

■ Research Paper

Beyond Words: Visual Metaphors that can Demonstrate Comprehension of KM as a Paradoxical Activity System

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Following criticism that, in business and management, metaphor is largely verbal and primarily used to convey similarity, this paper explores how visual metaphors can communicate the anomalous and the paradoxical aspects of KM more concisely than words, whilst simultaneously presenting more tacit associations to stimulate creative thinking. It considers a series of 30 assessed posters that aimed to re-present six basic KM paradoxes through imagery that captures both the analogous and the anomalous. We found six categories of radial metaphors able to convey paradoxical complexity in a concise way. This has implications for organizations thinking about how to engage people with both the familiar and the strange. Copyright © 2011 John Wiley & Sons, Ltd.

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INTRODUCTION

There are a multitude of ways in which people can view the world and thus a multitude of ways in which people attempt to articulate this view through imagery portrayed in metaphors (Andriessen and Gubbins, 2009).

Metaphors are comparative devices for illuminating the attributes of one object or activity, by drawing on understanding of another. In knowledge work, they support communication, comprehension and creative re-conceptualiz-

ation. The opening quote above is metaphorical, implying that visual perception contributes to the communicative power of speech. Given that sight represents 70% of the sensory input to thought, that is unsurprising. Yet metaphor is often conceived of as a 'matter of words rather than thought or action' (Lakoff and Johnson, 2003). Unfortunately, words can misrepresent complex issues, because linear expression evokes premature responses, and crystallizes meaning, which becomes hard to change.

Authors acknowledge that metaphorical *thinking* goes beyond words (Morgan, 1997; Lakoff and Johnson, 2003; Proctor *et al.*, 2005) but in business, oral and written routes to comprehension prevail. Visual imagery to communicate the

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essence of something is restricted mainly to creative fields like advertizing, with some exceptions in power-point presentations. Unfortunately, when people use evocative pictures in presentations, they often overload sensory input by poor choice of images and excessive text disconnected from the speaker's narrative (Mayer, 2001).

Analysis shows that metaphorical business language mainly conveys similarity. This only serves to perpetuate and enrich the known, making the 'familiar more familiar' (Oswick *et al.*, 2002). Similarity and analogy keep us in a cognitive comfort zone. Avoiding cognitive discomfort may reduce resistance to ideas, making it easier to convince the receiver of particular points of view, but, it ignores important opportunities to trigger exploration beyond the known and creative re-conceptualization. The linguistic devices that promote metaphorical thinking about difference and the unknown – viz paradox, anomaly and irony – are remarkably underprivileged. Yet difference stimulates new conceptualization. When Galileo related the earth to a sphere, the anomalous imagery made 'the familiar, strange' (Foucault, 1977 in Oswick *et al.*, 2002). To alleviate the cognitive discomfort from anomaly and paradox we have to reframe. Reframing involves demolishing limiting assumptions and perspectives to reveal new ways of thinking. This is the generative or creative power of paradox (Hampden-Turner, 1990). Paradox helpfully juxtaposes difference and

provides a means of collapsing false binary oppositions by revealing common patterns between and mutually implicated aspects within, supposedly diametrically opposed domains (Oswick *et al.*, 2002).

All organizing activity is inherently paradoxical (McKenzie, 1994; Lewis, 2000). Knowledge management (KM) is no exception. Re-conciling diametrically opposed organizational routines and human preferences for exploiting the known for immediate benefit, whilst simultaneously exploring new knowledge for future innovation (March, 1991; McKenzie and van Winkelen, 2004) is a core KM activity. KM expects others to

reframe organizing principles that worked in an industrial economy where tangible sources of wealth produced decreasing returns and limited resources had to be protected and hoarded (McKenzie and Van Winkelen, 2007). In the intangible economy, knowledge is unlimited, sharing can produce increasing returns (Arthur, 1996) and hoarding knowledge reduces an organization's potential for value creation.

Andriessen *et al.*'s (2009) systematic analysis of visual metaphors concluded that 'visuals can communicate connections and relationships that written language is unable to do'. This article considers how visualization can convey the paradoxical nature of KM in a meaningful way. To do this we explore the common patterns and mutually implicated aspects in thirty of the best posters submitted for assessment of a post-graduate course which deliberately positions KM as a process of co-ordinating six core paradoxes. The posters test how well students can communicate back to the tutors on a single page, their comprehension of diametrically opposed requirements and their creative conceptualization of how the strange helps them reframe the familiar and integrate differences into a coherent activity system.

CONCEPTUALIZING COMPREHENSION

Getting to Grips With Paradox

The very categories we use to simplify our understanding of the world are the source of paradoxes (Kegan, 1994; Martin, 2007). How we selectively prioritize and classify data, and convert it to information and knowledge through associations, forms our lens on the world. We use language to describe our understanding. Different experiences and category combinations produce different meanings for each of us. For example, one aboriginal tribe considers it appropriate to classify women, fire and dangerous things within a single category. For them the word 'balan' encompasses all this and more. None of the reasons we might find this bemusing would even enter the head of a Dyrirbal speaker. The reasons are complex, the connotations they

evoke rooted in myth and experience (Lakoff, 1987). But inevitably that classification conditions perceptions and filters new input. As we need to re-concile our personal meaning systems with the different way others interpret the world, learning and new knowledge emerge. The knowledge we deem important from that learning process continues to help us filter and respond to the world. It becomes part of our value system, influences our skills and behaviour as well as shaping perceptions of our own identity (Bateson, 1972). Conception and continued learning demands that, as well as building on the similarity of our existing knowledge, we explore difference and change.

To understand how visual metaphors can depict paradox, we must be clear what they are trying to capture. A single paradox has four main characteristics

1. It is a 'thing' which holds in tension two inter-related, but apparently contradictory, priorities associated with identity, feelings, practices, ideals, values or requirements.
2. It is constructed by individuals or groups when, as they try to grasp situations, they simplify reality by making either/or distinctions which hide complex interdependencies.
3. It comes to light when people interact or reflect and hit up against the frustration of co-existing opposites (Ford and Backoff, 1988; Lewis, 2000). When unresolved it is often referred to as a tension.
4. When re-conciled, the dual propositions of any paradox, whilst still remaining distinct and different, become mutually re-enforcing elements that simultaneously provide both stability and change in any system (McKenzie, 1994).

Paradoxes are infinite. As Rothenberg (1979) says 'As old opposites are overthrown, new ones arise in a never ending spiral of self generation paralleling the spiral of increasing knowledge'. Hampden-Turner (1990) argues that, in business, organizing for stakeholder value is a process of combining important priorities in configurations that transcend apparent contradictions between them, integrating them into a dynamic system of learning i.e. reframing mental schema. Meaning

emerges from connecting facets of increasing knowledge with what has gone before. As the distinctions become more complex, it becomes important to understand the system of interdependencies between the different organizing priorities, but harder to explain all the connections verbally.

Language as a symbolic system for thinking often ignores vital nuances and hides multi-directional interdependences. Yet nuances adhere in tacit knowledge which is hard to put into words (Polanyi, 1966; Baumard, 1999). Often the right side of the brain, which has a 'limited way with words' knows 'things that it cannot say'; concepts are mentally stored in images and feelings (Robertson, 2002). Sensory perception, emotion, and reason seem to connect conceptually in image schemas that provide rich chained associations between the many situational dimensions required for comprehension (Lakoff, 1987; Damasio, 2006). Experience and practice also inform the conceptualization process (Lave and Wenger, 1991). As the knower verbalizes thought, subtleties of meaning are lost, or re-interpreted, because the receiver attaches different sensory and emotional resonances to specific words.

How Metaphor Conveys Meaning

Metaphors transfer familiar attributes of our lived experience to unfamiliar situations and concepts (Lakoff and Johnson, 1999) by bridging two meaningful domains of understanding. Weick considers them a rare tool for 'creating compact descriptions of complex phenomena' (1989). They help us convey more associations between mental categories, which are the basis of our neural circuitry (Kegan, 1994). Their wealth of meaning enriches perception. Yet metaphors can also be generative, encouraging re-conception and new perspectives, particularly when they show how apparently anomalous expectations are successfully re-conciled in other contexts (Weick, 1989; Oswick *et al.*, 2002). Various mental processes help creative re-conceptualization: we extend beyond simple comparison (Cornelissen, 2005) by selectively projecting unrelated aspects from each concept

into a mental space for blending (Fauconnier and Turner, 2002). We move incompatible attributes which grab our attention into 'the blend' then create associations that did not exist when the two domains were separate. Next, we add a measure of background knowledge to fill the gaps and complete familiar patterns. Finally, we elaborate from that new combination of ideas and sensory associations in many different directions exploring 'off the beaten track', adding events, experiences and connections which were never part of the original perceptions.

Lakoff (1987) calls such metaphors radial. These are metaphors structured around a 'centre-periphery' scheme. The central category defines the system. It can be linked to many peripheral sub categories that help make richer sense of it. Radial metaphors convey information about both consequence and purpose. They overcome the conflict associated with different theories of causation, each with a distinct logic that seems incompatible, because they allow multi-directional models of causation and feedback. According to Martin (2007) radial metaphors do three things. By capturing the possibility of multiple causes, they help us conceive situations in a new ways, and get our mind around the interdependencies of complex issue. Then we can keep a coherent whole in mind whilst looking in more detail at the individual parts. This makes them rich in resonant associations for both objects and activity. Thus they seem suitable for conveying paradoxical concepts.

Andriessen has pursued a line of research exploring how metaphors shape our thinking about nebulous resources, like knowledge and social capital, which contribute to what he calls 'Weightless Wealth' (Andriessen, 2001; Andriessen, 2008; Andriessen and Gubbins, 2009; Andriessen *et al.*, 2009). Knowledge has potential value for organizations but can be conceptualized differently. For example we can explain knowledge as stable object or continuous flow of knowing (Blackler, 1995; Sveiby, 2001), in noun or verb, but we cannot show how it can be both at the same time. Verbal, analogical reasoning means we can only make sense of

object and action, concept and practice *separately* (through nouns and present participles, respectively). Consequently, when verbalizing the meaning of KM we start with confusion about what we are harnessing, depending on how we articulate it. Cognitive bias can colour what we think of as meaningful in conceptualizing KM. KM is about creating an organizing system in which that potential is translated into something that is valuable to the stakeholders. Strategically, organizing should generate greater value than markets because it allows people to address the paradox of specialization and integration (Grant, 1996; Spender, 1996). Hence, KM should be a business activity for converting individual knowledge and learning into flexible organizational capabilities. These capabilities underpin distinctive competencies that are the basis of strategic advantage (Prahalad and Hamel, 1990; Barney, 1991). However paradox arises firstly because we are dealing with human activity; people with choices, preferences and values will pay attention to different elements of what matters. Secondly, to assure sustainability in response to changing external conditions, systems, processes and human activity must simultaneously incorporate factors which provide stability and security as well as allow for internal change. The individual behaviours, management styles, systems and processes that lead to good use of current knowledge for stable performance today, tend to stifle knowledge creation and the change needed to adapt to future demands, and *vice versa*. Thus KM is an inherently paradoxical activity.

The Advantage of Visual Images

It has been argued that arts based communication helps people 'Apprehend the essence of a concept, situation or tacit knowledge revealing depths and connections that propositional and linear developmental orientations cannot' (Taylor and Ladkin, 2009). Visual imagery produces meaning in different ways to language. Unlike words, visual objects do not have a unified stable meaning in the mind of the viewer; meaning is created fluidly in movement and dialogue between the image, the author,

the view and the circumstances of perception (Belova, 2006b). Objects alone convey only part of the message. The viewers' perspective, the context, the juxtaposition of one object with others and the artful dynamics of their relationship all contribute to interpretation. This complex evocative process makes it more powerful for triggering emotion and actions (Taylor and Ladkin, 2009), so impressions are more easily remembered. The fact that so much is compacted into the images makes it harder to articulate, but intuitively allows a simultaneous grasp of several possibly contradictory meanings. So images are better at communicating tacit knowledge (Belova, 2006a). The fixed image provides a common immutable artefact around which to have a productive dialogue about detailed interpretations.

Research on consumer responses to visual images confirms that pictures do indeed convey more meaning, in a way that is 'analogous to writing in more detail' (Scott and Vargas, 2007). Advertising research suggests that people appear to interpret detail in a different order to words. They process visual metaphors literally, then figuratively, in relation to their interests, motivations and perceptions to create a relevant personal narrative about the picture. This establishes the cognitive comfort zone, without compromising the difference depicted or losing the big picture in the detail. Finally individuals try to re-concile conflicting cues (Proctor *et al.*, 2005) so they relate to meaningful messages *before* they experience cognitive discomfort.

Visually we absorb multiple features simultaneously, to better pick out patterns, differentiate object from a background (Johnson, 1987) so we get an overall impression of the whole from top-down processing, and fill in the details through bottom-up examination. Radial visual metaphors capturing multiple causation gives people the opportunity to work out the implications from a 'blended glimpse', so to speak. Anyone trying to communicate the big picture of KM must convey an activity system with inherent tensions. A visual metaphor is advantageous because it presents more thought provoking material than the short executive sum-

mary most leaders tolerate. Representing radial metaphors visually offers potential to depict intricate chained connections between the what and the how of a central theme, simultaneously and comfortably, thereby allowing concept and experience to be absorbed together.

Obviously, in practice, its effectiveness depends on how much the viewer is prepared to explore the stimuli and engage in a dialogue about the implications.

The Learning Benefits of Asking for a Visual Presentation

Some argue that using imagery is an essential part of developing managers' intuitive awareness in the face of uncertainty (Sadler-Smith and Shefy, 2007). Intuition as a mode of thought is preverbal. Vision and intuition are non-verbal modes of understanding associated with creativity and openness to new ideas. Images also transcend international language problems. Visual metaphors strong in conveying subtleties, suggest the student has thought deeply about meaningful connections and tried to see how contradictions can be resolved, rather than simplified through either/or choices.

As part of a KM course assessment we asked post-graduate students to find a metaphor to encapsulate six paradoxes. Verbal metaphors to comprehensively convey an organizing system in tension would have considerable interpretative limitations. We intended images to help students think of strange situations that simultaneously handle contradictory priorities and convey interdependencies. If they make explicit their understanding without words, we hoped the tacit associations would be more evocative, interpretation more comprehensive and less biased.

It could be argued that visualization as a test of comprehension provided better evidence of the rich conceptual image schemas that exist beyond words. In addition, since visuals tap into right brain activity it was more likely that imaginative students could creatively re-conceptualize organizing requirements. The tutor gets a sense of students' grasp of the multi-directional relationships between cause and effect.

METHODOLOGY

The KM course is taught as a process of exploring six paradoxes which research has identified as creating recurrent tension in organizational dynamics. Each paradox has one-dimension associated with maintaining stability and one that encourages change. In teaching each paradox, we make explicit the apparently contradictory business activities, identify the root cause of the tension and the KM techniques that may resolve it. Theory dictates why a resolution of the differences matters for performance so that business can do things right now and do the right things for the future (McKenzie and van Winkelen, 2004).

The course has been tutored primarily by the same two people over the whole period, marked and moderated consistently against a standard framework. We situate the KM teaching within an accepted activity metaphor – a learning journey across a knowledge landscape (Oliver and Roos, 2000). Within that, we frequently refer to the fundamental tension between conceptualizing knowledge as an object and as a flow (Blackler, 1995). Inevitably these will have some influence on source domains the students start from. However, it is the peripheral associations that they make around the centre which show depth of comprehension. We also actively encourage students to choose metaphors that resonate in their business context and capture the complexity of the interdependencies.

The assignment brief asks them to use visual metaphors to

Prepare a **poster** that succinctly captures and demonstrates the essence of KM in an organization. You should aim to **demonstrate creatively the interdependencies between various aspects of the course** and devise a coherent overview of the subject area.

The challenge for students is to find radial metaphors rich enough to differentiate and integrate, and illustrate coherence despite different and anomalous causes. Over the past 5 years, over 300 students have attempted this assessment. In line with Hampden-Turner's (1990) expectation that value creation comes from the

synthesis of apparently conflicting opposites into a coherent system, creative synthesis is rewarded in the marking process.

The criteria for an A grade state that a student will have considered the implications of interconnections between the key paradoxes we teach, demonstrated originality of thought and shown relevant inclusion/linking of concepts/theories from outside KM to add depth to the thinking. Where the metaphor used images associated with the products of the student's business, the familiar objects were credited with creating strong emotional resonances for corporate viewers. At times this also created compensating limitations because they were somewhat mechanistic and instrumental – for example jigsaw puzzles, cars.

A 10% sample was deemed sufficient for this exploratory research. By using the previously awarded marks to select the sample we were making a deliberate choice of imagery which most comprehensively re-presented (or communicated back) to the tutors the mutually implicated aspects of the system. This seemed to be a valid proxy measure for selecting which metaphors could capture paradox and difference.

Together, the tutors re-examined 30 posters awarded an A grade over the last 5 years to identify the central concept of the radial metaphors chosen to represent the essential activity system. The richness of the peripheral chaining and the experiential evidence were considered as demonstrating how creatively the student had conceptualized the mutually implicated aspects of paradox. We discussed how the metaphor flexed to convey tension and its re-conciliation (we called this the generative trigger). We also examined a random sample of 10 posters with middle range marks and a small sample of poor performing posters to compare how metaphor was used within these posters. This helped us to confirm the distinctions between what makes an evocative visual artefact and those which appeared not to communicate the necessary range of attributes.

In principle, we were exploring how visual metaphors could convey the social (communication), symbolic (comprehension) and psychological (re-conceptualization) dimensions of

reality with respect to knowledge (Steen, 2010). Our analysis suggests that the enactment of the students' understanding falls into six categories:

1. Natural objects in ecologies
2. Processes designed to synthesize
3. Metaphors associated with friction and power
4. Connecting web metaphors
5. Gaming metaphors
6. Journey metaphors

There was one very clever anomaly which placed emphasis on the creative power of reflection to change ones perspective.

ANALYSIS OF THE METAPHORS IN EACH CATEGORY

The six tables below cluster the radial metaphors by what is central to them. Like all categories, this clustering is a sense-making mechanism. Undeniably some posters contain elements occurring in other groups. For example, water inevitably played a different role in several scenarios. Where this has arisen, we have placed them into the group that is most representative of the story that they are conveying. It depended on whether the element helped make sense of the system or was the principle generating the nature of the

system. The former would be 'chained dimensions' of the central theme, so part of the periphery (Lakoff, 1987). At times we have referred to the short explanatory text accompanying the poster to stay true to the focus of the students reasoning (Tables 1–6).

The last poster (Table 7) was distinctive because so much was compressed into one glimpse that it created immediate cognitive discomfort (Oswick *et al.*, 2002). It is summarized in Table 7. Essentially the viewer was presented with a single picture in four different formats. The cleverness of the poster was the artful trompe-d'oeil created by manipulating a bisection of two halves of a scene containing reflections in a pond. This completely challenged the viewers' perspective on reality, because close examination highlighted anomalies that could only be re-conciled through personal reflection. As such it was strong on creative conceptualization and comprehension, but perhaps not as powerful as a communication mechanism.

DISCUSSION

Keeping in mind the fact that students were trying to grasp an intangible and paradoxical activity system by depicting tangible objects in a single picture, it is interesting to consider why

Table 1 Natural objects

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Water in different phase states – ice, snow, fluid, vapour, molecule	Transitions between objects in different forms and flow. Support for life.	Different states of H ₂ O need different activities to use it effectively.
Tale of two gardeners	Ecology of growth. Plant systems and conversion from seed to plant.	Different types of garden formal and wild come from different nurturing approaches.
Trees seeds and roots	Natural transitions in growth cycle. Objects changing state naturally through predetermined routes and seasons.	Roots leaves and branches are distinctions that fuel the richness of knowledge; seeds encapsulate the essence of similarity and difference.
Trees growing in woods	Transitions and continuity in a growth cycle. Objects changing state naturally, seasonality.	Different phases of a cycle require different conditions and interventions to support life.
Gaia – Cycle of life	Ecology – sustainability through purposeful human intervention.	As words around a virtuous circle.

Table 2 Synthesis

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Cooking	Familiar process with infinite possibilities to synthesize different flavours.	Ingredients have different flavours, textures and nutritional value. The recipe provides a predictable process. Heat and the creative inspiration of the cook help integrate contrasting flavours and contradictions into a tasty proposition.
Ship and crew	Journeying against the elements requires co-ordinated crew.	Rowing teams, ships and their crew, Formula 1 racing cars with their teams are all hard objects which only move smoothly and master the elements when different areas of expertise are effectively co-ordinated and harmonized to produce smooth and suitably rapid motion.
Shipshape	Changeable weather creates tensions. Four aspects of a working aircraft carrier that need to be weighed up and balanced.	
The car as it contributes to the driving experience	Imagining the impact of a different type of propulsion system. Fuel into movement affects personal driving experience.	
A rowing team swirling water with their oars on either side	Steering through knowledge flows requires balanced pulling together, with an inspirational cox.	
Jigsaw	Constructing big picture from mess to order. Tension represented, by lack of fit between puzzle pieces.	In the picture.

these radial metaphors appeared to meet the assessment criteria more effectively than others.

Unsurprisingly, nature provided a rich vein. Sustaining life requires pre-determined elements

of structural form to have an inbuilt capacity to adapt; structures in which stability and change co-exist simultaneously are credible and readily acceptable through examples like DNA and

Table 3 Friction and power

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Ship's propeller	Mechanism for shifting fluid to generate energy.	Redesigning the propulsion system to achieve better balance of activity.
Wind as energy	Harnessing an unpredictable natural force. Object plus movement.	Humans engaged with different weather states – calm and storm.
Water as energy in landscape	Phase transitions.	Various elements on the landscape.
Fast breeder nuclear reactor	Sustainability through conflict.	Heat and polarity managed by control rods in the reactor.
KM as a move from unsustainable to renewable energy generation	Sustainability from harnessing natural resources.	Migration from depleting resources of the industrial economy to renewable resources.
Oil in fast cars	Reducing friction produces better performance.	Oil exploration and oil usage.
Volcanic earth	Deeply hidden but measurable source of upheaval.	Implicit underground power source.

Table 4 *Connecting webs*

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Information Management	Symbols that drive a 'know it, share it, improve it' campaign around people in a network.	Implicit in the network connections.
Cross border connections	Multiple evocative images of KM practices superimposed on a world map.	
Evolution of human consciousness	Developing response to the world through relationships.	Maturing changes personal orientation to priorities.
Linking Brains	Connections between mental models.	Written into picture as loops between brains.

Table 5 *Games metaphors*

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Wallet and monetary system	Different aspects of knowledge as wealth carried together.	Separation of tensions without re-conciliation.
Snakes and Ladders game	Cyclical journey to a central ideal with ups and downs.	The tools that work for and against progress.
Knowlopolo (knowledge monopoly)	Competition through knowledge. Cyclical progress to greater wealth.	Contrast with monopoly. The various tools that help create wealth.

Table 6 *Journey*

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Road and journey	Possibility of new experiences.	Either/or choice of direction. Diverting around obstacles. Implicit in the objects scattered around the landscape.
Navigation, adventure map of journey	Possibility of different routes to same end. The map is not the journey.	
Skiing community in Alps	Peaks and valleys of knowledge landscape.	
Archipelago to virtual web	Connecting disparate islands through human intervention.	Association between inside and out, tacit and explicit knowledge.

Table 7 *A highly compressed metaphor*

Central metaphor	Generative trigger for re-conceptualization	Representation of peripheral associations
Mirrored perceptions in landscape of reality	Changing perceptions. Things are not what they seem at first glance.	Mirrored reflections in a lake force the mind to see things differently.

evolutionary theory. Some of the source domains are intuitively obvious e.g. trees and knowledge have a long historical connection. However picturing them over a life cycle offers many more associations. Natural metaphors can demonstrate how different properties are implicated as elements transition from one state to another while the essence remains constant e.g. water to ice or gas, or seed to plant. They can depict difference and variation in different time scales held together by the common thread of the element in its ecology. They represent latent energy and give the viewer a chance to ponder the how to access the energy that holds the system connections together. There are so many resonances with the way KM must resolve the tension between structural and human capital, the present and the future, exploiting and exploring knowledge, that they richly conceptualize how these facets could work synergistically rather than as diametrically opposed domains.

Landscape metaphors similarly allow the juxtaposition of contrasting objects in tension. Hills and valley can represent knowledge and ignorance and the entrainments of such things are very productive for thinking about KM. They have the potential to show how people can surmount structural obstacles by learning. However, physical progress across the landscape tends to imply either/or choices en route, as the traveller decides which way to tackle the problem. Reframing paradox requires both/and choices.

Synthesis metaphors, in contrast, suggest how different elements in combination can become more than the sum of their parts, presenting a reframing of fragmented domains into a coherent whole. Few people would talk of KM in terms of cooking or rowing because the words would sound improbable, but familiar and quite distinctive activities can provoke new perspectives. Games also represent many different facets as an integrated but risky process, though they do not represent the full synthesis.

Things that reduce friction (e.g. oil), and/or increase power (e.g. wind, water, sun and volcano's) are consistent with the idea that tension can be creative, natural energy can be harnessed, unfreezing can create change. Natural

forces evoke recognition of knowledge as a force for good or ill depending on the human capacity to use it productively. Web metaphors demonstrate the importance and contribution of multi-directional connections and relationships between people, places and ideas, with or without the intervention of technology.

Clearly each category privileges different aspects of comprehension; some are better at stimulating re-conceptualization than others. The distinction between these A grade posters and those with middle range marks, in terms of the use of metaphor, was the coherence of the story. Moderately rated posters offered some connections between picture elements, but lacked coherence because they lacked a central metaphor to show how the disparate elements worked together. The student then had to revert to words to explain the relationship between pictorial elements and where the paradoxes and tensions existed. This lack of coherence made it less intuitive for the viewer to integrate the ideas, which lost the big picture essence of KM. Other mid-range posters contained simple metaphors that depicted selective aspects of KM but ignored many conflicting activities. They may have presented anomalous and analogous elements in one glimpse, but the interdependencies were simplistic. Finally posters marked low contained simple depiction of the KM requirements with little simultaneous representation of similarity and difference.

IMPLICATIONS FOR PRACTICE

Conducting this analysis has confirmed that visual radial metaphors are a useful way to assess student comprehension of a paradoxical system like KM in a *concise* way. The artefact of the poster becomes a novel trigger for conversation that evokes tacit associations without the bias of verbal description. Visual imagery that simultaneously represents the anomalous with the familiar can be a trigger for creative re-conceptualization in a world where assumptions about organizing are rooted in the industrial model of managing tangible rather than intangible knowledge resources. We hope that the students' ideas

may help practitioners reflect on how to communicate KM to others without always resorting to the familiar. Further work is required to explore issues such as the effect of colour within the visual metaphor, the impact of the visuals on non-KM experts, and the poster effectiveness in creating dialogue. However, this 'proof of concept' longitudinal data analysis suggests that there would be merit in pursuing these studies.

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