The brain is a highly adaptable and flexible organ. It is no different to any other muscle in the body. It can be strengthened and developed, even though building new connections takes time to occur. There are limitations to its flexibility such as age and injury, but there is considerable information to support the premise that at any age we can influence and reshape memory processes, movement patterns, belief systems and therefore our understanding and experience of the world around us. It is definitely a case of the more you use it, the more efficient and flexible it becomes.

A fantastic and redeeming quality of the brain is its ability to be continually remodelled. Activities that challenge the brain expand the number of neural connections. If we continue to challenge ourselves with different and more varied experiences we strengthen neural connections by turning them into ‘super highways’ or myelinated pathways. By engaging in activities that are new and unfamiliar, we can alter the shape and direction of neural connections.

Movement is crucial for whole brain development. John Ratey\(^1\) states in his book, *A User’s Guide to the Brain* that:

- motion is involved in almost every aspect of human experience: thoughts move from one topic to another, emotions stir us deeply. Language is essentially a complex semantic dance of the mind and tongue, a sophisticated form of motion that allows us to manipulate the contents of the world without laying a hand on them. To improve our brains we have to move our bodies, take action and get going.

Paul Dennison\(^2\), an educational therapist, recognised the link between stress and body posture and response. He developed Brain Gym\(^3\) in 1969 to correct learning disabilities. Brain Gym uses specific physical movements to improve communication between both sides of the brain, known as the cortex. They also improve communication between the cortex and the middle and back parts of the brain to ensure maximum learning potential is available. Brain Gym works on repetition of movements to build and strengthen more neural pathways where we make more sense of the world around us. There are twenty-six movements specifically designed to promote more efficient and rapid communication of information to all parts of the brain.
To be a whole integrated functioning person we need to have all components of the brain co-ordinating, communicating and cooperating together. The brain and body are in constant motion, and the body’s senses feed the brain information, which it uses to form an understanding of the world. The more we activate these senses, the more thinking and learning the brain can achieve. Freeing the body to move and stimulating the central nervous system integrates the body and brain. Our own unique functioning sensorial system filters the necessary from the unnecessary information it receives. It is that filtering system that ultimately shapes our interpretation and perception of our world. We are constantly deciphering and interpreting this information, adjusting it and configuring it into some sort of order as we develop through life.

Movement is initiated from the brainstem and cerebellum in the back part of the brain. There are reflexes such as heartbeat, respiration, swallowing and blinking which remain for life. There are also reflexes that have a limited time span. They are a group of pre-ordained movements called primitive reflexes. They provide the training ground for more advanced movement patterns. They are present at birth and should be fully integrated into the body around twelve months of age. The primitive reflexes follow a well-structured combination of movements that build on top of each other as each set is mastered. Each reflex has its own particular movement pattern that trains and prepares the body to move into the next movement pattern.

As the infant grows and matures so does the central nervous system. Higher, more sophisticated regions of the brain begin to play a role in the infant’s development, slowly superseding the pure survival aspect of the primitive reflexes. As this occurs early survival patterns are integrated or controlled to allow the more mature patterns of response to occur.

The postural reflexes then come into play; they are regulated by the cerebellum that acts like a recording unit of movement patterns. It is only as postural reflexes replace primitive reflexes that the child begins to gain control of the body and body movements, learning to cope with the demands of gravity.

Sometimes a person, for a variety of reasons, does not complete some of these pre-ordained sets of movements. These retained reflexes continue to demand first priority on neural pathways long after they should. In this case, the person moves into compensation patterns, setting themselves up for more stressful and tiring learning.

When a person has not developed according to the desired format that nature intended, the person adjusts their body movements to seek equilibrium. Any living thing in nature seeks balance and will devise any method to gain it. In an elaborate system such as the human body, it will develop other ways to perform tasks.

It’s these compensation patterns that can create an extra burden on the body. If a child retains some of the primitive reflexes, the sensory perceptions may cause them to process incoming information in either a hypersensitive or hypopersensitive way, therefore, setting this person up for more stressful learning and behaviour patterns. During times of stress it is most likely we will operate from the reflexive part of the brain. When we are in this state it becomes difficult to draw on the wisdom and decision-making powers of the frontal lobes.

Stress can present itself in many forms affecting the connection between the brain and body. Under stress the automatic body response is to lock up the body, preventing the efficient flow of information from one area of the brain to another. Generally the body tightens, jamming up muscles, tendons and ligaments. Movement becomes less fluid, more rigid, emotions can run high with anxiety and self-doubt, and an overwhelming sense of inadequacy and fear can unfold.

A Brain Gym practitioner recognises these compensation patterns and uses a series of exercises to encourage the person to move in a more energy efficient and integrated way, helping unlock the body by releasing tense muscles, filling in developmental gaps and creating new learning pathways. Learning acquired under stress is easily forgotten and is not fully assimilated into the long-term memory.

If, for example, we have not integrated the Palmer reflex, a reflex designed to grasp and release objects, then particular compensation patterns will be noticed. Effects are poor manual dexterity of thumb and finger movements, poor pencil grip, hypersensitivity in the palm of the hand and quite possibly chewing type movements of the mouth, while trying to write or draw.

The physical characteristic when using a pen or pencil is that the grip continues to tighten with increased pressure of the pen on the paper, making fine and controlled motor movement difficult. The focus is on the mechanics of writing rather than the content. The most likely outcome will be writer’s cramp, sore and stiff shoulders and eventually a tight and stiff neck.
To compensate for this un-integrated Palmer reflex, the body will manoeuvre itself into a position it finds most comfortable. This person may prop his head up with his hand or rest his head on the table, or adjust his paper sideways. To an observer it may look awkward and uncomfortable. This individual employs more energy and exertion to complete tasks required by finger and thumb manipulation, than a person whose Palmer reflex has been integrated into his system at the appropriate time of development.

When compensation body movements have been adopted, specific movements are used to create a positive physical change. By releasing tight and locked muscles, we encourage better communication to all parts of the brain, allowing improved rational thinking, abstract reasoning and language communication to take place. We then learn in a more relaxed and calm way.

In the example of a retained Palmer reflex, there are a number of movements that help switch on the brain, so the body can then move in a more relaxed and smooth way, thereby improving performance. To improve pen grip we use movements such as the Neck Rolls, the Owl, Elephant 8s, Energy Yawn and Thinking Caps to release tension in the neck and shoulder areas.

The Owl re-educates the neck and shoulder muscle proprioception related to auditory skills. When this proprioception is re-established, the abilities to listen, think and access memory are enhanced. By relaxing and lengthening the neck and shoulder muscles, the left and right turning ability of the head improves, restoring the range of motion and increasing the circulation of blood to the brain for enhanced focus, attention and memory skills. This enhances binocular vision and improves saccadic eye movement. The Owl is an efficient way to release tension around the neck, jaw and shoulders and alleviates the desire to squint or stare, tilt the head or lean on the elbows.

Elephant 8s activates the brain to integrate vision, listening and whole-body movement. As with the Owl, Elephant 8s releases tight and locked muscles of the neck and shoulders. It improves short and long-term memory and assists with depth perception and eye-learning abilities.

We have the power to change our brains. The human brain’s amazing plasticity enables it to continually re-wire and learn not just through academic achievement, but also through experience, thought, action and emotion. As our brains train, the tasks become easier and more automatic.

I would like to acknowledge Julie Gunstone, International Edu-K Faculty member, who generously shares her understanding and extensive knowledge of Brain Gym with myself and many others in the field.

3. Brain Gym is a registered trademark of the International Educational Kinesiology Foundation.
There is much of our environment that isn’t available to us perceptually. Many will recall the description from their basic science courses of gases that are tasteless, colourless and odourless. Among these are oxygen, carbon monoxide, helium, argon, carbon dioxide, neon, xenon, nitrogen, hydrogen and radon. In the case of hydrogen, oxygen and carbon dioxide, this is fortunate as it would be annoying to be aware of things so ubiquitous. Many believe that the senses are so distributed as to recreate a clear sense of the environment, but perhaps our ability not to perceive it is just as important. On the other hand, it would be occasionally useful, for example, to know if carbon monoxide is present.

In the case of vision, we often believe that the world is the way that we see it. Yet there are spectra that we can not see. In Sensory Exotica, Hughes suggests that the proportion that we can experience is one over three times ten to the thirty-fifth power. This very large number, or extremely small proportion, appears to be the case at present. At some point in the past the proportion would have been understood to be close to one to one. The historical trajectory seems clear. To believe that the number quoted by Hughes is a final or absolute one takes more than the available arrogance. The accuracy of the number isn’t really important, after all, what are a few orders of magnitude between consenting physicists? What seems clear from this is that we don’t have access to any objective reality, what we perceive of the world outside ourselves is a limited view. That, which we deduce that it might be, changes with time and culture.

Perceptual Augmentation Devices

Ted Krueger

There is much of our environment that isn’t available to us perceptually. Many will recall the description from their basic science courses of gases that are tasteless, colourless and odourless. Among these are oxygen, carbon monoxide, helium, argon, carbon dioxide, neon, xenon, nitrogen, hydrogen and radon. In the case of hydrogen, oxygen and carbon dioxide, this is fortunate as it would be annoying to be aware of things so ubiquitous. Many believe that the senses are so distributed as to recreate a clear sense of the environment, but perhaps our ability not to perceive it is just as important. On the other hand, it would be occasionally useful, for example, to know if carbon monoxide is present.

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Animals can often sense things that humans cannot. The compound eye of a fly might be made of a thousand lenses, but perhaps more interestingly, these lenses can simultaneously sense chemical concentrations. The trout has organs that allow it to orient within magnetic fields. The pits of the pit vipers are found on the head adjacent to the nostril and are sensitive to infrared radiation. Similar to the back of an eye but without the lens, this organ allows a heat image to be built up from the swaying movements of the head. These are naturally occurring ‘night vision goggles’. That a bat navigates by echo-location is now common knowledge, but its sensory system was only discovered in 1938. Bats emit an ultrasonic ‘chirp’ and then read the echo for the size and location of objects – especially insects. Each type of bat emits a unique sound, but all are complex, varying in pitch and intensity. This complex signal allows the bat to resolve objects of different sizes. Although the size of its ears seems an obvious hint, the dominant theory before its ultrasonic sonar was discovered was that it navigated by touch. This may seem to be a difficult (or ridiculous) hypothesis, but something similar can be found in humans.

Facial vision is the sensitivity to the proximity of objects possessed by some who are blind. It is described as a light tingling sensation of the face when the person is near to an obstruction such as a wall. Its operation remained a mystery for years. Some researchers went so far as to anesthetise the whole face, but the feeling persisted. Facial vision was found to be an acoustic phenomenon that was not perceived as sound but was manifested as a sensation on the skin. Current research on this topic has indicated that the distribution of sound adjacent to a surface is not uniform – that low frequencies are intensified close to a wall and that this may be a contributing factor in facial vision.

Perhaps facial vision can be considered an aberrant or enhanced form of hearing. On the other hand, maybe the traditional five senses attributed to humans need reconsideration. Rivlin and Gravelle, in Deciphering the Senses, describe a vastly wider range. Among them are sight-visible light; hearing-vibrations in the air; touch-tactile contact; taste-chemical molecular; smell-olfactory molecular; balance-kinesthetic geotopic; vestibular-repetitive vision; taste-chemical molecular motion; nociception-pain; magnetic-ferromagnetic orientation; infrared-long electromagnetic waves; ultraviolet-short electromagnetic waves; ionic-airborn ionic charge; proximal-physical closeness; electrical-surface charge; barometric-atmospheric pressure; geogravimetric-sensing mass differences; eidetic-imagery-neuroelectrical image retention and vomeronasal-pheromonic sensing.

These last two are especially interesting. Eidetic imagery occurs in a percentage of children. It is an ability that is much like a photographic memory that is spatially situated. It is by looking back at the location of an event or object that additional detail can be recalled or extracted from the scene that is no longer there. This ability is found in very few adults and typically disappears in children with the development of language, though why this is so remains unknown. The vomeronasal sense is the ability to detect pheromones and is attributed to an organ that is located in the nasal passage. In the few that have this sense, there is no conscious experience that accompanies it – that is pheromones do not (in a way) ‘smell’ – but the awareness occurs nevertheless.

While Deciphering the Senses is not a scholarly text, Rivlin and Gravelle are not alone in believing that humans have more than five senses. In the anthroposophical tradition, Rudolf Steiner counts twelve in three categories, those that are physical – the senses of touch, life, movement and balance; those that are psychological – smell, taste, sight and temperature; and those that are spiritual or social – hearing, speech, thought, and the sense of ego. A recent article in New Scientist categorises senses into vision, hearing, smell, taste, touch, pain, mechanoreception, temperature and interoception. Depending on the sub-categories in each, the number of senses ranges from ten to thirty-three with twenty-one claimed to be ‘generally accepted’. Guy Murchie lists thirty-two specific senses grouped into categories related to radiation, chemicals, mental facilities, feelings and a spiritual sense.

Clearly there is a range of opinions and we cannot settle the matter here; however, we can say that our experience is our experience and our environment is what our experience tells us it is. These statements sound stupid and tautological, but recall that most people would consider our experience to be a rather direct transfer of the world into the head. Perception is of reality, they would say. We have seen, however, that we have at best a very limited apprehension and that which we do have is coloured by the number and makeup of our sensors. Other organisms and other people may experience things quite differently.

But experience and environment are too easily thought of in terms of senses alone. In fact, this may be an enormous error. All sensory experience is internal to the organism. Properly, you do not experience the table when you touch it, but the firing of your cutaneous nerves in conjunction with a host of other information including those senses of the self such as proprioception. The environment needs to be distinguished from the self from within this internal sensory flux. This task is complex and may well be the result of long experience and the acquisition of the necessary skills. O’Regan and Noè consider vision to be a skill-based activity rather than one passively dependent upon sensory input alone. They use the term ‘mastery of sensorimotor contingencies’ to describe a way of understanding that seeing is an activity that involves the whole body. This ‘theory of vision’ that does not get generalised to perception in general. It is the invariants in the sensations related to the movements of the body in conjunction with the invariants in the sensory flow that allow the self to be distinguished from the environment. This is what gives the impression that phenomena are taking place externally even though the sensory ‘information’ is completely generated internally.

The conjunction of the sensory and motor is not only a logical necessity but is a neurological feature. Vittorio Gallesse and colleagues have identified specific areas of the brain that integrate motor, visual, auditory and somatosensory inputs for the purpose of taking action within the space that surrounds the organism (in their case a monkey). This processing occurs at a rather basic level and is immediate. Rather than a second order cognitive function, multimodal sensorimotor integration for both perception and action is a fundamental feature of the brain. The specific organisations that have been found suggest that perception and action are related such that action is necessary for perception and that perception is fundamentally to serve action. It also shows that the sensorimotor contingency theory may have some basis in the organisation and operation of the brain.
Portions of those neurological structures that are devoted to perception and action are active when the organism observes actions in others in ways that seem identical to when the organisation ... learning by emulation. In addition, our conceptual frameworks are grounded in exactly these sensorimotor interactions.6 What were formerly assumed to be abstractions and idealisations are now understood to be concepts directly based on embodiment.7

To turn to a theme of the Sensoria conference, the ‘sensuous intellect’ is grounded in sensorimotor interactions; as Varela observes, ‘cognition depends upon the kinds of experience that come from having a body with various sensori-motor capacities and that these individual sensori-motor capacities are themselves embedded in a more encompassing biological, psychological and cultural context’.10

By understanding the nature of perception, it may be possible to intervene technologically in a manner that will enable us to experience a richer world. Lenay and colleagues have studied sensory substitution, a technique pioneered by Paul Bach-y-Rita that allows for deficiencies from the normal complement of senses to be ameliorated through the use of interface technologies. In Technology and Perception, they ‘wish to show in particular that cognitive technologies... give rise to new modes of perception... – that technologies actually constitute human experience by generating new domains of what is possible with unexpected consequences’.11

Bach-y-Rita’s work12 since the 1970s has shown that a sensorimotor skill-based approach to perception is empirically sound. The work was not intended to be such a demonstration; rather, what was sought was a way to assist the blind by developing a cutaneous interface to video imagery. Initially this was undertaken by building an array of tactors that vibrated on the back. It was found that under certain conditions patients were able to perceive the things recorded by the camera and to localise them properly in space. Eventually, the thigh, abdomen, forehead, fingertip and tongue were used successfully.13 Bach-y-Rita and colleagues found that central to the ability to externalise the stimulus was the ability of the patient to move under free will and then externalisation only occurred after many hours of experience with the apparatus.

While this work is frequently described as seeing through the skin, I believe that the work demonstrated instead that it is possible to augment perception with technology and to create the equivalent of new sense modalities. If we consider the situation from the standpoint of the blind subject in Bach-y-Rita’s experiments, a completely new way of perceiving has been developed. This is not ‘seeing’ as we know it and it is more important to understand that a wide range of possibilities has been opened than to believe that one has made the blind see (even though this has great cultural capital).

Devices

These ideas are guiding a research project to design and build prototype devices that have as their objective the extension of our perceptual abilities. In order to situate this work it is necessary to understand the relationship between an organism and its environment relative to perception.

A cutaneous interface has been chosen for the initial prototypes to make use of the existing body of knowledge in sensory substitution systems, and in addition, to allow normal sense modalities to remain operational while targeting under or intermittently used sensory capacity on the surface of the skin. The cutaneous interface allows new sensing capability to augment rather than replace existing senses. Keeping existing perceptual channels free to corroborate the new sensations is an objective of the device design. It is recognised a priori that the objective of this research is not in the production of the ‘prosthetic senses’ as technological artifacts or as isolated sensations, but rather, in the ways in which the new percepts augment and modify the apprehension of the world given by existing sensory modalities.

Several initial devices have been developed and are undergoing testing in the lab. The first device was produced as a simple demonstration for a seminar conducted by the author. It consisted of a photosensor mounted on a pair of reading glasses’ with output via a small vibrator mounted to one of the lenses. The results were poor because the glasses’ interface was intolerable for the ten to fifteen hours of use that are typically required for the externalisation of the percept. This experiment was important in that it developed awareness that the specific experience of the interface may well supersede all theoretical notions. It indicated that development of this kind of interface will be first and foremost a design problem.

The second device was based on a digital magnetic sensing technology used in automotive compasses. The purpose of the belt was to interface with immersive magnetic fields, those that are large with respect to the body. The output of the sensor was mapped to eight vibrators contained in an elastic belt. Global magnetic north was indicated by the vibration in the belt. Initial field testing took place in Melbourne, Australia. While the belt worked generally as expected, it was on an electric commuter train that the large scale dynamic magnetic fields surrounding the electric motors and lines could be felt.

A third device was developed specifically for smaller magnetic fields that are object-like with respect to the user. The movements that are required are haptic rather than locomotive. In this case, magnetic sensor input was transduced to a vibratory tactor located on the sternum.

The most recent design consists of a glove that contains a fingertip sensor that picks up fluctuating electric fields by induction. These signals are amplified and applied to the back of the finger by a vibro-tactile transducer that is identical to the one above. While, the vibrations are applied to the skin that on the back of the fingers is relatively insensitive to location, the vibrations are also conducted by the bone that lies immediately below. This makes the vibration difficult to localise precisely. In something akin to a tactile ventriloquist effect, a tingling is felt about the fingertip, sensation is thrown to the point of focal awareness. Like a bone conducting headphone, where the sound is conveyed by bone conduction without interfering with normal hearing, this vibration does not mask the tactile sensations from the fingertip (unfortunately, in the prototype shown the glove does that).
The glove is intended to provide tactile feedback on the orientation, strength and frequency of the fields which the left index fingertip explores. The laws of sensorimotor contingencies can be developed through repeated use. The experience of these fields will be integrated into the full range of other senses in the context or normal activities. While preliminary results are quite promising the glove is presently undergoing testing and evaluation.

The design and implementation of ‘prosthetic sensing’ devices presently under development, is relatively straightforward, and has been given clear direction by prior work in sensory substitution. Instead of hardware development, the research focus is to understand the relation between the sensors, the kinds of information that it can deliver and the manner in which that information is applied to the body in order to give rise to a perception that captures salient dimensions of the phenomena. This is fundamentally an iterative design problem. In addition to specific devices, we expect to produce an accumulated body of experience that can be used to generate the principles by which arbitrarily chosen sensor technologies can be interfaced to the human body with particular attention to the qualitative aspects of the experience.

2 Sensory Exotica is a compendium of information about animal senses.
10 V Gallese and G Lakoff, 2005.
All distances in space and time are shrinking. Man now reaches overnight, by plane, places which formerly took weeks and months of travel... Man puts the greatest distances behind him in the shortest time. He puts the greatest distances behind him and thus puts everything before himself at the shortest range. Yet the frantic abolition of all distances brings no nearness; for nearness does not consist in shortness of distance... What is incalculably far from us in point of distance can be near to us. Short distance is not in itself nearness. Nor is great distance remoteness. What is nearness if it fails to come about despite the reduction of the longest distances to the shortest intervals? What is nearness if it is even repelled by the restless abolition of distances? What is nearness if, all along with its failure to appear, remoteness also remains absent?

The notion of human interpersonal experience transcending distance is a powerful idea generator for artworks, literary explorations and scientific endeavour. The abnegation of physical limitations has inspired adventurers and voyagers of all kinds since time immemorial. Until the last century connecting with people in remote environments was a time consuming and laborious process. Messages to be carried beyond the range of human voice were either conveyed by foot or horse and necessitated long lead times between transmission and reception of information. The communicational reach of humans has exponentially grown with the introduction of each new technology to the stage where we can now send and receive messages in real-time from an expansive range of places. Campanella suggests that the advent of the steam train was one of the most powerful technologies to alter the spatial limits of the individual and allow for a renegotiation of the ‘space-time envelope’. The subsequent invention of air travel collapsed the time required to circumnavigate the globe from Verne’s fictitiously celebrated eighty days to a fraction of this time.

Today, contemporary technologies allow us to seamlessly connect with remote others from a far broader range of locations than ever before. While allowing us to transcend temporal dislocation, the barrier of different time zones, they neglect the spatial. This chapter investigates presence technologies which seek to address the spatial in remote connection through reintroducing a tactile element that is present in spatially co-present interaction.
The faraway project, conducted by Polazzi, Jacobs and Andersen, investigates modes for connecting people who are separated by distance. The projects are founded on the understanding that presence is about being in the ‘here and now’. That is, complete absence occurs when the significant other is occupying a different spatial and temporal dimension to us. Polazzi et al. suggest that intermediate situations, afforded by real-time technologies, allow us to reconnect temporally but not spatially. In this sense, the challenge is to develop presence technologies that provide a spatial and temporal sense of the remote other. The projects investigate the notion of an immaterial shared emotional space, which exists between people in intimate relationships. Technologies which allow us to enter this shared emotional space, despite physical separation, facilitate connection both spatially and temporally.

A critical factor within these and similar projects is that the proposed technologies are not attempting to replace traditional modes of communication but question whether a sense of intimacy might be enhanced through a peripheral presence indicator. The key to developing peripheral awareness devices is to connect people without relying on explicit language based media. Peripheral awareness devices facilitate the type of implicit understanding, between remotely located individuals, as occurs in face-to-face communication. Daniel Stern suggests that the moment at which a resounding connection occurs between individuals is vastly different from the narrated version of events that becomes part of our conscious memory. He draws a distinction between ‘awareness’ and ‘consciousness’ by suggesting that awareness is an experience of implicit understanding whereas consciousness is awareness that has been processed for translation into language, a procedure through which important emotional information is lost. Awareness, in this reading, is comparable to the notion of peripherally conceived presence. It is at this implicit awareness level that the following projects seek to be registered, allowing users to reconnect spatially as well as temporally, thus transcending physical separation.

Empathy Vest – remote environmental sensing

The Empathy Vest, a prototype developed in 2004, focused on the use of simple technologies to facilitate an embodied experience of remote space and place. The project questioned whether through physically sensing remote stimulus (light, wind, sound etc), the user might experience psychological change. Philosophically, the Empathy Vest sought to create a sense of ‘spatial empathy’ between people who were physically separated. Spatial empathy was defined as ‘the development of an implicit understanding and awareness of the spatial condition that another being is experiencing’. The prototype encouraged ‘spatial empathy’ through the real-time transmission of environmental stimulus. Conceptually, the prototype questioned whether through establishing a real-time feedback loop between two people, allowing them to sense each other’s environmental experiences, a deeper sense of empathy might occur.

The project was concerned with the creation of wearable information responsive environments that acted as transmitters and receivers of information. The wearable devices hosted a series of input sensors and output channels. The input channels, two touch sensors and one voice relay sensor, allowed the wearer to have a sense of experiencing informational stimulus mapped onto the body through the output modes: four light channels and one fan. The project was interested in the notion of emergent outcomes and thus the data channels were developed with a factor of chance in output combinations. The prototype was developed with a Programmable Logic Controller (PLC) microcontroller with multiple inputs and outputs, allowing for easy modification to incorporate new stimulus, depending on the situation being studied.

Samuel Natale proposes a model of empathy that has three distinct phases: Interactive Empathy – which entails sensing the feelings of another and communicating these to him/her; Predictive Accurate Empathy – imagining oneself in the space of another, thus being able to intuit the fears, thoughts and emotions of that person; and finally Predictive Accurate Empathy with a Generalised Other – the ability to put oneself into the position of a large class or group of people. Drawing from this theoretical framework the Empathy Vest aimed to explore the final two scenarios – empathetically connecting with a single other and connecting with a group of people. It was devised with a series of user interaction scenarios in mind: the relationship between two remotely located individuals; between an individual and a remote crowd; and between an individual and a remote space.
Ether Beat – heartbeat as a communication language

The Ether Beat projects are a distillation of design concepts initially investigated through the Empathy Vest. The garments and artefacts focus on transferring the singular biosignal of heartbeat.

The heart is a highly charged icon in most cultures. In contemporary Western thought the head is regarded as the home of intellect and the heart as the domain of emotion, their diametric opposition reinforced by a plethora of sayings and clichés. However, this view of intellect being located in the head is not shared by all cultures. In the Koran the heart is used as a synonym for knowledge whilst the Wuitoto tribe from southern Colombia use the same word for chest, heart, memory, and thought. McCraty et al suggest that the heart generates the strongest electromagnetic field of any part of the body. Through the use of sensitive electrostatic detection devices this field can be measured up to a metre from the body. A series of experiments, led by McCraty, determined that cardiac electricity was registered in the brainwaves of proximate others, particularly when people were touching. The notion of extending this zone of active current beyond the immediate radius of the body underscores the Ether Beat investigations. Within this research heartbeat – usually a private internal signal – is externalised and used as an active communication modality.

Ether Beat encompasses a range of compatible garments that sense, process, transmit and receive the heartbeat wavelength (ECG). The collection is made up of two sets of garments. Each set comprises: a singlet (Under Beat) that houses the ECG electrodes and which connects to either of the outer garments: Ether Scarf, a scarf, or Ether Beat, a blouse. The under garments are enabled with ECG sensors while the outer garments house signal processing equipment, small vibration motors, and radio transceivers. The sensation provided by the garments is of wearing the heartbeat of your remote friend/lover/relative as vibration through your garment.

The garments utilise simple technologies, which have been ‘re-jigged’ to suit the prototype, combined with specifically designed processing equipment. From a design perspective, the challenge has been to utilise the structure of the requisite technologies to inform the development of the apparel, rather than retrofitting an existing garment. In this foregrounding of the physical properties of technology, including the structural boning capabilities of wiring and the weight of the vibration motors, new opportunities for garment design arise. They have been drafted from the initial stages using traditional construction techniques in non-traditional ways to accommodate electronic pathways, processing equipment and battery power.

The prototypes aim to enrich the remote communications experience through reintroducing an embodied, tactile dimension that is present in face-to-face communication. They do not purport to replicate the complexity of the myriad channels at work in spatially co-present interaction but rather to introduce an element of peripheral awareness into the communications mix.
Hand Hearts – handheld communication devices

The Hand Hearts were developed to receive the ECG signal being detected and transmitted through the Ether Beat garments. They use similar technologies to the garments but incorporate them into handheld devices. The devices are resin cast hearts, derived from an anatomical model, that are fitted with small motors which vibrate with the received impulse. The hearts allow multiple users to interact simultaneously with a transmitted heartbeat. Philosophically, they are designed to question how such devices might impact upon remote interpersonal understanding and encourage the emergence of new group ecologies. The hearts were also created to ascertain the variation in user reactions between receiving the heartbeat through a handheld (Hand Heart) or a wearable (Ether Beat) device.

Within user testing trials individuals responded to the experience of holding the beating heart in highly emotional ways. Following are several responses from anonymous users after interacting with the hearts:

‘It feels like when I held my first cat. It was so little it sat in the palm of my hand. I could feel its heartbeat. This was when I was in grade six. The kitten was three weeks old – born under my grandparents house by a stray.’

‘Whilst holding the beating heart, I felt less focused on my own heartbeat, but aware of my hands sweating and my level of mild anxiety, and having to sit with that.’

‘Held in the palm, close to my wrist – bizarre, queezy feeling of recognition of self.’

While contemporary communications technologies have the capacity to mediate our relationships, they fall short of encouraging the richness of real-time colocated communication. The projects discussed here aim to address the limitations of remote communication by engaging a spatial dimension that is resident in spatially co-present interaction. They transmute internal processes into externally transmissible messages which are received by remote others through the agency of technology. As such they reposition the emphasis in remote communication technologies from technical issues (resolution, portability etc) to action at a distance, thus promoting new technologies which will allow us to connect physically despite bodily absence.
In the original presentation at the Sensoria Conference I related the creation of particular sounds and the production of spatial sound works to an encompassing field of technological, social and cultural conditions. It was an attempt at revealing the composite relations between ideas and their realisation as ‘works’ in the practice of one sound designer.

However theory has a tendency to make practice appear inevitable. In attempting to present a coherent narrative of ideas, motivations, projects and reflections the problem of flow arises. Should the presentation unfold like a proficiently edited film, or capture the detours, asides and spontaneous piecing together of thought? What a polished presentation lacks is a granularity that ensures an audience is exposed to the uncertainty inherent in doing things that may not have been done before, or new ways of achieving the known. How adequately can the inter and intra-dependence of the milieu and the work be described from inside by the practitioner?

Acknowledging this situation as one confronted by many, this text is written from the perspective of a sound designer and composer working in a school of spatial studies as opposed to the more likely scenario of a sound based practitioner working in a school of music, new media studies or acoustic engineering. This educational and research setting for sound based studies makes possible a broader focus on all aspects of human aural experience as the field of practice and investigation.

One task in teaching is to prepare emerging designers to consciously engage with the complex of real-world situations where they must know how to invent and maintain adaptable practices. Central to this are analytical abilities to observe and question what and how one is working, to find ways of investigating other ways of making and doing, essentially, to use research as a mode of learning.

For artists whose ideas are realised through sounding works, a plethora of production contexts are on offer, such as gallery based sound installations, concert compositions, radiophonic works, theatre and dance sound designs, urban soundscape design, games and other interactive media, CD, DVD, film and television audio production. With the advent of increasingly low cost technological platforms for spatial sound delivery in public, private and virtual spaces the opportunities have expanded to make work in formats other than the long-standing stereo one.
Acoustic ecology is a widely interdisciplinary field, built on knowledge from music, acoustics, psychoacoustics, sociology, bio-acoustics, anthropology, psychology and geography. In explaining how such a wide range of disciplines might successfully be integrated, its founder R Murray Schafer and others invoke the idea of an acoustic bauhaus. The dream was that the practice of acoustic ecology would synthesise ‘...craftsmanship and artistic production, functionalism and creativity...’ arising from an interdisciplinary teaching and design practice. Acoustic ecology is the study of living beings’ relationship to the soundscape. The word soundscape is...

...derived from landscape. Soundscape is the acoustic manifestation of place, where the sounds give the inhabitants a sense of place and the place’s acoustic quality is shaped by the inhabitants’ activities and behaviour. The meanings are created precisely because of this interaction between soundscape and people. Thus, the sonic environment (or soundscape), which is the sum total of all sounds within any defined area, is an intimate reflection of – among others – the social, political, technological, and natural conditions of the area. Change in these conditions means change in the sonic environment.

This broad agenda differentiates acoustic ecology from other environmental sound movements such as noise and right-to-quiet movements. While there is some debate about whether a phenomenological approach is appropriate within an ecological framework, I have found the student centred approach of acoustic ecology, applied to teaching sound within an architectural program particularly useful, as it is predicated on a listener within an environment, and not a range of objective measurements of quantity. Through this approach, the student as listener is situated within the environment and his or her own aural experience is the basis of learning about sound. Qualitative definitions abound in acoustic ecology, describing physical conditions and their intersection with social and cultural conditions.

This pervasiveness of electroacoustic sound in daily life necessitates a framework for considering it against other dominant forms of cultural expression, particularly those grouped under the readily accepted expression of visual culture.

...The ‘visual culture’ approach acknowledges the reality of living in a world of cross-mediation – our experience of culturally meaningful visual content appears in multiple forms, and visual content and codes migrate from one form to another: print images and graphic design, TV and cable TV, film and video, computer interfaces and software design, Internet/Web as a visual platform, digital media, advertising in all media,..., fine art and photography, fashion, architecture, design, and urban design.

In recent years, sound culture has emerged to describe the practice of artists whose ideas are realised through sounding works. But notice the difference. The term visual culture identifies an effort of the visually receptive sense and suggests an active engagement is required on the part of an observer, while the term sound culture doesn’t establish the same relationship. Sound culture gives the impression that sound happens, but listening doesn’t. Terms such as aural or auditory culture, as used by Michael Bull carry an assumption of a listener present in the relationship.

Knowledge of the sounding world has historically been embodied within the disciplines of acoustics and music. With the emergence of acoustic ecology or soundscape studies during the 1960s and 1970s, the entirety of the sounding world and its relationship to listeners became the subject of a single field. Soundscape studies comes closest to integrating identifiable components of the sounding world through which we may actively ‘...navigate and negotiate meaning’ as opposed to insensibly registering just the incidence of an aural stimulus.
Is there a connection between a collapse in the acoustic horizon, and the rise of spatial sound technologies and designs? I would propose a link exists and it is to reclaim a sense of aural expansiveness and detail, lost in our everyday experience in the built environment, through the virtual aural enhancement of the physical spaces we occupy daily.

Architecture and technology have been used to create enhanced physical or even metaphysical situations for listeners for centuries. R Murray Schafer in *The Tuning of the World* discusses immersion in sound, in a section called ‘The return to the submarine home’ in relation to plainsong chanting in Norman and Gothic churches. Quoting Viennese sociologist Kurt Blaukopf, Schafer expands on the point that the long and diffuse reverberation times and subsequent impossibility of localising the sound makes the listener believe they are part of the world of sound. Quoting from Blaukopf, he notes, the listener does not ‘...face the sound in “enjoyment” — he is wrapped up by it.’

The most common form of aural immersion today is that of headphone listening. While in the architectural mode of immersion in the cathedral one is surrounded by a sphere of moving elements, in headphone listening, one ‘...is the sphere’. Without an acoustic horizon to orient the listener, the listener is the universe of sound. But without releasing the experience of sound, Schafer points out that the listener ‘...does not take his place again with humanity’. We are a culture that doesn’t sing in groups in resonant spaces, and our daily existence relies on noisily traversing our environment and the dull drone of plant and equipment servicing buildings, cooling fans in computers and technology, and the hum of operating domestic appliances. It is as if we are silenced by the sounds around us.

Hearing is a continuous activity in human life, while listening is not. The difference is likely to be one of ‘psychological demarcation’. A way of understanding the practice of an acoustic designer is to describe it as articulating the demarcation between hearing and listening. A mereological (part-whole relationships) condition is created – listening niches are made in the continuum of hearing.

In his paper ‘The environment of mind’, Barry Smith describes J Gibson’s vision of reality as a whole, as ‘...a complex hierarchy of inter-nested levels of parts and subparts...’ where:

...molecules are nested within cells, cells are nested within leaves, leaves are nested within trees, trees are nested within forests, forests are nested within Special Federal Forest Protection Zones, and so on. Each type of organism is then tuned in its perception and action to objects on a specific level within this complex hierarchy – to objects (‘affordances’) which are the environmental correlates of adapted traits on the side of the organism and which together form what Gibson calls the organism’s ‘ecological niche’. A niche is that into which an animal fits (as a hand fits into a well-fitting glove). The niche is that in relation to which the animal is habituated in its behavior. It embraces not only things of different sorts, but also shapes, textures, boundaries (surfaces, edges), all of which are organized in such a way as to enjoy affordance-character for the animal in question in the sense that they are relevant to its survival. The given features motivate the organism; they are such as to induce upon its life, to stimulate the organism in a range of different ways.
In my own practice since 1999, the types of listening scenarios or environments have included an urban soundscape system, a VR centre, various exhibition spaces, theatre performances, radiophonic broadcasts, sound diffusion concerts, a community noise survey in a games engine, and the establishment of a new sound studio. Each of these projects can be described and compared in terms of physical properties (its topological milieu) and sound objects (affordances), human components (actions and experience of listeners) and the setting program emerging from the sequence of transactions between people and sound objects. Each of these settings are nested, bounded by describable conditions, and are niches within an overarching acoustic environment, they are designed to be composed of people and sound objects that configure in such a way as to carry out an experience or program within specified time-space boundaries.

5 Ibid.
8 Lawrence Harvey, Unpublished oral history interview with Graeme Harding, 2000.
The architecture of Decostered and Rahm proceeds by way of space-time distortions. We work on the very matter of space and time, using slips, shifts, accelerations and contractions. By going beyond the traditional metric and volumetric frame, our projects embrace a wish to extend the field of architecture into new dimensions. We work in the spectrum of the void and the density of the body, in the folds of time, and in the warping of distances and climates. The works proceed by way of climatic and temporal modification, generating a host of temporary local breaks, geographical breaches, astronomical shifts, and temporal contractions.

The current phenomena of globalisation and climatic irregularity accentuates the drift of man-oriented space into an autonomous space/time-frame, outside the natural astronomical and meteorological rhythms. The spaces that we occupy each day are conditioned somewhere around 21°C, at a relative humidity level of 50 per cent, with a brightness of 2000 lux, just like a fine spring day which you have decided to repeat ad infinitum, everywhere and forever and ever. This is the perpetual spring of the mythical Ogygia which is gradually being unfolded and elongated until it forms a global climatic continuum. A condition beyond biological cycles, which has neither sleep nor season, night nor winter, rain nor cold. The information is instant; the connection simultaneous, the network is global, and uninterrupted. Here and now, but also there and tomorrow.

Faced with this increasing and mean homogenization of space, our architecture tries to give rise to faults and flaws, meteorological dislocations, shifts of environments, and displacements, at once climatic, temporal and physiological. Our architecture works in the field of modernity, in the artificial transformation of places and climates; however we seek the supernatural rather than the artificial, the super-territorialised rather than the deterritorialised. In this sense it is architecture akin to a supermodernism.
The Hormonorium is a sudden drop in altitude, a high altitude climate which is compressed in just a few feet onto a seaside climate, a spatial contraction of 10,000 feet on to 10 feet.

The Hormonorium was exhibited as the Swiss Pavilion at the 8th Biennale of Architecture in Venice in 2002. The design was based on the disappearance of the physical boundaries between space and the organism, as revealed by biology and the neurosciences. Going beyond visual and metric mediation, the space sought to establish continuity between the living and the non-living, opening the space up to invisible, electromagnetic and biological determinations.

While the Hormonorium created an alpine-like climate it was also an assemblage of physiological devices acting on the endocrine and neurovegetative systems. In this sense it can be viewed as a physiological representation of an alpine environment, to be ingested, through respiration, through the retina and the dermis.

The dazzling, luminous false floor was made of Plexiglas to allow the passage of UV light. It was made up of 528 fluorescent tubes, which emitted a white light that reproduces the solar spectrum, with UV-A and UV-B. Because of its inverted radiation, emitted from the ground, as in the case of snow, the luminous radiation is not blocked by the eyelids, the eyelashes or the natural tilt of the head. This very bright light of between 5000 and 10,000 lux stimulates the retina, which transmits information to the pineal gland that causes a decrease in melatonin secretion. By so lowering the level of this hormone in the body, this environment allows us to experience a decrease in fatigue, a probable increase in sexual desire, and regulation of our moods. Due to the presence of UV-A, the Hormonorium was a tanning environment, while the UV-B rays enabled the synthesis of vitamin D.

Increasing the level of nitrogen in the Hormonorium reduced the oxygen level from 21 per cent to 14.5 per cent, which is that found at altitudes of about 3000 metres. This oxygen-rarefied space causes slight hypoxia, which may initially be manifested by clinical states such as confusion, disorientation or bizarre behaviour, but also a slight euphoria due to endorphin production. After about ten minutes, there is a measurable ‘natural’ increase in erythropoietin (EPO) and hematocrit levels, as well as a strengthening of the cardiovascular and respiratory systems. Erythropoietin is produced by the kidneys. This protein hormone reaches the bone marrow, where it stimulates the production of red blood cells, thus increasing the supply of oxygen to the muscles. Decreasing the oxygen level therefore has a stimulating effect that may improve the body’s physical capabilities by up to 10 per cent.

The Hormonorium was therefore a climate that stimulated the body physiologically, while simultaneously offering a new model for a de-contextualised, de-geographised public space. A physico-chemical place, it offered a partial displacement of a climate from higher elevations to the seaside, enhancing the body’s equilibrium through regulation of the neurovegetative system. Moreover, it was a place of potential transformation of our physical performance, through stimulation, through the physiological modification of human nature. An infra-functionalist architecture, a place whose visibility expands into the upper and lower wavelengths of the light spectrum, into the invisibility of the chemical compositions of the air, an endocrine architecture, to be breathed, to be dazzled by.
The Fabrice Hybert’s Winterhouse is a displacement of latitude in real time from the south to the north hemisphere, like a curve of space-time, overlaying a Tahitian summer on a Vendée winter, in western France, or a summer’s day on a winter’s night.

This project is concerned with the invisible modification of space by modern climate control. The aim is to broaden the field of architecture to the design of the invisible, of electromagnetic fields and chemical realms. The house is to be constructed in the countryside of the Vendée, near a small river, at a distance from other dwellings. We imagine it as a winter refuge, a conditioned space that will afford protection against cold and harsh weather during the rigors of winter. Our design is intended to restore to specialist engineers the task of designing the technical aspects of the building such as heating and ventilation as architectural elements. Hence the design considers the physical material of the heating and ventilation system not merely as a secondary aspect of architecture, but as its fundamental raison d’être.

Positioned in an outdoor winter temperature of 5°C the interior of the house is climate-controlled to 20°C, with 50 per cent humidity. If modern climate control of space is abstract and invisible, we propose here to construe it as the artificial reproduction of a geographically localised, chemically determined climate. Thus, in winter the interior of the house in the Vendée becomes a meridional or a tropical climate, at the choice of the occupant. For this purpose we have developed an architecture of air, invisible but physically modified. The heating system becomes a space for the production of this air, and contains not just the technical apparatus, but also exotic plants, earth, microorganisms and mineral substances from a region of the planet where the temperature is actually 20°C, with 50 per cent humidity. These plants, through photosynthesis and their emanations, will determine the chemical quality of the air that will then be pulsed into the living space. The light in this space will be determined by the real-time reproduction of the astronomical rhythm and light intensity characteristic of the delocalised region.
Mollier’s housing, 2005

The Mollier’s housing is a longitudinal contraction, by a decrease of the level of the humidity of the air from 100 per cent RH (relative humidity) to 30 per cent RH. The island of Eybesfed in Austria is a place of perpetual summer, beyond the earth’s rotation around the sun, and the seasons.

This project reveals and qualifies an invisible but nevertheless obliged relation between interior space and moisture. It seeks to transform a physical problem of the building into a question of architecture, until it becomes the efficient cause of the form.

The natural breathing of the occupants and the use of hot water, are the origin of the presence of water vapour in a domestic space. A person at rest produces approximately 40 grams of water vapour per hour and up to 150 grams per hour in activity. The use of a bathroom releases up to 800 grams in 20 minutes and that of a kitchen 1500 grams per hour. The typical response to the excessive presence of the water vapour in interior space is given today by the banality of the technical systems of ventilation. We propose here to formalise space according to the water vapour itself, opening a major and complex relation between the inhabitant, their body and the space according to its physical and chemical characteristics.

Our project establishes a space stratification of the water content. In the manner of a Russian headstock the dwelling is conceived according to the renewal of air in the house, considering the relationship between the driest with wettest, the more pure with the more vitiated, the room to be slept in with the bathroom.

However the project refuses the functional programming of space according to specific activities, rather it creates more or less dry spaces and more or less wet spaces, to occupy freely, to adapt themselves according to time and seasons. The plan of the house is a spatialisation of the diagram of Mollier, creating new corresponding programming sciences, where the same space can accommodate functions a priori separate. Room 1 (drier, sauna) – 0 per cent to 30 per cent relative humidity; Room 2 (room, office) – 30 per cent to 60 per cent relative humidity; Room 3 (bathroom, kitchen) – 60 per cent to 90 per cent relative humidity; Room 4 (swimming pool, lake) – 90 per cent to 100 per cent relative humidity.

It is through the variation of the relative humidity that this architecture takes shape and formalises spaces of the dwelling, the real and carnal immersion of the body of the inhabitants in the wet and variable body of space. The building establishes new, sensual and physiological relations between the inhabitant and space. It also engages in closer links with the lake landscape of Vassivière in the Limousin. The project amplifies the hygrometrical stratification with the landscape, integrating the physical presence of the water of the lake and natural external moisture like one of the rooms of the house.
Painting has a very specific position and function in our culture, although recently it has been seen by some as a disintegrating superpower hanging on to a crumbling empire, as an end rather than a means, as content rather than a tool. This approach leads to limited ideas about what painting is, let alone what could constitute a relevant contemporary painting practice. It is useful to remember here that painting is not a homogeneous entity. Painting by its very nature is a complexity, a multiplicity, operating in the world as ideas and actions, as phenomena and language.

Painting remains important because in certain of its manifestations it enables us to become aware of how we perceive, construct meaning and experience. It is a model for thinking, questioning, representing, feeling and understanding our world. It intertwines our internal and the external experiences of the world in actual and virtual forms.

Elisabeth Grosz in her essay ‘The future of space toward an architecture of invention’ argues for a concept of the logic of invention, which she opposes to the Aristotelian logic of identity, reflection, reason and self-containment. (She claims that a logic of invention still has to be invented, while I would suggest it already exists via the model of art). She suggests:

> Only such a logic can mediate between the reflective categories of philosophical thought and the pragmatic requirements of an empirical object. Instead of the self containment of the syllogism (in which conclusions are logically entailed in validly constituted premises), a logic of invention is necessarily expansive, ramifying and expedient, producing not premises so much as techniques, not conclusions so much as solutions, not arguments so much as effects.

Grosz continues: ‘Architecture too is bound up with problem solving and with multiplicities, though the multiplicities with which it deals are not simply conceptual or simply material.’ It is in this context I will discuss certain ideas that have affected my practice particularly regarding painting/installation, that is a painting extended in time and space, which by its very nature is hybridised, relational, existing amid the world.
Virtual duration is a temporal experience recognised through intuition. It is an ongoing embodied experience of time, internal and ongoing in our life, a continuum. It is how we experience the world and is absolute. Our experience of reality is therefore a composite where the internal and the external or the actual and the virtual meet. A composite is a mixture of things different in kind: experience gives us a composite of space and duration.

For Bergson, it is not a matter of opposing these as a dualism or reducing the multiple to one, but of distinguishing between the two types of multiplicity. He wrote: ‘When sitting on the bank of a river, the flowing of the water, or the gliding of a bird, the uninterrupted murmur of deep life, are for us three different things or a single one, at will’. Perception here operates as action, not only representation in the duration of time. Memory informs perception and operates to bring the past into the present, the virtual moves into the actual, as a mixture of experience and representation: a composite.

I have used the ideas of the composite and multiplicity to assist with the development of art works that reconcile, not unify differences of kind. Artworks are composites where diverse languages and sensation meet in concrete form. The internal and external meet in the actual time and space of the present, in the experience of the viewer.

My recent works explore the intersection of painting and the world, often extending the pictorial space of painting into the actual space of installation, creating fields for the viewer to reflect upon and project upon, where contents become recoverable in the experience of negotiating the work over time. The works exploit time and duration in order to create ‘slow works’ asserting a contemplative function for art.

By describing the two projects Duration of Light Project 2004 and The Black Reflection Photopaintings 2001-3, I can perhaps suggest the complexity of experiencing the work, as an eye in a feeling, thinking body amid time and space, amid culture. The distribution of signifiers in time and space means that content is recovered as the viewer moves through the work. The site of the work is recognised as carrying readings. The body operates amid it, inserted into the work through devices such as reflection, colour saturation, placement and interval.

In **Duration of Light Project 1**, I created a reflection work by painting a large black acrylic rectangle to the external face of the glass wall of Project Space, RMIT. When viewed from the inside this appeared as a mirror. The viewers saw themselves perceiving in a space, amid a bigger space and time, their reflections framed by external views, inside meeting outside. From the exterior the black form blocked views of the interior, deflecting readings and creating formal tonal contrasts.

Within the gallery the rectangular monochrome wall paintings referenced colours observable through the windows, setting up relational comparisons between the changeable and the fixed, the constructed and the actual, between here and there, now and then. Next door, the small Spare Room space was painted intense yellow, creating an immersive environment affecting the viewers’ perception of colours and light, heightening the relative nature of perception.
The Black Reflection Photopaintings 2001-3, are photographs on which gloss enamel rectangles are painted leaving the edge of the photographs visible, similar to the black window painting/installation discussed above. They are composites existing between the representational conventions of photography and the actuality of painting. What photographs are as well as what they are of, is important. Photography is presented as another form of representation, not as a privileged realism or truth. The photograph is an image of an event, a memory, another time another place. It also functions as a physical support. The material and temporal nature of the photograph is highlighted, contrasting with the properties of the enamel paint.

The painted black monochrome rectangle initially functions to obscure the information behind it, asking the viewer to examine the periphery of the work, generating readings and associations from fact to symbol. The paint surface contains dust which is not only symbolic but which also addresses scale. The physical matter and gesture of the paint reveals its application in time. The black gloss paint reflects real space/time/events/people, referencing the traditional mimetic space of ‘Western realist’ painting and a ‘live time’ screen.

Here the viewers see themselves observing in the present. The works are sites for becoming aware of our changing perceptions and constructions of meanings. Again meanings here are relational, informed by context, related to our attention and intention, that is, what we are looking for and how we look for it within the continuum of time.

2 ibid, 255.
7 Gilles Deleuze in Bergsonism, 37.
According to one theory of conjuring, the feats which induce a sense of magical experience can be divided into a relatively small number of categories. These include productions (from not being to being), disappearances (from being to not being), transformations (from being in this way to being in that), transpositions (from being here to being) and natural science laws disobeyed (which is in itself one definition of magic).

A group of emerging artists and designers, whose work deals with the experience of perception, were invited to create works to direct attention to such shifts, slips and reversals within the spaces of Melbourne’s Conical Gallery.

To walk round the exhibition was to experience an exercise circuit of perceptions, heightening awareness of one’s own perceiving body in action. Many of the works manipulated the audience physically by inviting participation in their performance – stepping up, leaning closer, throwing the head back – while at the same time heightening our awareness of acts of looking, seeing and speculating.

Slips, Shifts and Reversals
Patricia Pringle
Several of the works were called into existence through the engagement of the viewer entering their zone. As spaces and relationships were revealed, they became cohesive spaces for the duration of the experience, visible only to their occupant and falling back into their disparate elements once the attention was withdrawn. In particular *Slipping Spaces* (Olivia and Madeleine Griffith) and *The Return* (Megg Evans) each brought us into a tantalising relationship with our own self, one where our reflection looked not back at us but onwards to another place.

The Griffiths’ work, which used a video loop to let viewers see themselves in an enchanted other world, drew on the bright and dark enticements of fairy tale, heightened by its placement in a secretive underair position at child’s-eye level. In contrast Megg Evans’ unsettling endless mirror circuit called up the relentless displacements of phobia, filled with paradox and prohibition, by refusing ever to let us reach the person that we were following, who was again our own self.

Sanne Mestrom’s large work *The Myth of Political Vision* used 3D techniques and stereoscopic lenses to focus on the process of perception and the revelation of multilayered realities through shifts in vision. The sensation of perception was visceral; one felt the machinery of vision in action. The dubious grandiosity that its scale implied sat nicely against Tim Mattison’s *Tremor*, which in contrast conjured an equally post-apocalyptic narrative out of simple scraps of cardboard and torn paper. These were used to create a stop-motion video epic whose fluttering protagonist, animated out of the most ephemeral media, rose up for a short moment of glory before being once more dismembered and reduced to fragments. Viewers found ourselves engaging with the epic even as they laughed at the incongruity of it all, their own physicality perhaps briefly troubled by an empathetic embodiment with the flat and tattered figure as it shifted from animated humanoid to non-existence.

Works by Linda Choi and Rowena Martinich brought viewers emphatically back to their own bodies. These again set us in motion. In *Looking Practice 8: Corner Study* Linda Choi set up an experience against which it was almost impossible to stand still for long, so compelling was the desire to move from one position to another to relish the optical quandary that it provoked. In an acute-angled corner space she had positioned a full size photograph of the corner itself, imposing a picture plane and intercepting the visual continuum. As one moved in and out of the zone in which the photographic simulation matched the context of the viewing space, the walls forming the acute angle seemed to swing round in an attempt to sustain some possible view.

Rowena Martinich made us move also, but with a meditative pace. There was no single position from which to see her pieces which, like landscape, were scanned with the physical eye and the mental eye. They made the viewer hover, while looking up, looking through and looking past with a swelling and contracting of vision.

With Reflection: *Spatial Screening* Erin O’Callaghan shifted time with an illusory reflection. Viewers glancing towards an existing window would see the reflection of the space that they were in but at a different moment in time, and being moved through by other gallery visitors. The disconcerting effect of this was that one felt the presence of other invisible visitors in one gallery while oneself becoming an invisible occupant of that other gallery. This was achieved by back-projecting video on to the window/screen via apparatus which was concealed in a purpose-built chamber attached to the outside of the gallery wall.

The physical scale of the behind-the-scenes construction necessary to make this exhibit function flawlessly made the delicacy of the final exhibit all the more touching. Hannah Bertram’s two small works, *Echo* and *echo*, demonstrated the power of small things to work on us physically, calling us to move closer, engaging the magnifying eye of our attention. Lacellike trajectories of powdery colour, they suggested that the molecules of wall and floor had slowly and quietly changed places. Scarcely visible at first sight, they grew in the mind to become substantial works which would be called up in memory long after their delicate placement and displacements of dust and wall had vanished.
The Glasshouse series of works interface with architecture and landscape to create elemental, immersive and enmeshed spaces where the language of porosity and fluidity is used to create a fusion with the environment, slowed spaces that are reflective, to bring us into contact with the life-world. An in-between space, where fixity of meaning becomes fugitive, enabling notions of transcience and transformation to be invoked.

The Green between Glass is a large glass veil between the restaurant and the foyer of a Melbourne Hotel. It is a visually fluid wall shifting between transparency, translucency and opacity, the material and the immaterial, encapsulating images of the edible plant world.

The wall is made up of overlapping glass panels. Layers of green glazes have been poured onto the glass, possibly with the gesture of sowing seeds forming these ‘spilt’ fluids, whose ‘flowing’ presence suggests the essential oils and liquids we extract from plants.

In varying degrees of transparency these fluid panels underlay and overlay screen-printed drawings from early botanical illustrations of medicinal herbs and plants. The plants’ Latin and common names are interwoven to form horizontal bands of text through the centre and bottom of the glass panels. Like large-scale vertical microscope slides we are able to inspect at close range the liquids and solids, the chemistry encapsulated within the layers of glass.

Both transparent and membranous this elusive glass wall shifting in light attracts us from a distance with its abstract fluid green, as a wall of light. It is continually within the present reflecting the light world around it whilst creating glimpses through from one side to the other. It can be viewed from both sides, each offering a different aspect. The elusive layering both obscures and distils our vision, suggesting the facts about plants whilst at the same time conjuring the ephemeral, fleeting and fluid nature of organic matter and of light and glass itself.

As a botanical frieze, the artwork combines the graphic representation of edible herbal matter with the notion of its immateriality its ability to decay, decompose, be ingested, distilled to extract essential flavours and elixirs both static and fluid reminding us of the transformative flux of nature. It is a poetic foray into the vegetal world where flavour, essence, and the fundamental chemistry of medicinal herbs are frozen within glass.
The Verdant Works are an exploration of reflected and veiled environments of the physical world. They allow one to engage with a way of looking within the world rather than at it and invite the viewer to experience oneself through materiality. It is also very much a space that one reflects oneself onto it and become a reflective space. Many of the works hark back to Laurence’s earlier expressions of elemental and alchemical states. The glass is presented as a clear fluid, a medium which can suspend or transmute molecules of matter or traces of a reflection.

In works such as Wingbeat/Moss Glass (2004) a sense of uncertainty and dissolution is induced by the overlapping images of the modernist architecture and the adjacent forest. “The dualities of nature and culture have become diffused and entangled through the play of multiple reflections and the seeping interference of sulphurous, unguent swirls of pigment.”

In Space Dissolving, the work shows the iconic Barcelona pavilion of Mies van der Rohe transforming through the layering of glass panels as fluid and organic forms appearing to dissolve it which brings to mind Toyo Ito writings on it:

…What we experience here is not the flow of air but the sense of wandering and drifting gently underwater. This very sensation makes the space distinct and unique.

…This fluidity and density felt in the Barcelona Pavilion gradually disappeared even from Mies’s own architecture. Instead, architectural formality rapidly gained its place. That space which once felt fluid was lost, as if liquid had been transformed into solid. And, as we await the 21st century, we are once again in search of that erotic architecture that fuses with the environment.

All these works are made up of veils of varying degrees of transparency, both in order for their matter to be experienced and to create a degree of difficulty in seeing, to draw us in to immerse us and yet the material of glass itself reflects us back as Michael Tawa has said:

To gloss-over is to skim, scan, slide-over – so as to miss engaging or connecting with something. The slipperiness of glass is not only in its glossy surface, but also in its internal propensity to slide, its fluidic constitution. The slippage it effects is also in its betrayal of transparency – its mineral lineage. Glass is neither a liquid or a solid. In its deferral of distinctions between stability and movement, between inside and outside, glass slips from being seen through, to being looked at, to itself looking and throwing glances. Towards what? Towards us, as a measure of its appearance, as a turning towards existentiation.
**Elixir** is a site-specific permanent artwork that forms part of the ‘necklace’ of art, architectural and landscape projects that are transforming the mountainous traditional rice farming community and its spectacular landscape with its radical seasonal changes in Echigo Tsumari, Nigata Prefecture, Japan.

One makes a pilgrimage to this place, and a journey to Echigo-Tsumari is a journey to the *Snow Country* of Kawabata’s 1948 novel:

> In the depths of the mirror, the evening landscape moved by, the mirror and the reflected figures like motion pictures superimposed one on the other. The figures and the background were unrelated, and the figures, transparent and intangible, and the background, dim in the gathering darkness, melted into a sort of symbolic world not of this world.¹

The Echigo Tsumari Triennale is a visionary project under the directorship of Fram Kitagawa and Art Front. It is regarded as the major event in the Japanese contemporary art calendar whilst at the same time managing to involve the local community to both realise and then maintain the projects. This is a great experiment where art becomes the bridge between humanity and nature.

The region, spread out over a vast area, is regenerated by this contemporary cultural event and interventions, many of which are permanent. There is a wonderful variety of sites through the different villages, towns and landscapes.

Art projects are commissioned every three years by a vast range of internationally well known artists such as Christian Boltanski, Magdalena Jetelova and Yayoi Kasuma, as well as younger Japanese artists. As the boundaries between architecture and art are increasingly blurred, here the intertwining is with the environment itself, as a reference and a framing, resulting in a successful synthesis that reinforces a respect for the natural environment.

Recently two major architectural projects were commissioned, one being the No Butai Cultural Centre by MRDV from the Netherlands, a white building that disappears in the deep snow winters. In a nearby area wrapping around a forest is the Museum of Natural Science, a red rust cor-ten steel bunker into the landscape, designed by architects Takaharu and Yui Tezuka.

The surrounding forests are woven pathways lined with story stones by Jenny Hütter and Kawamata’s wooden walkways and shelters creating trajectories and spaces for one to experience and inhabit the landscape.
One may choose to spend a night at the James Turrell House of Light, a house designed by Tadao Ando, in which one experiences the series of spaces of disclosed light and others that open and close to reveal the transforming aspects of light and colour of day into night and night into day.

Another night could be spent in the Dream House by Marina Abramovic, offering visitors the experience of sleeping in suits and sarcophagi (sleeping boxes) with dream-enhancing magnets and mineral stones, in rooms coloured by their old glass sliding screens. It is a traditional wooden farmhouse transformed into a psychic space.

Within the garden is the Elixir House, a restored, traditional, small, wood storage house. The interior within the dark wood house is transformed into a light reflecting glass laboratory like space echoing both an old apothecary, and tiny, botanical museum. It is an experiential space that immerses one into the essence of the surrounding landscape.

This wooden interior room of Elixir is lined and layered with glass veils stained with plant fluids, and inscribed with the plant names, botanical drawings and medicinal remedies from this environment (sourced from ancient books and individuals within the region). Around the edge are hanging, elongated blown glass vials each containing plant specimens.

In the centre of the room is a layered cantilevered glass bench laden with glass laboratory vessels filled with the elixirs: extracts of plants mixed with shochu as potions/drinks, which one takes from tiny glass beakers. A glass box containing the clear fluid shochu sits above, casting light reflections around the space playing out the Japanese poetic of light from shadow.

The work reveals and regenerates an ancient tradition and knowledge of the medicinal plants whilst forming an intimacy with the natural surrounding landscape.