How metaphor functions as a vehicle of thought: Creativity as a necessity for knowledge building and communication

ABSTRACT
Within this article we will question several common assumptions regarding knowledge building and dissemination, including scientific knowledge, and will argue that creativity is an essential component, as exemplified through a discussion of one of the works of Jack Ox and the centrality of metaphor in her body of work. The framework for this discussion is based on the Conceptual Metaphor Theory, which assumes that metaphor is a mode of thought underlying our understanding of the world around us. Accepting that metaphor is not a figure of speech, but a mode of thought, allows the investigation of metaphor underlying multimodal literacy, questioning the variability in expression of thought within and among modes, i.e. the role of transmodal metaphor, or intermedia, in knowledge building and communication.

The context for evaluation is based on a collaboration and ongoing dialogue between the authors of this article in their work. Van der Elst and Ox have approached the subject of creativity and knowledge from different angles that allow Ox to revisit her work from over a decade ago from a theoretical perspective. The first part of the article describes the theoretical position emerging from these discussions. In the second part, Ox uses this thought structure to evaluate the creative process and knowledge transfer from one medium to another, which she accomplished as a practicing artist.
The focus of the article is on a six-year-long production (1990–1996), Jack Ox’s visualization of Kurt Schwitters’ ‘Ursonate’ (Ox 1993; Hossmann and Ox 1998). By looking at one completed, extensive, creative conception, it is possible to delineate and separate two distinctly different kinds of mapping, intermedia and implicit inferences. Ox’s current work in the Virtual Color Organ™ is also briefly introduced as it relates to the move into a scale-less world of virtual reality and 3D sense experience.

INTRODUCTION

As a practicing artist, I, Jack Ox, have been developing and producing large-scale, hand-painted visualizations of extant musical compositions for over 30 years. During most of those years, my efforts have concentrated on developing visual languages through which the musical structures and emotional content expressed in an aural, time-based medium are displayed comprehensively in a visual, spatially based medium. As will be shown, practitioners of conceptual art were pursuing ideas of multimodality and implicit inferences before cognitive scientists recognized that visualizations were actually a metaphoric process (Higgins 1966). The realization that different modes can play a role in the acquisition and communication of knowledge is not new; however, technological developments have revolutionized the way we do so (Pauwels 2006). Creativity, long considered to belong primarily to the domain of the arts and not the sciences, is now regarded as a central value for developing new frameworks for building and communicating knowledge that can bring about social change (Sales et al. 2007).

Logic and reason, memory and imagination can all be considered human cognitive abilities in our knowledge-building processes, in which sense experiences form an integral component. The way this process works is far from clear, but recent developments in cognitive sciences have provided insights into the way we make sense of the world around us. Old models of mental maps and mind as computer have made way for new ideas such as blending, referring to the dynamic complexity between perceptual, pre-conceptual and conceptual aspects of our thinking (Fauconnier and Turner 2002; Kövecses 2006). Knowledge building, especially ‘true knowledge’ as based on scientific discovery, was, and often still is, considered based on empirical observations and inferential reasoning. A study undertaken by Hollingsworth, however, shows that major scientific discoveries are mostly the result of interplay among perception, reasoning and other cognitive abilities. This interplay or concept of cognitive complexity indicates individuals who tend to ‘internalize multiple fields of science and have greater capacity to observe and understand the connectivity among phenomena in multiple fields of science’. Individuals who exhibit this capacity are most likely involved in other fields than scientific practice, such as art or social activism, or are able to internalize multiple cultures. Hollingsworth (2007) argues that scientific discoveries are based on unexpected connections made by the scientist; the ability to make those connections is based on the characteristics of individuals that go beyond standard scientific training and practice. The work process analysed here will be evaluated in such a way as to gain better insight into such processes.

The emerging framework based on our conversations has allowed me, Jack Ox, to return to my artwork and sort out the different kinds of metaphors I employed intuitively while creating the original painting, and to create the Source Domain/Target Domain table that is found later on in our article.
THEORETICAL FRAMEWORK FOR ANALYSIS OF ‘URSONATE’ PAINTING

Knowledge and the role of communication and creativity

Our current era is often referred to as a ‘knowledge society’ or the Information Age, to describe the essence and the most prominent characteristic underlying human relationships and dynamics, distinguishing this time period from previous periods. Information and knowledge are, or are quickly becoming, the most desirable resource, restructuring global infrastructure and technological development. The difference between information and knowledge can be understood as the availability of a tangible resource, i.e. information, and the inferences and connections made based on those resources that are more fluid and intangible, i.e. knowledge and understanding. This intangible nature of knowledge is based on its association with the processes within individual human minds, but can also refer to the collective cognitive space of a specific culture or group. Communication networks and technologies, connecting groups at multiple scales, facilitate this stream of consciousness. Keller and Tergan, for instance, describe the common distinction between explicit knowledge and tacit knowledge, where the former can be readily transmitted between individuals, for instance as scientific formulas, whereas the latter refers to subjective insights, perception, etc. and is highly personal. The interesting question that arises out of that categorization is how these different kinds of knowledge interact (2005: 4).

The approaches of both the natural or physical sciences and many social sciences rely on empirical/objective observation as a source of knowledge and justification; truth claims are based on empirical testing or inferences made based on theories of probability (Fumerton 1985). This idea of knowledge, although widely accepted, has been plagued by the Cartesian-based dualistic notion of reality and the need for certainty. A key question is that of whether what we perceive is a representation of an independent world (objective), or whether it is a construction of our mind (subjective). Objectivity, commonly understood as independent external reality, can also be understood as transcendentally intersubjective. Intersubjectivity can be defined as the way we know the objective world through the plurality of interrelated subjects, in simple terms as the sum of all subjective experiences. The different aspects of intersubjectivity have been explored by Husserl, and recently extensively discussed by Birnbaum (2008). The capacity of communication of our subjective experiences is therefore the central issue, and philosophical inquiry and recent cognitive approaches are revisiting this idea to attain intersubjective spheres (Zhang and Patel 2006; McDowell, 1994); Calhoun 2007). However, important questions arise regarding the nature of perception and representation within different modes. For instance, if language influences thought (Levinson 2003), what is the relationship to other human perceptual and representational modes: is visual representation, for instance, more broadly/universally understood? Can music be understood cross-culturally? Do we learn the same things from a musical performance or is it filtered through our cognitive framework? As Daniel Levitin (2007) writes, for instance, pitch is directly represented in the audio cortex of our brains and is mapped onto a tonotopic map, which is the spatial arrangement where sounds of different frequencies are processed in the brain. This process is universal for all humans; we all recognize pitches and scales of pitches in the same way. However, different cultures organize and map these sounds differently (Ashley 2004).
Sources of knowledge include, but are not limited to, our sense experiences. The differences in our perceptions and observations are not just the result of physical differences in point of view, but are dependent on our underlying or related conceptual systems in the way these experiences are processed. Recently, theories of metaphor have come to the fore in addressing these cognitive and representation processes. This article will address that specific aspect of knowledge and knowledge transmission.

**Metaphor as a vehicle of thought**

*Metaphor* has a lively, interesting narrative, which defines its role in philosophical, linguistic and artistic practice; John Locke’s seventeenth-century evaluation of decorative uselessness seemed to prevail before cognitive and neuroscience started their collaboration at the end of the 1970s (Cohen 1978). Before this epistemologically groundbreaking change, metaphor could be compared to ornaments occurring in seventeenth-century Baroque music, or as a figurative expression more akin to the practice of creating tropes in plainsong. It is beyond the scope of this article to cover this history in detail; however, since the 1980s, the notion of metaphor has become central in cognitive approaches towards understanding human thinking, namely metaphor as a mapping of structural and qualitative values from one (source) domain to another (target) domain. Cognitive neural scientists today speak of metaphor as that which makes abstract thinking possible (Lakoff and Johnson 1980; Kövecses 2002; Genthner et al. 2001).

I work with two different categories of metaphoric mapping, both existing within the parameters of Conceptual Metaphor Theory (CMT). The first is a transmodal, structural-mapping metaphor and the second can be described as a cognitive space transference metaphor. Conceptual metaphor allows each individual to use source domain inferences to reason about a target domain; this also refers to the development of scientific models as argued by proponents of CMT (Lakoff and Johnson1980; Lakoff and Nunez 2000). Typically, the source domain is rooted in the physical world and the target domain is more abstract.

Assuming that metaphor is a mode of thought, based on the CMT as set forth by Lakoff and Johnson (1980), expression and translation of thought can occur through different modes (Forceville and Urios-Aparisi 2009). Scientific and information visualization are examples of this premise. Van der Elst and I contend that a diversity of modes is necessary to express human thinking and communicate knowledge, i.e. no single mode (or medium) is sufficient to express the complexity and diversity of human thinking (Ware 2000). This can also be expressed as transmodality.

Systems of communication have changed and new technologies allow for multimodal expression of data and information (ideas and concepts), including but not limited to visualization and sonification. Within this article we address the fact that ‘translation’ or cross-modal expression has only begun to be addressed recently; however, artists have long experimented with what we now identify as transmodal mapping, a concept that was termed *intermedia* by the well-known theorist and Fluxus artist Dick Higgins (1966). Both of the authors believe that literacy in modes other than the dominant mode of knowledge production, i.e. writing, is not well understood (yet). The evaluation of my work is a step in this direction.

As I will describe below in the explorations of the ‘Ursonate’, a very important part of my visualization comes from accessing Kurt Schwitters’
subjective space by making images of landscapes where research has shown that he spent time and by which he was influenced, and then using these as source materials for visualization of themes in the composition. I also made drawings of some of his large-scale installations and used them in the same way as the landscape material. This second kind of metaphoric mapping, which I call cognitive space transfer, drives the choice of visual images used, and these interpretive, visual propositions lead to implicit inferences (Sperber and Wilson 1995). One could say that the reference to Schwitters’s subjective space is a sharing of cognitive space. This intersubjectivity carries implicit knowledge to the new domain.

Through the discussion of the ‘Ursonate’, the following issues can be explored:

- Perception and expression can occur in different modes, sequentially and/or simultaneously.
- There is no one common language that can serve to express the complexity of human thinking.
- Creativity allows for new connections and inferences within and across modes.
- The breadth of sense experiences as sources of knowledge is not well understood.
- Transmodal literacy; intermedia.

**Case study: Intermedia – the work of Jack Ox: Towards an understanding of transmodal metaphor in knowledge building**

The six-year-long production (1990–1996) of my visualization of Kurt Schwitters’ ‘Ursonate’ provides the basis for the discussion. The source of the data used in this visualization was a taped copy of an original wax or shellac recording made by Kurt Schwitters, the revolutionary German artist (1887–1948) who was most famous for collage and his great installation, ‘The Merzbau’ (Figure 2).

As stated above, I used two different kinds of metaphoric mapping: transmodal mapping and cognitive-space transference, which connects cultural, personal and geographical influences. In the first I mapped the relative distances between different objects that exist in a given set over a period of time. In the second there is an aesthetic/poetic mapping of less tangible or quantifiable characteristics.

Multimodal metaphoric mapping has gone by the term ‘intermedia’ in the art world since being named in 1966 by Dick Higgins, noted ‘Fluxus’ theorist and artist. It was defined as the occurrence of structural elements from two or more different media together in the same medium (Higgins 1966). In psychology, important similarities were observed in the **syntax** between objects in a set, transferring this kind of structural information from one domain to another. An example would be electrons flowing in a circuit, which is similar to people on a crowded subway platform walking to the exit (Gentner et al. 1983). So, perhaps we can say that equivalent contextual elements simultaneously occurring in two different domains are also an instance of intermedia.

Intermedial mapping will be explored through looking at my visualization of the ‘Ursonate’ pronunciation patterns and how the images that make them up are changed through cutting and displacement of segments based on the...
type of consonant, coloured in a certain way because of how and where the vowel sound of the voiced phoneme is produced in the vocal tract. The image segments shift up and down, vertically mimicking pitch level changes, and grow larger and smaller in scale, corresponding to the dynamic changes of volume. (Ox 1993).

The second mapping category drives the choice of visual images used, because they connect to Kurt Schwitters’ life and individual creative works. These interpretive, visual propositions lead to implicit inferences (Sperber and Wilson 1995). I collected images from which I made drawings that are connected with the actual life of Schwitters, images he would have known well or even created. An example is my detailed and accurate drawing of Schwitters’ ‘Merzbau’ (Figure 2), a large, immersive installation that was built during the same decade that he created the ‘Ursonate’. The original, in his home in Hannover, was bombed to complete destruction during WWII. Other images attached to phonemic themes are landscapes in Norway and the Lake District in England, places where Schwitters lived and worked, thereby conforming to models in his mind. Final paring of landscapes and themes came from a similarity I perceived between the forms of the aural themes and my drawings of the landscapes and installations. These connections are also multimodal/intermedia, as, for instance, the curves in the stone fences of an English landscape bear resemblances to the curve in the prominent ‘G’ of the theme, ‘Grimm glimm gnim bim bimm’, thereby mapping the form of a picture to the form of an important letter in a theme and to a rounded ‘G’ sound in the back of the throat (Figure 11).

This article explores these methodologies of mapping source and target domains within the current frameworks on transmodal mapping and metaphor and will show that my approach provides a model that can enable new ways of learning and knowledge building (intermedia epistemology) and as such can broaden our literacy and levels of understanding of the world around us.

Gathering data
The source of the data used in this visualization, as mentioned above, was an original recording made by Kurt Schwitters, which was completely unknown in the world of art historians. Even Schwitters’ son Ernst had no previous knowledge of its existence. The recording, found during the 1960s, was in a storage closet at the Westdeutscher Rundfunk (WDR West German Broadcasting) electronic music studios in Cologne, Germany, by Jaap Spek, the Dutch sound engineer who worked there with Karlheinz Stockhausen.

The only ‘score’ that existed was the published, Schwitters-commissioned, visual poetry rendition of the sound poem, created by Jan Tschichold, the famous Swiss typographer (1988). This meant that the themes and variations, every phoneme in the ‘Ursonate’, were placed carefully in very interesting groupings on the page. This is called visual poetry, and is considered intermedia because of the crossing-over of boundaries between art and text. Now I had Schwitters’ own recording of pitch changes, rhythms, silences, etc. A student at Cologne’s music academy – who was a percussionist with perfect pitch – volunteered to listen and write down the musical score of Kurt’s performance.

Equally important to the musical score was a phonetic score. Because the ‘Ursonate’ consists entirely of German phonemes, I went to the Phonetic Institute at the University of Cologne. A Ph.D. student at that time, Angela Fuster-Duran, agreed to teach me phonetics, and together we made a complete phonetic transcription into the International Phonetic Alphabet. The handmade
score incorporating both the music and the phonetics can be seen in its entirety online. Timing markings of two-second intervals were created from a MIDI version of the 1950s recording from Ernst Schwitters, the artist’s son, who had tried to perform an ‘Ursonate’ in the manner of his father, albeit a little faster and with his voice (suffering from throat cancer) going in and out of pitch.

The top ten items in Table 1 are all concerned with structure, while the last item is of a completely different nature. It is the top ten that tell us

<table>
<thead>
<tr>
<th>Source Domain</th>
<th>Target Domain</th>
</tr>
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<tbody>
<tr>
<td>Time: one second</td>
<td>Space: one inch</td>
</tr>
<tr>
<td>Voice sounding</td>
<td>Images from Schwitters’ Merzbauten (installations) or landscapes that would be</td>
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<td></td>
<td>familiar to him. All images are divided into vertically separated areas marking</td>
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<td></td>
<td>each phoneme’s realm in the theme/image. They are also marked with pitch levels</td>
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<td></td>
<td>so that the image can be taken from the appropriate horizontal starting place.</td>
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<tr>
<td>Voice not sounding: silence</td>
<td>Solid coloured sections, which are determined by the length of the silence,</td>
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<tr>
<td>or pause</td>
<td>ranging from light yellow for a breath, to deep red, for around two seconds.</td>
</tr>
<tr>
<td>Pitch changes</td>
<td>Directional shifting of image sections, up for pitch rise, down for falling pitch.</td>
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<tr>
<td>Dynamic changes: softness</td>
<td>For a louder section, the image appears at a larger scale, therefore showing less of</td>
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<tr>
<td>graduating up to loudness</td>
<td>the image. Softer sounds show more of the image at a smaller scale.</td>
</tr>
<tr>
<td>in a four-step scale.</td>
<td></td>
</tr>
<tr>
<td>Vowel Sounds*:</td>
<td>Transparent colours painted over phonemes based on a system determined by the</td>
</tr>
<tr>
<td>There are sixteen German</td>
<td>tongue height and the forward/backward position of the where the vowel is created in the vocal</td>
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<tr>
<td>vowels</td>
<td>tract. Diphthongs are softly blended on their edges as the speaker moves from one vowel to</td>
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<tr>
<td></td>
<td>the next. All rounded vowels come from the cool side of the colour wheel, while unrounded</td>
</tr>
<tr>
<td></td>
<td>vowels are from the warm side.</td>
</tr>
<tr>
<td>Consonants:</td>
<td>Collage patterns and image manipulation including colour inserts for fricatives.</td>
</tr>
<tr>
<td>Plosives</td>
<td>A voiced plosive has a vertical cut in the image section, the location of which is determined by</td>
</tr>
<tr>
<td></td>
<td>whether it is a ‘b’ or ‘d’, and the right section is upended. Unvoiced plosives, such as ‘t’ or ‘p’,</td>
</tr>
<tr>
<td></td>
<td>are sliced horizontally in different places, with the upper segment turned around.</td>
</tr>
</tbody>
</table>

(Continued)

7. Ox created a 60-page score in order to reproduce the structural elements gleaned from the sound poem: http://www.jackox.net/pages/Ursonate/UrIndex.html
Fricatives = The voiceless ‘f’ has a diagonal cut from right to left in the top half of the image segment, with a thin strip of cerulean blue inserted, and ‘s’ has a strip of yellow inserted in the cut. The voiced fricative ‘v’ is cut from left to right, diagonally in the top half of the image segment, with a strip of violet, and ‘z’ is the same direction with orange inserted.

Trills = Trills call for cutting the segments into ¼-inch segments. Either every second one is upended, or the same image is painted forwards and backwards, and the trill strips alternate between strips from the two different paintings.

The themes of the ‘Ursonate’:

= Each theme has a different sound and feeling. Each image was chosen by the artist for a correspondence between the lines and patterns drawn aurally by Schwitters and the visual lines and patterns perceived in the drawings of Ox.

Table 1: Separation of data sets into structural and semantic sets and creation of appropriate target domains.

this visualization is indeed intermedial, but what is happening in the last category? Spoken themes of the ‘Ursonate’ are represented by landscapes and quasi-architectural, three-dimensional artworks. What can possibly be tying these two domains together in my mind, and does it work for others?

Jaron Lanier writes about V. S. Ramachandran, a neuroscientist at the University of California at San Diego and the Salk Institute, who created and ran a research programme that establishes a multimodal brain connection between form and sound. It is called the bouba/kiki experiment and has participants matching two pictures similar to the ones below with either bouba or kiki sounds. He found an agreement across cultures in the responses that the rounded, cloud-like shape looks like bouba and the spikey shape like kiki (Figure 1).

Figure 1: Bouba is the rounded shape and kiki is the spikey shape.
This multimodal phenomenon can be linked to the mental phenomenon of metaphor. Ramachandran found that in patients who have lesions in the cross-modal brain region called the inferior parietal lobule, there are difficulties with not only the bouba–kiki problem, but also in interpreting stories that depend on mapping a story to another situation (Lanier 2007; McGeoch et al. 2007). This research explains why I was able to link different landscape and architectural drawings to the sounds of different themes in Kurt Schwitters’ ‘Ursonate’.

The first and most important theme is ‘Füms bö wö tää zää Uu pögfiff, kwiiEe’ (Figure 2). It occurs most often throughout the ‘Ursonate’. I chose the ‘Merzbau’ installation for this theme, as it was built during the same ten-year period of time as the ‘Ursonate’ was composed. Creating both major works in exactly the same period of time would constitute a major cognitive connection for the artist. Also, both compositions use fragments of things, either nonsense syllables or things found on the street and nailed into the growing life-size, three-dimensional collaged construction.

The second theme is ‘Dedesnn nn rrrr, li Ee, mpiif tillff too, till, Jüü kaa?’ (Figure 3) I found a similarity between the rolling clouds over the low
Curiously, Schwitters does not name a theme 5.

mountains in Norway near Molde, the place where Schwitters spent much time, and the sound.

‘Rinnzkekete bee bee nz krr müü? ziiu ennze, rinnzkrmüü’ (Figure 4) is a theme with sharp corners that sound like the points on this Norwegian mountain, where Schwitters spent time.

‘Rrummpff tillff toooo?’ (Figure 5) The sound moves in a flat, long direction, similar to the clouds, water and hills. This picture is from late at night on 21 June, and is from Molde.

‘Ooooooo00000000000000’ (Figure 6) is made with rounded lips in the back of the mouth. One can imagine a long, rounded form coming out. This low, rounded hill, near Molde, where Schwitters had his summer hut, fits with the sound of Ooooooo000000000000.

‘Aaaaaaaaaaaaaaaaaaaaaa’ (Figure 7) is created with an open mouth, and the vowel is made behind the teeth in the mouth cavity. The way the left hills curl into the beginning of the right slope feels like this sound. This view is in the mountains before arriving on the coast at Molde in Norway.

‘Lanke trr glt pe pe pe pe Ooka ooka ooka ooka’ (Figure 8) is the theme labelled III (Third Movement) and the eighth theme in the scherzo. It begins

Figure 4: Theme 3, 31.5” × 85”. © 1992 Jack Ox.

Figure 5: Theme 4, 32” × 52”. ©1992 Jack Ox.
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Figure 6: Theme 6, 28” × 42.5”. ©1992 Jack Ox.

Figure 7: Theme 7, 32” × 45”. ©1993 Jack Ox.

Figure 8: Theme III + 8: 28” × 73”. ©1992 Jack Ox.
"The LITTORAL Trust is working with a team of leading architectural conservation and art restoration experts to restore the Merz Barn at Cylinder estate to near its original state (when Schwitters left it in 1947). The Trust is in discussion with the Hatton Gallery and Tyne and Wear Museums, about the restoration of the surviving Merz Barn art work in the Hatton Gallery. Once this work has been completed it is proposed to make a high resolution 1:1 replica of the wall and to place this back inside the Merz Barn, in the place of the missing work.” http://www.merzbarn.net/restoration.html

Figure 9: Theme 9, 33” × 55”. ©1993 Jack Ox.

the use of landscapes from the Lake District in England, where Schwitters lived the remainder of his life after WWII. He actually made a painting of the bridge in this drawing, and the rolling green hills with trees and other vegetation sound/look like, feel like, this pastoral aural theme to me.

‘Pii Pii Pii Pii Züüka Züüka Züüka Züüka’ (Figure 9) is also in the Lake District. ‘Pii Pii Pii Pii’ moves across the clouds, and the trees turn back on themselves towards the left and take on the rhythm of ‘Züüka, Züüka, Züüka, Züüka’.

‘Lümpff tümpff trll’ (Figure 10) is a visual play between the first syllable ‘Lümpff’ in the clouds, the second ‘tümpff’ in the land, and the ‘trll’ in the water below. The difference between the textures of the clouds, land and water is similar to the differences between the syllables. This is a picture of ‘Windermere’, the largest natural lake in England, and its name translates to ‘Vinandr’s lake’, from the Old Norse source. Schwitters came to the Lake District because the landscapes reminded him of his home in Norway. The Lake District was invaded and settled by Vikings, and this mirrors Schwitters’ own journey from Norway to Cumbria. He was very much invested in the landscapes where he lived, painting many of them. When he lived in a city, such as Hanover, his landscapes became constructions inside his house that were created out of city rubbish, such as the ‘Merzbau’.

‘Grimm glimm gnim bim bimm’ (Figure 11) is the first theme from the fourth movement and is a green piece of pastureland with a curvy, meandering system of stone walls. The shapes of the walls in this image seem to almost spell out the ‘g’ velar sound in the theme.

‘Tilla loola luula loola & Tilla Lalla tilla lalla’ (Figure 12) are two themes from the fourth movement, and are represented by Schwitters final ‘Merz’ construction, the ‘Merzbarn’, that was built in the Lake District in England. To me the long vowel sounds coupled with repetitive ‘L’ sounds creates a curve in the mind. The ‘Merzbarn’ is a curvaceous organic relief sculpture in plaster, very different from Schwitters’ earlier constructivist compositions. The completed wall (Schwitters died before the barn could be finished) has been living at the University at Newcastle upon Tyne for many years, in order to save it from crumbling in the original barn.11
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Figure 10: Theme 10, 33” × 80”. ©1993 Jack Ox.

Figure 11: Theme 11, 33” × 58”. ©1993 Jack Ox.

Figure 12: Themes 12 and 14, 80 × 174 cm, 33” × 68”. ©1993 Jack Ox.
‘Tatta tatta TuiiEe tuiEe’ (Figure 13) is represented by the forested landscape in which the ‘Merzbarn’ sits. Being a native English speaker, I connected the sound of the syllables to the English word ‘tree’, so the mapping has crossed languages because the theme connects to the English word, although not the German word, for tree, *baum*.

‘Graaaaaaa’ (Figure 14) includes two images: a waterfall seen from the top and the bottom. One always hears two Graas together. The sound of graaa, with its vowel sounds created deep in the vocal tract, is intensified by the velar ‘g’ sound, as in the theme ‘Grimm Glimm Gnimm’. This is a waterfall in Norway that was visited and noted by Schwitters (Lemoine et al. 2004; Stadtmüller 1997).

*Figure 13: Theme 11, 76 × 136 cm, 30” × 54”. ©1992 Jack Ox.*

*Figure 14: Theme 15, 74 × 198 cm, 29” × 78”. ©1992 Jack Ox.*
‘Eke Eke Eke Eke Eke’ (Figure 15) is a sound with a strong plosive between two vowels, the first of which sounds like the first syllable of ‘Edison’ in English and the second like the vowel in ‘but’. To me, there was a corner ‘V’-shaped affect, which takes the same form as this landscape from Norway.

‘Zätt üpsilon icks Wee fau Uu Tee äss ärr kuu Pee änn ämm Ell kaa Li haa Gee äff Ee dee zee bee’ (Figure 16) is the German alphabet backwards, spelled out in letters. The letter ‘J’ is missing because Schwitters left it out, and ‘O’ and ‘A’ are left out because there are two landscape themes above, which are ‘ooooo’ and ‘aaaaa’. The image is considered another ‘Merzbau’ (Stadtmüller 1997), and is from Schwitters’ cabin on the island of Hjertøya off the Norwegian coast at Molda. The walls and door were thickly collaged by Kurt Schwitters, and I made a drawing of this. It is appropriate for an alphabet theme because of the many instances of type in pasted pictures.

‘Priimititti too taa tuu’ (Figure 17) is the last landscape from the Lake District in England. The first part of the theme – ‘Primi’ – has the same movement feeling of the trees that are leaning to the left, located on the right side of the image. ‘Titti’ moves along to the final rising hill that locates ‘too taa tuu’.

The questions raised earlier cannot all be answered within the confines of this article; however, certain aspects of diversity of sense experience and transmodal literacy are emerging as they are related to intersubjectivity. I have
endeavoured to replicate Schwitters’ mindset and cognitive mental space though the use of images from places where he spent time and images of his own work. These images become subliminal as they are segmented into smaller pieces based on the time values in the composition, with their vertical image inclusions based on the pitch level of their production, and incorporation of scale shifts controlled by the spoken volume of Schwitters. Even though the syllables are considered nonsense, the sounds can be perceived as German in that they are all phonemes coming clearly from German and not other languages. These sounds evoke different ways of visualizing, but are all closely related to the understanding I developed of Schwitters’ life experience, as well as being based on my own experiences of working with the material. It is entirely conceivable that another artist would have ‘translated’ the ‘Ursonate’ differently because how one visualizes a given set of values is both a creative and subjective experience. Not only does this provide us with new ways of accessing Schwitters’ work, it also questions our commonly held beliefs of distinctions of perceptual experiences. I, for instance, ‘translated’ these syllables into a visual language. This process of mapping a syllable to a specific form as a separate element is a synergy of explicit and tacit knowledge, as discussed by Keller and Tergan (2005).

What the presentation of my work in the light of this theoretical perspective shows is the complexity of associative cognitive processes of multiple sense experiences as a cross between what we distinguish since the Enlightenment as art and science. Even though few of us do this at this level, it can be suggested that all of us engage in these processes continuously and synergistically.

**Current work of Ox adds different dimensions, expanding the senses**

The ‘Ursonate’ painting was the last completely 2D work made to date. The images in the flat 800-square-foot painting were cut into pieces that shifted straight up or down as a representation of corresponding pitch changes. All of the rhythmic timings that were made by Kurt Schwitters are frozen. The widths of image strips reflecting how long Schwitters would hold or speak a syllable cannot be changed. Please see Figure 18 for nine lines of eight feet by one foot of the painting’s first movement.

Since this work, I have moved into the three-dimensional world of virtual reality, where all space and scale are relative, not absolute in their values. This is similar to the way ordered pitch pattern in music, known as melody, can be played using different notes when they are realized in different keys. The
entire melody can be played higher or lower and still preserve the differences between different notes and the rhythms and silences.

Affordance, as a theory set forth by Gibson (1977) and introduced into cognitive science by Zhang and Patel recently (2006), refers to the actionable properties between the world and an actor, indicating a relationship, as it cuts across the subjective–objective dichotomy. The affordances of my visualization system were exponentially increased by entering a three-dimensional environment. Instead of the limited possibility of moving only on an X/Y axis, there is an entirely new direction, Z, or depth. Although one could have the illusion of depth through scale and colour changes before, it is now possible in a 3D virtual environment to move around an object, and of course this is approached in the fourth dimension, time.
Once again, the 2D world has an approximation to time in that the ‘Ursonate’ painting is too big to see in one visual frame. However, one can only point to time through scale, not actually experiencing it the way one can in a VR world. One of the greatest affordance multipliers added into a 3D VR world is the ability to move around and see things from different viewpoints, as well as inviting and exploring other senses than the five traditional senses, such as spatial sense and cognition. Things are no longer fixed in time and space. Viewpoint becomes a variant; in fact, there are now an infinite number of viewpoints. One must think in the round – seeing all sides of an object, plus sensing what is there out of your visual range. With the visualized music inside the Virtual Color Organ™ (co-created by Dave Britton and Jack Ox) (Candy and Edmonds 2002), Im Januar am Nil (Ox and Britton 2000; Ox 2000, 2002a, 2002b), a composition by Clarence Barlow, the path of the music was put into a parabolic spiral path because the original algorithmic musical construction was based on a two-dimensional, flat spiral. By making the visual artefacts, produced by pitch, timber and rhythmic elements of the music, move in a three-dimensional parabolic spiral path, inner, complex patterns are perceived visually.

To summarize, both van der Elst and I believe that sense experiences are essential sources of knowledge and knowledge communication, and this view is supported by prior research. The notion of cognitive complexity that was introduced earlier in this essay (Hollingsworth 2007) can now be placed within the context of my work. Within the confines of scientific practice, the dominant domain of knowledge building, sense experience and representation has been limited to a few modes of expression, primarily language (i.e. writing). Even though visual thinking and expression has been recognized as an important supplement, the exploration of this visual language has been largely limited to two dimensions (Forceville and Urios-Aparisi 2009). We contend that sense experiences such as music/sound are fundamental to human understanding, of human-to-environment and human-to-human relationships. Exploring these sense experiences and representations, as shown in my work, is essential in creating intersubjective, or distributed, cognitive environments (Zhang and Patel 2006).

REFERENCES
How metaphor functions as a vehicle of thought


NOTES


SUGGESTED CITATION


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