattern of our thinking even before we have an insight into the point of completion or a resolved outcome. These emergent working methods open multiple pathways while subjective and interpretative ways of thinking, integral in creative activity, add further complexity and richness to the process. This paper outlines four standpoints from which we might consider material thinking. They are separate but related frames through which I will attempt to articulate a working concept that may be broadly useful across academic and research domains as well as in the creative industry sector where the value of entrepreneurial activity is most highly prized.

Design education has a foundation in artistic practice or at least engages the relationship between art and design activity. As artists or designers, we conduct our explorations, inquiry, investigations, experiments and our formal research processes in a particular way. This is not necessarily the way that scientists in other disciplines would conduct their investigations and researches. When we reflect on our creative practices and practical applications, we engage a particular kind of criticality that is sensitive to the materiality and to the poetics of the work. We have an embodied relationship to objects in our environment, including those not yet transformed from the imagination into material form. Material thinking results from our interactions in the environment, with its forms and spaces but the intellectual and emotive range is much wider and includes our beliefs worldview, and spirituality.

Materiality is distinct from physicality, although the two often intersect. It can be summed up as the stuff that makes up a thing; broadly applied, this does not just mean the metal of a key or the flax of a basket. It refers to the processes in which these materials have a part. In the case of the basket, its materiality includes the plants it is made from, the harvesting and preparing process, and qualities of the flax, such as tensile strength, that influence the final shape. Materiality is therefore (in part) an alternative to the idea that an interaction between a person and a thing is one-sided, the imposition of will onto matter. (Schrader, 2010)

Material thinking is not the imposition of will onto matter. On the contrary, it has always been an engagement where objects, materials, ideas, people and space are acknowledged to have affective force. All factors have potential to contribute to the emergence of meaning and form. All are 'inter-affective'.



Figure 1: *Maungawhau* (Mountain of the Whau tree), Mt Eden terraces. Source: Wikimedia Commons, Author: Avenue

### **Old Material thinking**

Ancient pā sites in New Zealand (Figure 1), some of which go back to the 15<sup>th</sup> century, like many other historic sites around the world, reveal material thinking at its simplest - a human connection with the land. The geographer Yoon (1986, 1991, 1994, 1999) recognized this profound human/landscape relationship as both visible and invisible. He coined the term geomentality to refer to the subconscious connections of a culture to the land. He defines it as “an established and lasting frame (state) of mind regarding the environment”. It affects our behavioral patterns and informs our culture. For example, traditional Maori geomentality did not recognize private ownership of land, a frame of mind that led to serious misunderstanding when Europeans arrived and the treaty was signed. The Treaty of Waitangi is New Zealand’s founding document, an agreement that was made between the British Crown and about 540 Māori rangatira (chiefs).

Like some other indigenous cultures, Maori in New Zealand had enormous respect for the land not only as the fertile source of food and shelter but also more significantly as the ancestral place of belonging. The land and the tangata whenua (people of the land) were and still are conceptually bound together. The physical place of ancestral life is deeply valued as the invisible and emotive place of comfort and belonging. This is material thinking. It is old.



Figure 2: *Piupiu* (harakeke skirt), 900 x 690 mm, Weaver unknown. Collection of Te Papa, New Zealand – and harakeke (flax) plant.

Contemporary Maori weavers provide another good example of material thinking that is as old as the history of their craft (Figure 2). Even today, the practices of traditional harvesters and weavers follow the ancient principles. Harvesters do not cut harakeke (flax) in the early morning or late evening when living creatures are most active and their ecosystem may be disturbed. They wait till the morning sun has dried up the dew and the insects are resting before they cut. Nor do they cut wet harakeke, which can be slippery posing a risk of injury to both harvester and to the living plant. The harakeke plant is treated like a family with the *rito* (child, next generation) protected by the *awhi rito* (parents) at all times so that it will grow strong. Care and management of the plant involves removal of old dried growth, cutting always as close to the ground as possible and cleaning out the dead waste material. Part of the rationale of maintenance is respect for those coming to harvest later. When leaves are not cut properly, the dried, hard edges become lethal, like a knife. The material thinking of harakeke harvesters is concerned for the entire ecosystem, including the human community, the on-going life and quality of the plant and its leaves and the symbiotic relationship with other living creatures.

So, in one sense, material thinking is as old as all of our place making, tool making and community making. But the notion has a more contemporary impetus in relation to academic research in art and design.

### **Academic (Methodological) Material Thinking**

Our practices in design and creative technologies, and in many cultural industries are characterised by the significance of physical/material considerations in the emergent

processes of experimentation, development, application and production. Research in these areas is usually practice-led and the rapidly growing level of postgraduate research courses worldwide, has led to an exciting new wave of academic interest in appropriate research methods for this type of work. The study of method in design and creative research orientations is an evolving field.

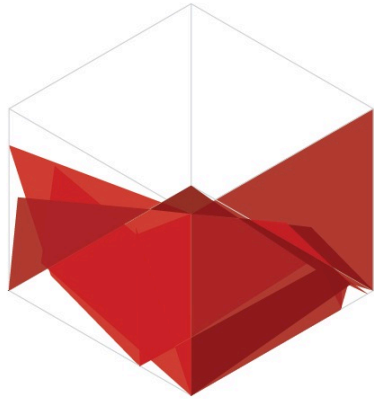
It is a topic of importance to the development of rigorous practice in postgraduate courses, particularly those that value trans-disciplinary thinking. It would be fair to say that although studio methods and approaches are well understood in tacit form by practicing artists and designers, the articulation of these methods and practices is done in divergent ways, not broadly understood or agreed across related disciplines. The advancement of practice-led design research will benefit from a shared understanding of research approaches that are currently being differentiated and analyzed in academic discourses across a variety of fields and disciplines. Identifying and explaining methodological approaches that we adopt in our studios and workshops will inevitably contribute to better practices, enhanced collaborative opportunities, because we will understand each other, and ultimately it will contribute to robust research intervention.

Methodology is an emergent subject in art and design but also in many other academic disciplines where established paradigms are under challenge and review. As a conceptual space, it opens up the potential for artists and designers to focus on the current task of defining and enlarging our research vocabulary. It will also offer new perspectives for understanding research in a wider context and will have something of value to contribute to other disciplines through trans-disciplinary collaboration.

**Studies in  
Material Thinking** Vol 5-7



**Studies in  
Material Thinking**



Studies in Material Thinking (SMT) is a peer-reviewed, open access journal for the publication of working papers and articles about research in fields of design and art practice where an appreciation of materiality is important.

We would like SMT to be a catalyst for a better understanding of the paradigm shifts occurring in art and design and to open the way for a collective re-envisioning of approaches to practice, theory and methodology.

SMT is currently seeking new members for the international committee of Associate Editorial Advisors and Reviewers. We welcome colleagues from all fields of design and artistic practice who would like to participate in the development of new initiatives and collaborations.

The evolving trans-disciplinary alignment of art and design practitioners from around the world facilitates communication between practitioners, academics, industry partners, researchers and students.

Countries that are represented in this collaboration include New Zealand, Australia, USA, Canada, UK, Finland, Sweden, India and Hong Kong. A rebranded online presence will go live in 2012, with recent collaborations and archived journal issues.

The Editor-in-Chief is Nancy de Freitas from the Auckland University of Technology. For more information please email [nancy.defreitas@aut.ac.nz](mailto:nancy.defreitas@aut.ac.nz)

Studies in Material Thinking, ISSN 1177-6234, Launched in 2007, Faculty of Design and Creative Technologies, Auckland University of Technology.

Figure 3: SMT journal flyer, December 2011

The journal *Studies in Material Thinking* was launched at *ConnectED - International Conference on Design Education* in Sydney in 2007. It is an open access, peer-reviewed journal for the exploration and development of design and artistic research approaches and methods. The future significance of this initiative is to communicate divergent thinking, culturally framed approaches, international differences and the transdisciplinary strengths of our collective material thinking as artists and designers. It is my belief that in this regard, we have much to offer our research colleagues in other domains.

The notion of material thinking originated with the author/artist, Paul Carter:

Material thinking occurs in the making of works of art. It happens when the artist dares to ask the simple but far-reaching questions, 'What matters? What is the material of thought?' To ask these questions is to embark on an intellectual adventure peculiar to the making process. Critics and theorists interested in communicating ideas about things cannot emulate it. They remain outsiders, interpreters on the sidelines, usually trying to make sense of a creative process afterwards, purely on the basis of its outcome. They lack access to the process and, more fundamentally, they lack the vocabulary to

explicate its intellectual character. For their part, film-makers, choreographers, installation artists and designers feel equally tongue-tied: knowing that what they make is an invention that cannot easily be put into words, they find their creative research dumbed-down...their social and cultural function dangerously dematerialises. (Carter, 2004, p xi)

The journal title was a gift of Paul Carter whose book *Material Thinking: The Theory and Practice of Creative Research* was published in 2004, in which Carter discusses the key features of creative research. According to Carter these are relationality and attention to process.

- 1) Relationality is a broad concept that includes collaborative and cooperative ideas along with notions of substances and schemes being in formation, evolving, emergent.
- 2) Attention to process is the state of being alert to, engaging with and critical of all materials: physical; natural; synthetic; imaginary; social; organizational and spatial. Such engagement is the only way to tap into the intrinsic knowledge and vital authenticity of material processes.

Margaret Boden's conceptual quartet: chance, chaos, randomness and unpredictability (Boden, 2004, ch.9) describes the encounters and the environment of artistic and design creativity. In the academic context we want to open these encounters to scrutiny and attempt to account for the way in which we maneuver around them. In so doing the creative 'work' is exposed to view and the distinctiveness of our research, the dexterity and skill we apply as well as the accidental moments become part of the collective dialogue. In creative and design practices, the conjecture, the visualizing or envisioning process is often indirect or circuitous, moving back and forth or leaping out of zone as it attempts to resolve into an area of clarity. A material thinking approach does not attempt to inhibit this wildness but it will document the evolving process in order to communicate and comprehend the significant developments. I call this reflective, attentive process, active documentation (de Freitas, 2002). It is material thinking in the academic context, a method for working with emergent ideas and simultaneously a method of communicating the rigor of that work.

Let us look briefly at a range of practice-led methodological orientations that encourage material thinking. These are approaches to design and artistic research that we are all familiar with – although we may call them by another name or have no name for them at all.

**A grounded approach:** *immersion in the subject, topic or area being investigated.*

**A responsive position:** *driven by the requirements of the practice as it develops.*

**An improvisational approach:** *possibly collaborative, exploiting possibilities.*

**An experimental orientation:** *proceeding from and building on results / findings / outcomes*

**A heuristic approach:** *exploring divergent possibilities, using cycles of reflection and aiming for unexpected cross-fertilisation of ideas.*

**A bricoleur approach:** *making use of materials at hand (often improvisational).*

**Emergent strategy:** *responsive to and interacting with both the evolving artefact and the research question. Also may be called a dialogic approach.*

Andrew Feenberg, the Canada Research Chair in Philosophy of Technology at Simon Fraser University delivered several lectures last year (2010) based on an address he gave at the Biennial Meeting of the Society for Philosophy and Technology in 2009. I would like to draw on Feenberg's analysis of the social and material context of technology as another lens for viewing material thinking. Feenberg presents a philosophy of technology that challenges us to better understand the complex relationships between our selves and our objects of design. He challenges us to recognize how often we decontextualize objects into parts, overlook the prime objective, the design question, or dislocate the inquiry from its social, spatial context. When this happens, we become blinkered to the connectedness of the thing with its place. Feenberg reminds us that we cannot focus narrowly on the parts as opposed to the whole else we risk ignorance of the relational significance and the affective impact of our interventions.

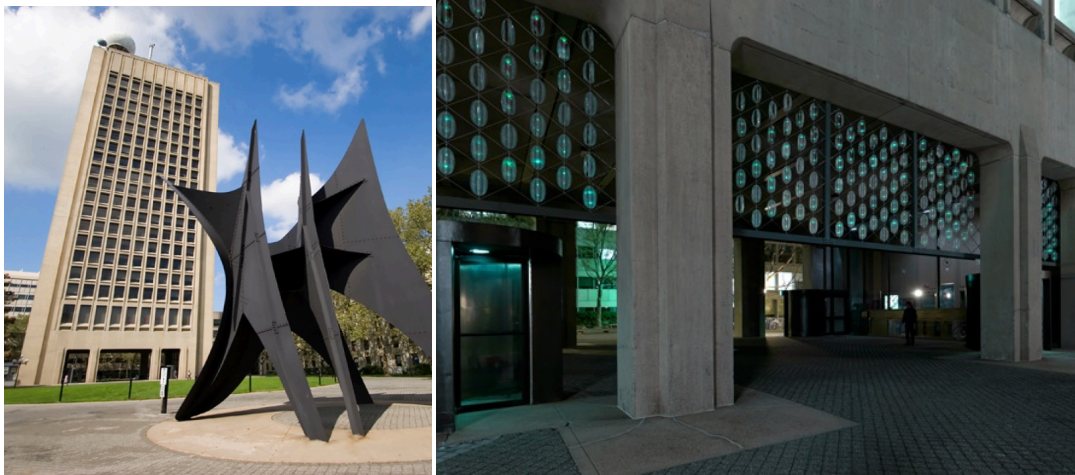


Figure 4: *The Green Building* by E. M. Pei and *Wind Screen*, April 2011, an installation by Meejin Yoon.

The Green Building tower on the MIT campus, with its 10 M high open concourse at ground level, was designed by I. M. Pei (Figure 4). When it first opened, the increased wind speeds caused by the building height and the open archway made it almost impossible to get in and out of the hinged doors at ground level on windy days. Large wooden panels were erected to deflect the wind and eventually revolving doors solved the problem. The building has a history of issues relating to wind. So it was a perfect site for a hybrid research creation installation dealing with wind power. This year, in May, Meejin Yoon, an Associate Professor of Architecture at MIT installed a temporary artwork in the arched "breezeway" at the base of the Green Building, to take advantage of its legendary wind gusts. *Wind Screen* was an array of wind-driven micro-turbine generators that lit up whenever there was adequate air movement. It was part of the Festival of Art, Science, and Technology celebrations commemorating MIT's 150th anniversary.

Meejin's research is a good example of material thinking that draws together all the physical, material, external, historical and experimental facets of a concept. Her design research is primarily engaged with the relationship between form and performance, that is, the experimental work on turbine design. But she and her colleagues have embraced in their work, the broader spectrum of material issues including issues of public space and technology, interactivity and architecture as well as the difficult social issues concerning public resistance to wind turbines in the environment. In New Zealand, there is currently some intense public debate about the aesthetic and social impacts of wind turbines and particularly wind farms but that's another story.



Meejin's multidisciplinary practice, located at the intersection of architecture, art, and landscape is a typical example of a future oriented material thinking research practice of the kind we want to encourage and support in our institutions.

### **What Material Thinking is Not**

Material thinking is not a way of generating 'mere newness' to use Boden's phrase (2004, p.39). As she puts it, creativity is the capacity to think or make new, surprising and valuable contributions to society in the form of ideas and artefacts. She includes in the notion of ideas the broadest range from literary concepts to scientific theories, culinary innovations, jokes etc. and her notion of artefacts extends to all our consumer products, industrial, mechanical and technological goods, the fine arts and all the crafts including simple things like origami or penny whistles (Boden, 2004, p.1). Her concept of creativity is value-laden. It is not enough for a breakthrough to be new and surprising, it 'must be useful, illuminating or challenging in some way' (2004, p.41).

Here is a conceptual approach that is concerned with a 'genuine originality' that provides solutions, innovations and knowledge that is needed or desired in specific contexts. It is within this context of creative activity that the notion of material thinking resides. If creativity is the ability to come up with ideas or artefacts that are new, surprising and valuable, this is achieved by combining and exploring ideas or by transforming conceptual spaces (Boden 2004, p.3-6). In Boden's account of how new structures are created through transformational creativity, she provides an explanation of conceptual space. This is a good place to locate the methodological orientation of material thinking.

In general, this involves the transformation of a previously-existing conceptual space, by modifying (or dropping) one or more of its defining dimensions. A conceptual space is a style of thinking--where "thinking" includes conceptualizing, theorizing, composing, painting, sculpting, dancing, cooking ... and so on. Each space/style is defined by a set of generative rules (not necessarily conscious) that both constrain and enable what can be produced. Whereas exploratory creativity involves the application, and perhaps the minimal 'tweaking', of these rules so as to generate stylistically

acceptable structures never realized before, transformational creativity actually alters the style. (Boden, forthcoming)

By this, Boden means that the transformation alters one or more of the defining rules for thinking. This is material thinking as creativity. She suggests that the bigger the alteration is to the conceptual space, the more profound is the impact and in some cases, the change is so great that it may be difficult to recognize or accept. When this happens, the new thinking is likely to be rejected even by colleagues and peers. Consider Copernicus and his concept of heliocentric cosmology, which seemed absurd and impossible from the prevailing view. Cosmologists at that time knew only the Aristotelian division between the heavens and the earth. It took over one and a half centuries for the practical physics to be devised to underpin Copernicus' creative new concept. Consider Darwin's own early rejection of biological evolution. Think of the contemporary ridicule faced by the early impressionist painters in the 19<sup>th</sup> century whose works were refused entry to the Academy of Fine Arts annual Salon show. In 1863, Napoléon III opened the Salon des Refusés for the rejected artists to exhibit works in an annex to the regular Salon where the work was still ridiculed by critics and the public. Look at the current debate that is simmering over the claim by global design firm Populous that they can create economically and environmentally sustainable stadium designs where temporary and permanent elements gear faultlessly into each other. New thinking is not easy.

### **Our Future Environment – more virtual, more transdisciplinary and more entrepreneurial.**

Material culture discourse generally refers to relationships, the relationships between individuals and artefacts, society and technology. This discourse is an important aspect of design education and design practice in an age when the potential exists for our impact on the world to exceed our capacity to limit the damage. It is a world still dominated by economic policies based on growth where we struggle to make sense of how we can implement sustainable design. We need to better understand our social and cultural attitudes to materiality. But the escalating impact of digital technologies is a further challenge to our understanding of it. We are now compelled to distinguish between physicality and materiality. Massumi (2002) offers a useful distinction between real and virtual, building on the ideas of Deleuze and Guattari (2004) who describe the virtual as 'real, but abstract' - an 'intense, torsional

coalescence of potential individuations', in other words, a certain type of reality, a reality of potential. Massumi's distinction helps us to avoid thinking of the virtual world as a fictional or fake reality, something that is the opposite of physical materiality. Thinking of the virtual as real potential is a material thinking perspective for the future.

### **Virtual light and magic light.**

Consider the candle iPhone app (Figure 5). The designer is a 22 year old university student from Oregon in the USA, Marty Ulrich. This virtual light became a worldwide phenomenon after the recent death of Steve Jobs. But its popularity and success was not a matter of deliberate design so much as a matter of chance. The application was already available having been previously designed for a client and available on the web, appearing in iTunes when people searched for "candle". The immediate social need for a virtual tribute to Jobs was instantly satisfied. Over 800,000 downloads were recorded recently. The scale of this collective phenomenon is certainly a noteworthy factor.



Figure 5: *Free Candle* by Poets Mobile and *Isang Litrong Liwanag* (A Litre of Light). Website images.

Scale is also a factor in another example, the *Isang Litrong Liwanag* (A Litre of Light, Figure 5). In the slums of Manilla and Laguna, Illac Diaz, a local social entrepreneur

and a group of MIT students have been spreading an innovative, eco-friendly idea for bringing light to millions of Filipinos who live without electricity or permanent light in their homes. Bottles destined for recycling are filled with water (with some bleach to keep out the algae) and then inserted tightly into specially cut holes in a roof. The curve of the plastic bottles and the water inside work together to refract the sun's rays, scattering about 55 watts of light across an otherwise black room. It is up in an hour and lasts for five years. This design concept is based on the principle of using appropriate technologies to address basic needs in developing countries – material thinking. The first plastic bottle solar bulbs were actually devised under third world conditions by a Brazilian, Alfredo Moser, during the 2002 energy blackouts in Brazil. The idea was picked up by some MIT students who designed the social entrepreneurship project that has become “A litre of Light” and it is currently being implemented in the Philippines.

I want to position these two projects as material thinking examples at opposite ends of a continuum or scale. I do not yet know what this scale is, but I believe it may be important to our material thinking forays in the future.

When we consider the state of contemporary design industries and the proliferation of national policies for cultural and creative growth, one thing that does appear to be evident is that the capabilities required of graduates entering these industries are rapidly changing. There is evidence world wide that our designers and artists are expected to be capable of entrepreneurial action, attentive to intercultural and transdisciplinary prospects, farsighted in terms of the fragility of our planet and mindful of the ethics of distribution and access to the world's resources. And *entrepreneurial* expectations, in the business, civic and social sectors is very much a part of our new environment.

Consider the *business entrepreneurship* of New Zealand's 'poster boy' of innovation and research, Jeremy Moon who noticed that the closer we get to nature, the less likely we are to find people wearing something natural (Figure 6). At age 25, he started the company Icebreaker in New Zealand, using 100% pure merino wool direct from the Southern Alps of New Zealand. Icebreaker is now the largest buyer of merino wool in the world and is claimed to be the first major clothing innovation in the global outdoor apparel market in more than a decade.

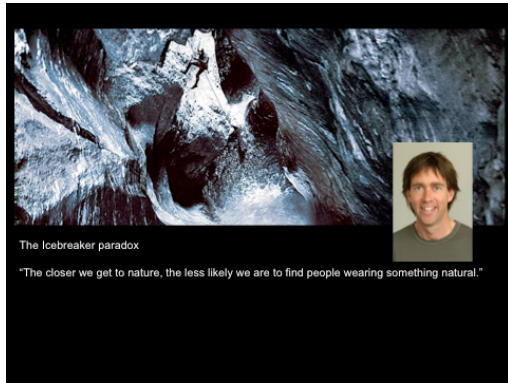


Figure 6: *Jeremy Moon* and *Bernard Tschumi*. Entrepreneurs in business and environmental design.

Consider the *environmental entrepreneurship* of architect and designer Bernard Tschumi who created the artistic complex Le Fresnoy (the National Studio for Contemporary Arts, Figure 6), the prestigious center for crossover artists just outside of Paris.

The existing Fresnoy facilities were preserved because they were spatially perfect as studio spaces and were supplemented by newly-designed ones, including exhibition spaces, sound studios and assorted production facilities, a library, a cinema, a restaurant, and apartments for faculty and students, all protected from the weather by a new umbrella roof that has become the project's common design denominator. Information on the architect's website describes the project:

In keeping with the Surrealist image of the meeting of the umbrella and the sewing machine on the dissecting table, the scheme of the project aims to accelerate chance events by combining diverse elements, juxtaposing the great roof, the school and research laboratory, and the old Fresnoy, a place of spectacle. The whole is precise and rational in its concept, and varied and poetic in the resulting spatial richness. (Bernard Tschumi Architects)



Figure 7: *The Leaf Bed*, a “mutant cardboard furniture kit for habitat emergencies”. Information from Leaf Supply website.

Or consider the social entrepreneurship and simple elegance of design projects like *Leaf Supply*, the organisation producing products and services in the context of high uncertainty for humanitarian use as emergency shelter and domestic survival. Their leaf bed is a cardboard module that can be assembled into a number of useful configurations for sleeping, sitting or working off the ground (Figure 7).

## **Conclusion**

I said at the beginning that I would outline four standpoints from which we might consider material thinking. I have been talking about them, but I have not been explicit. I am coming to this. So far, I have tried to show that material thinking is re-framed by the environment in which we function as artists and designers. It is influenced by contemporary academic expectations on one hand and by the challenges and future demands of our social environment on the other.

New material thinking is old material thinking in a new environment, an environment of our own making. This new world challenges us to embrace complexity. And we are expected to work more and more in a transdisciplinary context, at the intersections of cultural and economic forces that may not be well understood. And in a world that is distributed and mobile. I am suggesting that transdisciplinarity is the contemporary and future locus of our material thinking. But also I am suggesting that the new demands of the creative and cultural industries for designers as entrepreneurs is another factor that is changing the way we operate in our fields and the way we educate our young artists and designers.

Hearn and Bridgestock (2011) identified four imperatives in a creative economy: domain specific creativity; innovation; transdisciplinarity and networks. Of these, the most difficult to embed in practice is transdisciplinarity, which is oriented outward, away from disciplinary methods, towards the significant issues and challenges of the world. In this respect it is a socially focused concept. Although the notion of transdisciplinarity began with the philosophical writings of Kuhn (1962) and Jantsch (1972), there is currently renewed interest in its significance as a conceptual underpinning for the complex design problems of our potentially unsustainable, globalised world. Nicolescu (2002) argues that a transdisciplinary, outward-looking focus in solving problems is one that attaches importance to all relationships and human contexts. When he speaks of the rigor of transdisciplinarity, it is clear that he includes in this notion a sense of valuing and caring for humanity.

One can even assert that the rigor of transdisciplinarity is a deepening of scientific rigor to the extent that it takes into account, not only things, but their relations to other beings and things. Taking account of all of the givens present in a particular situation is a characteristic of this rigor (Nicolescu, 2002, p.120).

We can access the materiality of our thinking from the following standpoints:

- **In the fray:** As artists and designers, we work in the studio, in the workshop, in the field, on-site, at the factory, in the laboratory, in the theatre, in the museum, in public spaces. These are the sites we must understand and examine critically in order to develop our material thinking capacity.
- **In process:** We need to be sensitive and critically aware of the way in which we ourselves work and interact with our materials and ideas. We understand our thinking processes better by practicing active documentation as we develop progressive iterations and adaptations. We can examine material thinking in the evolutionary trajectory of our creative processes.
- **Interconnected:** We will find further evidence of material thinking through our collaborative activity, particularly the discursive filtering of ideas that happens collaboratively, the way we share information, distribute out ideas and provide or use feedback. And the way we misunderstand each other.

- **In the future:** The processes that drive us forward are another standpoint from which we can identify and understand our material thinking: our envisioning methods; the way we play with ideas and how we implement them. We can encourage our material thinking capacity by being persistent, optimistic, unencumbered, and entrepreneurial.

These are the standpoints from which we can gain access to the materiality of our thinking as creative practitioners. Material thinking artists and designers value their knowledge and skill in the active manipulation of all their physical materials and tools. But more than this, they focus on a holistic comprehension of materials in space and time and culture.



## Bibliography

- BERNARD TSCHUMI ARCHITECTS, Website, <http://www.tschumi.com/projects/14/#>  
[accessed November 27, 2011]
- BODEN, M. A. (2004) *The Creative Mind: Myths and Mechanisms* (2nd ed.) London and New York: Routledge.
- BODEN, M. A. (forthcoming) 'Creativity and Artificial Evolution' in J. Copeland and R. Brooks (Eds.) *Creativity, Mathematics, and Computers* (provisional title), to be published by Templeton Press/MIT Press.  
<http://www.informatics.sussex.ac.uk/courses/creative-systems/publications.htm> [accessed Oct 14, 2011]
- CARTER, P. (2004) *Material Thinking: The Theory and Practice of Creative Research*, Carlton: Melbourne University Publishing.
- DE FREITAS, N. (2002) Towards a Definition of Studio Documentation: working tool and transparent record, *Working Papers in Art and Design*, vol.2.  
<http://www.herts.ac.uk/artdes/research/papers/wpades/vol2/index.html>  
[accessed October 17, 2011]
- DELEUZE, G. and GUATTARI, F. (2004) *A Thousand Plateaus: Capitalism and Schizophrenia*, Translated by Brian Massumi, London and New York: Continuum.
- FEENBERG, A. (2010) Ten Paradoxes of Technology, *Techné* 14(1).
- HEARN, G. & BRIDGSTOCK, R. (2011) Education for the Creative Economy: Innovation, Transdisciplinarity and Networks, In Araya, D. & Peters, M. (eds.) *Education in the creative economy: Knowledge and learning in the age of innovation*. New York: Peter Lang.
- Jantsch, E. (1972). Towards Interdisciplinarity and transdisciplinarity in education and innovation, in CERI (ed.), *Interdisciplinarity: Problems of Teaching and Research in Universities* (97-121), Paris: OECD.
- KUHN, T.S. (1962) *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press.
- MASSUMI, B. (2002) *Parables for the Virtual: Movement, Affect, Sensation*. USA: Duke University Press.
- NICOLESCU, B. (2002) *Manifesto of Transdisciplinarity*, Translated by Karen-Claire Voss, Albany, NY: SUNY Press.
- SCHRADER, R. (2010) *The Future is Curatorial! Reconceptualising curation through material culture*. Dissertation submitted to the Victoria University of Wellington

in partial fulfilment of the requirements for the degree of Master of Museum and Heritage Studies. <http://researcharchive.vuw.ac.nz/handle/10063/1503> [accessed November 14, 2011]

YOON, H. (1986) *Māori Mind, Māori Land: Essays on the Cultural Geography of the Māori People from an Outsider's Perspective*, Berne: Peter Lang.

YOON, H. (1991) On Geomentality, *GeoJournal* 25(4): 387-392.

YOON, H. (1994) Two Different Geomentalities, Two Different Gardens: The French and the Japanese Cases, *GeoJournal* 33(4): 473.

YOON, H. (1999) Geomentality and the Construction of Regional Knowledge: Examples from New Zealand and Korea, *Text and Image*. Leipzig: Leipzig University.