

Synaesthetics – a basis for meaningful musical learning and cross-curricular connections in the arts

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This paper traces the historical and scientific links between music and the visual arts through the phenomenon of synaesthetics. Through examination of the theory of synaesthetics and the work of well-known synaesthetes this study identifies commonalities between music, visual art and language that strengthen the connections between the disciplines. Along with personal reflections on my own creative works this paper traces the metacognitive process that led to a study of synaesthetics as a result of a trip to Antarctica in 2004. This study also draws comparisons with the work of other New Zealand composers who have travelled to Antarctica, as well as identifying the implications for teaching and the impact on composition students. The final part of the paper looks at the emphasis placed on integrated arts in the three most recent music syllabi in New Zealand and explores how synaesthetics and the relationship between image and sound forms a useful connection for the cross-curricular teaching of the arts.

Composers, painters and writers have frequently found that the creative act contains a mixture of the planned and the spontaneous. Sometimes it is because the work itself has evolved in a direction of its own that was different from what was originally intended or at other times because the artist has seen different possibilities for the work during its creation. A significant degree of introspection is usually involved and sometimes, in a moment that artists might describe as inspirational or even an epiphany, the metacognitive side of the creative process is revealed. It is this aspect of the creative process that has led to the exploration of synaesthetics, a “common ground” where performing and visual arts meet. Many of the examples used in this paper refer very specifically to the relationship between sound and colour but this inter-relationship between the senses goes well beyond that. The Psychology Department at the University of Sussex describes the medical condition synaesthesia as “a joining together of sensations that are normally experienced separately. Some synaesthetes experience colours when they hear or read words, whilst others may experience tastes, smells, shapes or touches in almost any combination” (as retrieved from <http://www.syn.sussex.ac.uk/>, April 2009) while Robinson (2009) describes the condition as one “in which [people’s] senses seem to mingle or overlap: they may see sounds and hear colors” (p. 33). Scientific proof of the effect this sensory overlap has on our brains is stated by Sacks (2008, p.193) with the confirmation that functional brain imaging has detected activation of the color-processing areas of the brain in synaesthetes when they “see” colors in response to speech or music. It is important to establish this scientific basis as it would be all too easy to regard the study of synaesthetics in purely aesthetic terms, confining it to the arts purely as an affectation, akin to beauty perceived only in the eye of the beholder.

Historical and Scientific Context of Synaesthetics

In considering Antarctica, it became increasingly apparent that much of the language I used to describe my music was colour-based. This, in turn, led to making the connection with synaesthetics, the link between sounds, colour and language of which the most common is that between colour and sound (colour-hearing or *audition colorée* (Gage, 1999)). The association between colour and sound has a long history and was proven by the mathematical statement of physical fact by Sir Isaac Newton in his treatise *Opticks* (1704). Newton analysed white light and spectroscopically identified the seven colours of red, orange, yellow, green, blue, indigo and violet. He then proceeded to draw comparisons with the seven different notes of the diatonic scale, stating that these analogies were “based on the breadth of the seven colour-bands in the spectrum and the seven string lengths required to produce the scale” (Scholes, 1984, p. 205). This phenomenon highlights one of the most important similarities between light and sound

with both made up of waves capable of being broken down further into component parts; white light is comprised of the other seven major colours and a single note is comprised of the notes from the harmonic series. Gage (1999), points to how easy it is “to see how attractive it has seemed to find points in the continuum of spectral colour analogous to discrete pitches in the continuum of sound whose relationships have been regarded as harmonious in the Western tradition” (p. 141). However, there have been those who have suggested a hierarchy, such as George Field in his *Chromatography* (1835), who argued, “the painter should follow the musician in matters of harmony” (Gage, 1999, p.264). However, most, like David Hay in his *Laws of Harmonious Colouring* (4th ed., 1838), avoid being so didactic and settle for making the connection of “a scale linking music and colour in the most direct way” (ibid, p. 264).

As an adjunct to the various scientific theorems seeking to explain the relationship between colour and sound, the invention of special instruments has helped to demonstrate practically the phenomenon, such as the Rimington colour organ, the clavilux and the clavecin oculaire (ocular clavichord). The latter was developed by Louis-Bertrand Castel in 1730 and had sixty coloured glass windows in the side, which Kemp (1990) described as “the elaborate box of colour octaves” (p. 289-290). These would no doubt have appealed to the painter Paul Klee – the inventor of “polyphonic painting” (Düchting, 1997, p. 88) – who is reported to have said “one day I must be able to improvise freely on the keyboard of colours” (ibid, p. 17). Even science fiction writers have combined colour and sound when describing musical instruments of the future, one of the most notable being in Isaac Asimov’s *Foundation & Empire* with the Visi-Sonor, a device capable not only of conjuring up the most wonderful music and light effects but also, ultimately, controlling the emotions and the mind (Asimov, 1952, pp. 147-150).

On a broader level still, the close relationship between the arts and science is accurately represented in the cultural history of Antarctica. Reflecting the times they lived in (and the holistic education system they were educated in), many of the early art works of Antarctica were created by scientists on the expeditions of Scott and Shackleton. These men were hobbyists for sure but many of the works display a competence and appreciation for the aesthetic, if somewhat conservatively, in the analytical quality of the watercolours and rough pencil sketches. Although primarily scientists many were artists as well, the epitome of the scientific artist or artistic scientist. It is therefore interesting to compare the culture of early Twentieth Century Antarctica with that of the present day where the lines between scientists and artists are more clearly drawn, a result, perhaps, of the more specialised nature of the educational system in the latter part of last century. This gradual separation of art and artists from other disciplines in contemporary society is echoed by Couture (2004), who uses the example of the Inuit, stating “they do not recognize the notion that artists are somehow different or separate from other people. Life and art are beautifully intertwined and give meaning to each other” (pp. 91-92). It is this *connection* not separation that helps create meaningful learning in an integrated arts curriculum, creating what Coleridge once defined as “the balance or reconciliation of opposite or discordant qualities” (Tsur, 2007). The re-establishment of this connection appears to be behind current educational thinking and the design of the new school curriculum in New Zealand discussed in the penultimate section of this paper.

Practical Applications of Synaesthetic Theory – Artists and their Work

The most popular synaesthetic link between sound and colour is the suggestion that particular keys have a colour, thus indicating an inherent emotional impact. There are many instances, more familiar to practising musicians, where composers have ascribed colours to keys in order to identify their expressive qualities. Beethoven, for instance, once described B minor as being black (Scholes, 1984, p. 203) while both Rimsky-Korsakov and Scriabin drew up a table of colours as they perceived them relating to specific keys and tonality. Scriabin’s interest in keys went even further than ascribing green to A major, steel (grey) to E flat and a vivid blue to F sharp (Griffiths, 1985). In his symphony *Prometheus* Scriabin went beyond the mere suggestion of colour by tonality, wishing “to flood the whole auditorium with coloured lights” (Gage, 1993, p. 243). Probably one of the most overtly synaesthetic composers was Messiaen. For example, in the preface to the score of *La cite celeste*, he states that, “the form of this work depends entirely on colours” (Griffiths, 1985, p. 203). Indeed, in this work Messiaen has single chords

match the colours of the celestial city's precious foundation stones and in the score he specifies the colours he visualized on every page so that the conductor would be aware of the colour relationships and convey that to the players (Hall, 1996, p. 107). In his orchestration it was his intention "that the brass 'play red', that the woodwind 'play blue'" (ibid p. 107) and, as Griffiths (1985) observes, for Messiaen the word chromaticism "itself implies some kinship in experience between harmony and colour" (p. 203).

The terminology used to describe both colour and sound is long-established, with the German term *klangfarbenmelodie* clearly linking colour with sound. There are also many creative works in music and painting that make obvious reference to the genres of the other, such as Kandinsky's *Die gelbe Klang* (1912), Schoenberg's *Die Glückliche Hand* (as well as his own self-portraits and paintings), and Bliss' *Colour Symphony* (1921-22). Kandinsky (1979) freely So, too, did the pioneers of abstract film Viking Eggeling and Hans Richter who developed film representations of music using graphic images, such as that of musical fugues in Richter's *Orchestration of Colour* (oil on canvas) of 1923 (Düchting, 1997). and the work of early twentieth century colour theorists Itten and Hauer investigated this relationship further. Hauer (Düchting, 1997) was "interested in the synaesthetic agreement between colours and musical tones in what he termed a *Klangfarbenkreis* (circle of sound and colour)" (p. 21).

The melding of the arts into one all-inclusive *gesamkunstwerk* (total work of art) was Wagner's ultimate aim in his stage productions (Düchting, 1997, p. 10) and set the benchmark for such large-scale, artistically integrated events. Wagner's operas are perhaps the pinnacle of the synaesthetic experience during the romantic era, with the composer central as the consummate artist, not only composing the music but also writing the story and libretto and sketching the set design. A further dimension, in purely musical terms, was that not only did Wagner write straight to score i.e. he visualised the orchestral "colour" immediately rather than writing a piano score first then orchestrating, as was the standard practice. Wagner also expressed the desire for the orchestration to work "in such a way that colour itself becomes action" (Riley, 1995, p. 293). In his set designs for the Los Angeles production of *Tristan and Isolde* (1987) and the Chicago production of *Turandot* (1991), David Hockney, himself a synaesthete, approached the works with the idea he could "paint with light" (ibid, pp. 294-296). Hockney took, as his lead, Wagner's own synaesthetic reference from Act III of *Tristan und Isolde* when the "hero sings 'Wie hor'ich das Licht' (When I have heard the light)" (ibid p. 293).

The type of synaesthesia described so far is generally regarded as a neuropsychological phenomenon. The other type is verbal or literary synaesthesia where the exploitation of verbal synaesthesia is used for specific literary effects (Brown, 2001) e.g. Keats' "The same bright face I tasted in my sleep" from *Endymion* (1.895). The use of synaesthetics enjoyed its greatest prominence in writing during the romantic period, Nabokov, Coleridge and Shelley being notable synaesthetes. Baudelaire's *Correspondances* and Rimbaud's *Voyelles* (Tsur, 2001) are full of synaesthetic imagery. *Voyelles* demonstrates how isolated vowels are qualified by colour adjectives, opening with the line *A noir, E blanc, I rouge, U vert, O bleu*, which Gage (1999) suggests should remain untranslated "because it was the sounds and not the visible letters that were generally thought to evoke the synaesthetic effect" (p. 262).

Author and composer Anthony Burgess never talked of himself or his work synaesthetically (i.e. with regard to colour) but he does span the disciplines of music and literature and his comments are helpful in identifying how he transfers his creativity between the two disciplines. This is also useful when attempting to making connections for teaching as focussing purely on a sound-colour relationship can prove overly specific, particularly when dealing with the majority of students who are non-synaesthetes. Burgess' continual transference between the written word and music in his work is one which helps broaden the possible parameters for synaesthetics to accommodate process as well as perception. Burgess (2001) confessed, on completion of his third novel, "it was a temporal necessity for me to cleanse my mind of verbal preoccupation by composing music...The struggle with words, their syntax and rhythms and referents, yielded to a concern with pure form" (ibid, pp. 34-35). Keenly aware of his considerable ability in both

disciplines, Burgess expands on the common ground shared by music and literature, stating “that the dimension they work in is time” (ibid, p. 41).

Burgess’ “cleansing of the mind” is a comment with which I can identify when I look back on my early attempts to express my ideas following my return from Antarctica. Writing poetry provided the solution to my lack of creativity and, in order to get things moving, I wrote a series of stream-of-consciousness texts from which the poem *white* was eventually developed. With it came the realisation that colour was beginning to play a large part in my assimilation of the experience.

Synaesthetics and the Antarctic Experience

It is indeed somewhat of a paradox that a study of synaesthetics should arise from a visit to Antarctica, a place much *reduced* in sensory stimuli which Pyne (1987) describes as “so sparse, so stripped of sensory impressions, that it can hardly be witnessed as a landscape at all” (p. 205). However Antarctica has been the destination for four composers from New Zealand seeking inspiration for their work – Chris Cree Brown, Phil Dadson, Gareth Farr and myself – and several from other countries have all made the journey south, along with a host of writers, visual artists and other creative people. For all of us it has proved to be one of the most significant things we have done as creative artists.

In 2004 I headed south as an Honorary Antarctic Arts fellow with Antarctica New Zealand’s education and artist’s programme. My proposal, entitled *Sounds of Antarctica*, involved spending 10 days down on “the ice” gathering inspiration for a portfolio of compositions. As stated earlier, one of the most significant developments in my work since visiting Antarctica has been the metacognitive investigation of the processes involved in the creation of the pieces themselves and the synaesthetic relationship sound has with the visual arts and literature. The awareness, and subsequent study, of synaesthetics has broadened my understanding of how artists perceive the surrounding world and how this impacts on the creative act, as well as rekindling a personal interest in poetry and painting.

One of the first questions people ask is what Antarctica is actually like. In truth it is unlike anything or anywhere else I have encountered but my answer is invariably the same; it’s white; it’s blue, it’s black; it’s cold. Pyne (1987) concurs, stating “the only color is the aurora of the polar night and the bleached blue sky of the austral day; everything else involves tinges of black and white” (p. 207). Fearnley (2006) also highlights the extremely limited colour palette, stating

the sky bleaches, becomes a shade of dull white; yet the ground is still in many places, the colour of charcoal. In the hollows, where the snow has settled, the impression is of a brass rubbing: marks made by white chalk passing over a sheet of black paper (p. 7).

Sounds are limited to skuas, penguins, petrels, the wind and those made by humans and machines. Otherwise, it is one of the quietest places on Earth, very different from one’s normal noise-rich environment. In Lawrence Fearnley’s novel *Degrees of Separation*, Sally, a composer visiting Antarctica, remarks “there was so little in the way of natural sound” (Fearnley, 2006, p. 154) and “I’ve never been in such a quiet place before” (ibid, p. 87). Fearnley and I were in Antarctica together and talked at some length about the quality – and lack – of sound and much of Fearnley’s comment on Antarctica is to do with this lack of aural stimulus. Capturing the sounds of Antarctica also proved a challenge for composer Chris Cree Brown during his visit to Antarctica in 1999. Cree Brown (as cited in Shepherd, 2008) states

One of the striking aspects of the Antarctic sound world is the apparent incongruity of many sounds when compared to the environment. The massive, majestic icescapes and graceful, sweeping glaciers evoke a music that embodies grand, slow moving, dense and interweaving textures... I had hoped to find sounds whose morphology and spectra I could digitally transform to create abstract sounds that would reflect some of the magnificence of the continent... After several attempts, all of which sounded rather contrived, I resorted to

using non-Antarctic sound sources for the abstract material and into this material I reticulated the (mostly) unaltered Antarctic recordings (p. 103).

Perhaps the issue is, rather than having too little information, that such an environment provides a saturation of information, as commented upon in Rood (1991), where “whiteness, or white-black, is the idea of the predominant ever-present medium in which all other colour is sunk” (p. 101). Arnheim (as cited in Tsur, 2007) describes white as both completeness and nothingness, while perhaps the pinnacle of such a discourse might be found in Rauschenberg’s all-black and all-white paintings (1952) and his erasing of a drawing by de Kooning (1953) (Pyne, 1997). These works curiously anticipate the aesthetic questions of representing the colourlessness of Antarctica. An all-white canvas may seem to be the ideal pictorial representation of the landscape while the erasing of de Kooning’s entire pencil drawing could provide the ideal allegory for a world of white that seemingly absorbs everything but where little survives. Perhaps also the white paintings were meant to be “a receptacle, a sink for shadows or other events to act upon” (ibid, p.204) and the black ones “to create complexity without revelation (‘that there was much to see but not much showing’)” (ibid, p. 204). Both statements ring true for the artist attempting to make sense of a monochrome environment where so much more – physically, figuratively and historically – is hidden from immediate view.

One of the initial challenges of writing Antarctic music is interpreting the landscape as it is such a large part of one’s reason for going there. Certainly, many artists have looked to nature for inspiration. In the nineteenth century, Cézanne said “Art is a construction parallel to Nature” (as quoted in de Saumarez, 1964, p. 65). However, writing music that somehow represented the landscape was not an issue for composer Gareth Farr who, having travelled to Antarctica in 2006, is even more emphatic about the purpose of his music. Farr states “I’ve never been that keen on the idea of expressing landscape through music because I don’t think that music exists for that purpose” (Shepherd, 2008, p. 103). Farr’s comments are echoed in Düring’s comments on Klee, stating “music showed him the ‘innermost essence’ of nature, not a reproduction of it” (p. 88). Pyne (1987), also believes that in an ideal world the quality of art would be governed by art’s own self-investigation and that the morality of art would be established by precisely such an internal search by the artists “not by his ability to render the external world” (p. 154). Placing this argument in perhaps its broadest perspective is Bohm (1996) stating “Man has a fundamental need to *assimilate* all his experience, both of the external environment and of his internal psychological process,” (p. 33). Relating back to Antarctica, this also resonates with Sir Ernest Shackleton’s comment that polar exploration is not so much an outward journey but more a journey within oneself (as cited in Morris, 1997). These statements negating the artist’s function of merely portraying realism point to the need for Antarctic artists to look further afield, interpreting their experience in more subtle ways. It is perhaps this focus on internal process rather than external stimuli that has led me to examine the metacognitive aspect of the experience rather than the experience itself, the process rather than product.

This may also have accounted for the difficulty I had in expressing my ideas on my return from Antarctica. Rauschenberg’s nihilism is difficult to replicate in sound unless one reprises Cage’s *4’33”*, but even then, on a philosophical level, Cage was attempting to express a universality, not a negative. The musical drought was broken with the opportunity to write a microscore lasting no more than 30 seconds for Auckland-based contemporary ensemble 175East. This proved the perfect vehicle for unlocking some of this latent energy and *katabatic* became the first in a series of compositions with a consciously synaesthetic basis. Although the work itself is somewhat programmatic in depicting the swift onset of a katabatic wind and subsequent swift subsidence, the underlying colour of the work is white or even absolute colourlessness. The flourishes of the E flat clarinet are merely empty noise, while the sound effects and glissandi in bass trombone and cello act as a negation of tonality. Similarly colourless are the breathy effects that open and conclude the work.

This musical breakthrough eventually led on to how one might write a musical equivalent to the poem *white* where, for reasons of audience attention and interest, one could simply not deploy

effects across a full orchestral texture for over ten minutes. The challenge was to construct an extended work that satisfied two fundamental questions – what does white, blue and black sound like in a musical context and, if something is “empty” (i.e. an Antarctic landscape devoid of vegetation, cities and people) how can it also be completely saturated (i.e. mirroring Newton’s discovery that colour saturation results in white light)? Moreover, on what sounds should a composer focus to achieve these goals when deploying a vehicle such as the full symphony orchestra that is so rich in musical colour? One solution is offered by Arnheim (1967) (as quoted in Tsur, 2007), stating, “white is completeness and nothingness. Like the shape of the circle, it serves as a symbol of integration without presenting the eye the variety of vital forces that it integrates, and thus is as complete and empty as a circle” (p. 32). In the symphonic poem *cryosphere*, I used the idea of “shades of blankness in a pale palette” from *white* to create a musical texture that is predominantly either white or a nothingness of colour, if one subscribes to Arnheim’s view. The absence of chromatic colour suggests white (the colour Rimsky-Korsakov ascribed to C major) or nothingness and because of this, I was certainly conscious of not ascribing key signatures to any of my Antarctic works, thus implying emptiness visually, at least, if not tonally. It does also display a certain brightness that is very much in keeping with the Antarctic landscape regardless of any other suggested colour-key relationship. The idea for layering the orchestration i.e. the independent entry of different instruments and subsequent horizontal, rather than vertical, sense of movement, was also deliberate, inspired by seeing a Kovac’s drill boring into the ice like a large corkscrew. When the drill is withdrawn, scientists can identify ice strata in much the same way as a tree scientist examines the rings of a sawn-off tree trunk. This layering is also used in the acrylic *cryosphere* (2009) where the same construct is employed using a limited colour palette to develop a linear design. It was always my intention to write an audio/ visual pairing in this way as viewing the painting heightens the awareness of the layering in the music and the musical tonality and the blue/whites of the painting help give one a clear sense of the emptiness and cold.

Impact of Synaesthetics on Students

One of the clearest implications of synaesthetics for teaching is that, if you are a non-synaesthete i.e. you do not have clinical synaesthesia, it is something you can use or discard in much the same as any technique or formula. This was certainly true of Antarctica-inspired works by two of my composition students. Both students were present in the same class and received the same instruction, including anecdotes, music, photographs and poems. The results were quite different. In Pieta Hextall’s score *Antarctica* I was taken aback by the strident martial elements used, largely in response to a casual remark made about the US military presence at McMurdo Station and the marines who had shared the flight south with me on board the USAAF Starlifter. Hextall’s work is an aggressive, pulsing work, full of rhythmic vitality and energy that is surprising in both its dynamism and directness. Colour was the farthest thing from Hextall’s creative palette. By contrast, Thomas Brazier’s score, also entitled *Antarctica*, captures the airiness and delicacy of the landscape and conjures up the play of light on the ice and snow in similar ways to my own score *cryosphere*. Brazier uses the melodic and harmonic material to develop a substantial work out of deceptively simple material and in his score one is confronted by pale blues and whites in a cold soundworld clearly evoking Antarctica. As with all good art works, one can enjoy both scores without knowing the background behind them but the important aspect this experience emphasised is the diversity of inspiration one can take from a single experience and how widely different can be the interpretation.

In addition to working with composition students, one of my stated outcomes for *Sounds of Antarctica* was to work with students of the Young Writers’ Workshop in Christchurch. This group of students, ranging from primary through to young adults, meet on Saturday mornings during term time to develop their writing skills. The workshop is an excellent opportunity for students to broaden their vision, experiment with new ideas, get feedback from like-minded peers and experienced tutors and to think about creative writing in more depth than perhaps is allowed during normal class time. Tutors from the workshop also visit primary and secondary schools during the week. Many of the responses from the children in the workshop focused, predictably, on the harshness of the environment and death, from the explorers, baby penguins and seals to the Erebus plane crash. Two poems by year 6 pupils capture the colourlessness. In

Kynan Cowley-Hunt's *Sunlight* (Strange, 2008, p. 11) only the word "blue" suggests absolute colour while the words "ice", "bloom", "frozen", "shine", "frosted", "dark", "ink-stained" and "moonlight" all hint at colourlessness:

Sunlight

Snow petrels search
for ice fish
thawed in sleepless sun

A blue whale yawns
as krill bloom
like frozen flowers

Phytoplankton shine
like frosted stars
in dark winter

A giant squid wakes
from ink-stained dreams
and bathes in moonlight

In Jordan Whitteker-Love's *Long Lost Lives* (ibid, p. 11) the poet captures another aspect of the relationship between the artists and his/her environment in a rather quirky and unusual way:

Long Lost Lives

Adelie penguins
are artists exploring
an unpainted continent.

A blank canvas
stretches across the horizon
as snow paints the painter.

Webbed footprints
look like the crown
of an emperor.

Daily survival
is an art form
in an unforgiving landscape.

Antarctica is an extremely popular topic for projects with pupils and is covered at virtually every level of the primary school. In support of these projects, I regularly visit local primary schools to give talks and presentations using music, visual images and poetry as a focus. It was at one of these talks that one child asked me why all my Antarctica sounded sad. I wondered if, in attempting to produce music that evoked the specific colours of white, black and blue, that I was inadvertently creating sounds that were being interpreted as austere and melancholic? Was it also, perhaps, that because the music was contextualised by historical events of often extreme examples of suffering and death, and images that supported that, that my attempts at depicting colours was being overshadowed by other factors? Fearnley's character of Sally, the composer, bemoans the fact that Scott Base is black, white and stony and was just not "prepared for just how depressing it was, how little colour there was. Everything was black and white" (2006, p. 42).

Synaesthetics in the Cross-Curricular Teaching of the Arts

Picasso once famously said that, "every child is an artist. The problem is how to remain an artist as one grows up" (Cameron, 1994, p. 20). In his consideration of the creative spirit of both the

artist and scientist, Bohm (1996) approaches the same issue from a slightly different angle, implying that it is up to each individual to discover their own means of original thought and creativity, reminding us “the child-like quality of fresh, wholehearted interest is not entirely dead in any of us.” (p. 27). Some researchers have amplified these statements to suggest that we are not only born with the creative faculty but that every child possesses synaesthetic faculties at birth though these somehow diminish over time. Rather than synaesthetics being regarded purely as a medical condition, an artistic way of thinking (bordering on a doctrine in some cases), or a physical phenomenon, Baron-Cohen and Harrison (as cited in Sacks, 2008) suggest a strong influence of synaesthetics in young children. Their research suggests we may all be born “colored-hearing synaesthetes” but lose the connections between the two areas around three months of age (p. 194). If we go one step further and define the term “artist” as someone who exhibits creativity, then the statement by Ward et al (2008) that “creativity is typically defined as the ability to generate novel associations that are adaptive in some way” (p. 127) becomes particularly useful for the inclusion of synaesthetics. Their study also showed that, while people with synaesthesia are more likely to engage in the arts and generally score higher on some scales of creativity, they warn against the suggestion that synaesthetes are any more able to use their knowledge flexibly than non-synaesthetes. The study states that an alternate reason for this increased engagement may be more to do with the unusual experiences they (the synaesthetes) have experienced rather than creativity being the automatic by-product of the condition.

The principle of synaesthetics (i.e. a sensory connection) is present in the work of cognitive theorists such as Gardner (1993), Harré (1983) Keil (1989) and Perner (1991) and creativity itself has become a recognised form of intelligence that can significantly benefit a child’s learning. Much of the work of these researchers has helped entrench the arts as a main source for children to develop their repertoire and mental skills, as well as broaden their view of the world in significant and imaginative ways. The arts also provides children with unique opportunities to exercise the general skills that form part of everyday living and use a range of mental skills and abilities that share a common structure with other subjects (Brown, 2001). Ross (1978) is a strong advocate for the arts in collaboration, stating

What more do children gain from working within an expressive arts situation as distinct from working traditionally? We believe that they come to see the arts as being collaborative, rather than competitive; that they see a variety of artists talking, working, helping and arguing with each other. The very fact that they see their teachers in such close contact must, we believe, help them to realize that the arts do spring from common ground. To experience a similar situation, whether it be in paint, clay, wood, music, dance etc., will help our pupils to build an awareness of the problems, disciplines and limitations of the media. But perhaps one of the most important aspects of this work for our children is the gradual awakening and awareness of the life of the senses (p. 190).

Langer (as quoted in Ross, 1978) moves even further into synaesthetic territory, suggesting

Moreover, the same symbols, qualities, lines, rhythms – may occur in innumerable presentations; they are abstractable and combinatory. It is quite natural, therefore, that philosophers who have recognized the symbolical character of so-called ‘sense-data’, especially in their highly developed uses in science and art, often speak of a ‘language of the senses’, a language of musical tones, of colours and so forth (p. 138).

The symbiosis between image and sound in education is succinctly described by Hausenstein (as quoted in Dürting, 1997), suggesting “music comes to the aid of painting, drawing assists music. Painting and music become parts of an eschatology; unconcerned by possibility, they seek finality” (p. 12). This relationship is particularly well documented in an excellent project described in Fisher (2004). From the broad topic of weather, the activities of reading aloud, writing, music, movement and wind paintings all come together. The learning was developed further with the possibility of a school-wide theme integrated into social studies and science and

the functionality of the teachers involved in this project was well captured in the statement “we arts specialists are simply, within these new contexts, no longer a solo act” (ibid, p. 241).

The most recent official documentation in New Zealand has begun to address the teaching of integration in the arts in more depth. Integration in the arts was first hinted at, then encouraged and now, in the syllabus to be implemented in 2010, is explicitly stated. The Music Syllabus for Schools (1989) was too compact a document to deal in depth with the intricacies that could meaningfully examine the relationships across the arts. Most of the comments in the document are restricted to the discipline of music but it does venture, on occasion, into broader territory, suggesting that music contributes to “programmes organised around themes, experience or interests. It also helps to build coherent programmes which emphasise relationships amongst aspects of learning” (Department of Education [DOE], 1989, p. 4). However, it does not go into further detail as to what those aspects are nor how they can be implemented. The syllabus also suggests that music programmes should “develop important cognitive processes, such as imagining and lateral thinking” (ibid, p. 5), both of which imply a cross-curricular connection but in practice leave much up to personal interpretation. In pre-service teacher training, many of the students are coming to teaching, and music, for the first time and the links need to be more clearly expressed and explained.

With the publication of *The Arts in the New Zealand Curriculum* (Ministry of Education [MOE], 2000) one can see a “freeing up” between the arts disciplines. Most obviously, the four disciplines of visual art, music, dance and drama are all presented in the same curriculum document thus making explicit what was previously only implicit. This syllabus makes reference to music as relating to the other Essential Learning Areas (ibid, p. 97) as well as collaboration specifically within the arts (ibid, p. 93) with a series of practical integrated arts exemplars indicating that meaningful learning across the four disciplines should be an aim for arts courses in our schools.

The links between music, dance and, to a degree, drama are relatively clear. For the classroom teacher, the links between music and visual art are the most tenuous. Brown (2001) suggests that these connections are best satisfied through images and stories as the children search for what Van Sommers terms “graphic similitude” (p. 92). One might also take this further and say that terminology such as colour, shape and line are equally applicable to either discipline and provide a commonality for connection between the two. In drawing attention to the importance of image, Ross (1978) makes another important link, stating “the language of perception furnishes the language of the feelings as the phenomena of perception furnish the phenomena of the imagination. *Thinking in images is thinking in feelings*” (p. 37) and it is possibly these “feelings” wherein the common ground of the arts resides. It is this shift from knowledge to perception (“feelings” if you will or what, in artistic terms, Cunliffe (as cited in Brown, 2001) describes as “aesthetic sensitivity” (p. 94)) that has gained importance in the New Zealand Curriculum coming into effect in 2010, formally tying together the arts in the curriculum. Possibly this syllabus offers the clearest direction for links between the arts. In particular, the term Music-Sound Arts suggests an acceptance of a broader spectrum of sonic experimentation, particularly when it advocates that the use of “sound from natural, acoustic, and digital environments is the source material for expressive ideas in music” (MOE, 2007, p. 21). Further learning relationships are defined in the description of the learning areas and one can see how synaesthetics can help foster those connections. The document stating “in the arts, students explore, refine, and communicate ideas as they connect thinking, imagination, senses, and feelings to create works and to respond to the works of others” (ibid, p. 17) and also “learning in, through, and about the arts stimulates creative action and response by engaging and connecting thinking, imagination, senses, and feelings” (ibid, p. 20).

Conclusion

That synaesthesia exists as a definable medical condition is beyond question and the important role synaesthetics has played in the development of the visual arts, music and literature is widely documented. It has given me a valuable insight into the metacognitive processes occurring in my own work and a deeper appreciation of the work of others who have used

synaesthetics as a primary basis for their work. While I was largely unaware of the significance of synaesthetics prior to my Antarctic trip, it has become clear that the near absence of colour and sound in such a barren environment actually focussed my attention on that which was gone, reminiscent perhaps of the lyrics from Joni Mitchell's *Yellow Taxi* – "you don't know what you've got 'til it's gone". However, valuable synaesthetics is it should not go unstated that sceptics suggest that it is merely a neurological disorder, localised to those with the condition synaesthesia, and that synaesthetic learning might be the result of suggestion rather than genuine experience. It is also fair to say that, from the available studies, any conclusions one makes regarding synaesthetic learning are going to be highly subjective. However, my own experience suggests that it is absolutely feasible for a non-synaesthete to use synaesthetics to enrich one's own understanding of one's work which, in turn, leads to making stronger connections in one's teaching.

It is also true that all the examples of creative work cited in this paper, are widely open to interpretation by non-synaesthetes and that a lack of synaesthetic perception barely diminishes from the effectiveness of the works themselves. Synaesthetics is not alone in providing effective connections between the arts but the case for its inclusion in the teaching of the arts is strongest when focused more broadly on using it as a tool to link sensory perception between sound and image.

Discovering first Antarctica and then synaesthetics has taken my work in new and unplanned directions, opening up new avenues in both my creative work and teaching. From the initial exploration of synaesthetics as relating purely to colour and sound I have come to regard it more broadly as the relationship between image and sound and, while the colour-sound relationship is a distinct and definite one, I believe the broader scope of image as relating to sound, and vice versa, offers a wider and more meaningful range of possibilities.

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