M.Sc. in Occupational Psychology

An exploratory study on the use of metaphor to increase

Creative Cognition

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2009

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Abstract

Creative Cognition is a vital aspect in the effective functioning of individuals, organisations and societies. This exploratory study investigates the self-reported effects of the use of Clean Language (a metaphor based technique) on Creative Cognition. Definition and measurement are barriers to the study of Creative Cognition. The traditional view that metaphor is a special case of imprecise language is challenged and the view that metaphor forms the basis of our cognitive processes is proposed. A mixed between and within subjects design was employed where the self-reported effects of the use of Clean Language on Creative Cognition were examined. A test group (n = 80) with at least two days training in the technique reported a higher degree of Creative Cognition when they used the technique than a control group (n = 131) who did not use the technique. The test group also reported a statistically significant difference in Creative Cognition between their current use of and before they trained in the technique. Blended Metaphor Theory demonstrates how new knowledge emerges in the Creative Cognition process. The study was limited by the lack of objective measures of creativity and by the self-report method.

Introduction

Creative Cognition and its Importance to Organisations and Individuals

In an ever faster changing world the need to adapt and innovate is critical to both individuals and organisations. The capacity to create new products, services and processes is a fundamental driver of today's economy (Johnson, 2007). Creativity is important to organisations in that it can lead to the development of new products, services and scientific findings thus building competitive advantage. Organisations and individuals must also adapt existing resources to changing demands (Amabile, 1996). As a consequence organisations have placed increased emphasis on strategies to improve employee creativity including the following: recruiting more creative individuals, rewarding creativity, and improving creative cognition using training techniques (Birdi, 2005). This exploratory study will investigate how a training technique called Clean Language effects Creative Cognition.

What is Creative Cognition?

Creative Cognition has been defined as the thought process that brings about ideas that are new for an individual (Weisberg, 2006). Many writers have added that the resulting idea needs to add value in order to be creative (Shavinina, 2008). It is therefore proposed that Creative Cognition is not judged in an absolute or objective sense but is very much contextual. As both value and novelty are relative to the user, creative thought is 'in the eye of the beholder'.

There are a number of aspects to Creative Cognition. Making new connections is important as new ideas can emerge by combining concepts not normally seen as overlapping (Hampton, 2001). The title of the bestselling book The Monk who Sold his Ferrari is a case in point. We do not normally associate monks with expensive cars. Unexpected categories in this title combine to create a new

category, what is sometimes called Emergent Knowledge. Problem solving is also a particular subset of Creative thought. There have been significant volumes of research in this area (particularly in laboratory settings) and it has received much more attention than problem finding (Runco and Sakamoto, 2006). Problem finding can be defined as deciding where to focus one's cognitive capital in the creative process (in other words, thinking creatively about what to think about). Critical and creative thinking are often contrasted. Whereas creative thought is expansive and unconstrained, critical thinking is focused, logical and constrained (Ward, Smith and Vaid, 2001). Creativity is sometimes placed on a continuum with many writers proposing degrees of creativity, radical discontinuous inventions at one end and incremental improvements at the other (Kirton, 2003). Organisational interventions that demonstrate increased Creative Cognition are clearly worthy of investigation.

Creative Cognition Research Context

The study of creativity in the western world has had some links to the mystical from ancient times until the recent past. Ideas around divine intervention or inspiration gave rise to the notion that the person was an empty vessel waiting for inspired ideas from the outside. Plato even argued that the muse dictates what the poet creates, implying that there is a lack of agency in the creative process (Rothenberg, 1990). As a result some people believe that creativity cannot be influenced and even that it should not be researched (Sternberg, 2006).

There have been a number of pragmatic approaches to Creative Cognition (De Bono, 1992; Osborn, 1963) which have been more concerned with developing creativity rather than understanding it. These approaches have been criticised by psychologists as lacking in both theoretical underpinning and empirical attempts to validate them (Lubart, 1990). Psychodynamic approaches (such as Freud, 1964) suggest, for example, that artists create as a way to express their

unconscious desires in a form that is acceptable to the public. While the psychodynamic approach has added some value, it is difficult to validate using scientific methods. Instead this approach has relied on case studies of eminent creators (Weisberg, 1993). The case study method has also been used to learn from real life examples of Creative Cognition. However it is also difficult to make generalisations to the wider population based on individual cases (Gruber and Wallace, 2006).

Often, when one considers creativity, eminent examples of exceptional creative endeavour (such as Picasso) spring to mind and the case to measure individual differences may seem compelling. The Torrance Tests of Creative Thinking (TTCT) (Torrance 1974) seek to measure individual traits in Creative Cognition. The TTCT measure divergent thinking, number of ideas, originality and variety of perspectives. This and other psychometric approaches have been criticised as inadequate scores which fail to capture the concept of creativity or provide a basis for its development (Weisberg, 2006). This point is of central concern to organisational and personal development– if Creative Cognition is 'built in' then it can only be improved through the recruitment and selection process. However if Creative Cognition can be trained then many organisations have the option to develop both individual and group creative capability.

The Social approach to the study of creativity (typified by Amabile, 1983) seeks to identify how motivation and environment can influence the creative process. Studies have shown how manipulation of motivation can influence creative performance (Gruber and Wallace, 2006). The use of motivation techniques (which can, for example, focus on the participant's locus of control) has improved creativity in tasks such as writing poems (Nickerson, 2006). The relationship between motivation and creativity may not be linear though when students' creative abilities are valued their creativity improves (Sternberg, 2006). Environmental factors like demand and availability of resources may also

contribute to creative output (Gardner, 1993). In fact as so many possible factors may influence the creative act some writers such as Csikszentmihalyi (1999) have proposed that creativity be studied as a 'complex'. He suggests that breaking down creativity into components may lead to a loss of fidelity in the process. Csikszentmihalyi (1999) and other writers (Albert and Runco, 1989) have called for studies with a high degree of ecological validity on this basis. However designing studies that best reflect experience 'in the real world' can lead to increased challenge in the related areas of definition and measurement.

Enhancing Creative Cognition

There is widespread support in the literature for the notion that creativity can be enhanced through training (Johnson, 2007; Nickerson, 2006). Encouraging individuals to express strange ideas without self criticism or censorship (brainstorming for example) has a long history (Osborn, 1963). Lowering the tendency to self criticise increases the number of ideas generated and encourages new modes of thought (Ochse, 1990). The Cognitive Research Trust (CoRT) designed a training programme to generate ideas that might not normally come to mind (De Bono, 1992).

Synectics is a creativity technique developed by Gordon (1981) designed to stimulate new ideas using analogy and metaphor. Sanders and Sanders (1984) have also proposed teaching creativity using only metaphor. Using a metaphor technique, they believe, imagination is given free rein and critical thought is temporarily suspended. If, as proposed by cognitive linguists, all conceptualisation is based on metaphor (Lackoff and Johnson, 1980) then processes that utilise this knowledge may prove fruitful.

The Metaphorical Basis of Cognition

In the first twenty years or so of its development cognitive science focused on mental functions such as memory, perception and symbolic thought, regarding them in a similar way to how computers process information (Fauconnier and Turner, 2002). Indeed when one looks at specialisms in any university psychology department this breakdown is largely maintained. Looking at the functioning of the brain in this modular way may not be the most conducive to the investigation of Creative Cognition (Sternberg, 2006). New ways of framing this important aspect of thought may lead to new insights into both the theory and practice of Creativity (Csikszentmihalyi, 1999).

How we acquire language and construct meaning is also of great interest to psychologists (McNeil, 1996). There is a long-standing view that there is a sharp distinction between literal and figurative language. From the traditional perspective literal language is clear and unambiguous whereas figurative language is flowery, imprecise and largely the domain of writers and poets. Indeed the notion of positivism has, as one of its assumptions, the notion that reality can be described and tested in literal terms (Ortony, 1993). Figurative language on the other hand has different uses. Metaphor, for example, is seen as a 'special case' of language where what the speaker means is not literal. (For example if someone says they could 'eat a horse' it is known to mean they are very hungry. See Searle, 1969.) In this way it is proposed that non-literal meanings depart from the specific language used and convey the intentions of the speaker (Pylyshyn, 1998).

In their 1980 book Metaphors We Live By Lackoff and Johnson (1980) challenged this paradigm by proposing that thought itself is largely metaphorical in nature. They began with evidence from up to 78 different languages showing parallels in how we organise our thoughts. Across these languages they found many similarities based around (for example) emotional

experience such as anger. Universally (according to their studies) anger is thought of in terms of container metaphors, for example, 'I was boiling over', 'She couldn't keep it in'. Throughout the 1990s and 2000s the field of Cognitive Linguistics has grown from these ideas and developed a wide range of theory and research (Langacker, 2002). Cognitive Linguists build on the notion that all thought is metaphorical in nature (Evans and Green, 2006). This groundbreaking field of research provides new insight into many areas of psychology including Creative Cognition. Metaphor provides a novel theoretical lens for this exploratory study as it allows Creativity to be viewed in a different way. Cognitive Linguists define metaphor as a conceptual device where a target (Love) is defined in terms of a source (Journey) (see Fig. 1).

Figure 1: Mappings for Love is a Journey

Source: JOURNEY	Mappings	Target
Travelers		Lovers
Distance		Progress
Obstacles		Difficulties
Vehicle		The Relationship
Destination		Goals of the Relationship

While Saddock (1976) stated that metaphor was an 'extension of natural language', Lackoff and Johnson (1980) proposed that metaphor forms the basis of conceptual structure. This structure is based on cross domain mappings between conceptual domains (a conceptual domain is a domain of knowledge that organises our thoughts and experiences; see Evans and Greene, 2006; see Fig. 1). Some of these mappings are based on pre-conceptual embodied experiences. For example when we talk and think about quantity we make

connections to vertical elevation; 'He got a high mark in the exam' does not relate to physical height but to a good mark. Our early embodied experience (as children) corresponds with this idea, since as we put more milk in a container the level of the liquid rises. Lackoff and Johnson (1980) suggest that quantity and vertical elevation are linked with this experience, which firstly gives rise to a conceptual correlation and in turn to linguistic representation.

Here are some examples of underlying metaphors in everyday language and thought which illustrate how metaphor underlies all thought (including Creative Cognition). In the following example one can see from common phrases that how 'CONTROL IS UP' is a common underlying metaphor (Evans and Green, 2006):

- I'm on top of the situation.

- She's at the height of her powers.

- He is under my control.

Argument is typically spoken about in terms of war:

- He defended his position well.

- She attacked the weak points of my argument.

- He never won an argument with her.

- All of my points were shot down.

Relationships are often thought about in terms of a journey:

- That's how far we've come.

- We're stuck.

- They are at a crossroads.

Lackoff and Turner (1989) have used evidence from the study of several languages to show that the mapping process involved in metaphors moves in one direction from source to target (as shown in Fig. 1). In other words the target domain of 'difficulties in a relationship' is understood in terms of the source domain of 'obstacles'. Developing the idea that metaphors have a direction (from source to target), Kövecses (2002) found motivations that relate to this pattern. The most common source domains are the human body, animals, plants, food and forces. 'Don't push me into something I don't want' is an example of a source domain of force (push) being used to explain a target domain of persuasion. Conceptual categories like emotions, thought, relationships and time are the most common target domains. This led Kövecses (2002) to believe that, while source domains tend to be tangible and concrete, target domains tend to be abstract, leading to the view that higher order concepts are grounded in bodily experience. Manipulation of abstract concepts has been shown to be an important part of the Creative Cognition process (Sternberg, 2006) and the source/target mechanism of metaphor may be a useful way of increasing ones ability to understand the abstract.

Another important idea in Cognitive Linguistics is that depending on the source metaphor used differing elements can be highlighted or hidden (Gibbs, 1994). For example using the metaphor of 'an argument is war', highlights the combative nature of an argument, whereas using the idea that an argument is a journey highlights progression (They proceeded step by step; We have covered a lot of ground, etc.). This factor has been shown to be particularly important in the practice of creativity as differing aspects of a concept can be stressed or hidden depending on the metaphor used to describe it (Schon, 1993). For example the London Underground Map is modelled on a wiring diagram. As a metaphor for representing the Underground it highlights connectivity while lowering the emphasis on scale and actual location. It is highly effective,

particularly for users unfamiliar with the London Underground, but can also lead to anomalies like stations appearing further apart than they really are (Miller, 1996). Highlighting or hiding aspects of a problem can be important in the creative cognition process as it may enable new viewpoints to be taken (Amibile, 1983).

As the Cognitive Linguistics approach is a significant challenge to existing views of psychology it is important to check for supporting evidence beyond the linguistics field. Studies have shown that science, maths, religion, myths, dreams, politics, advertisements and social structures have a metaphorical basis (Gibbs, 1994; Jackendoff, 2002; Kövecses, 2002). Spontaneous gesture studies have shown that gestures that accompany speech often trace out conceptual images (McNeill, 1992). American Sign Language has lots of signs that reflect cross-cultural metaphors (Taub, 1997). In concluding this section it is proposed that all cognition is metaphorical, and that many of these metaphors are based on early embodied experience. Far from being a linguistic device used in poetry and prose, metaphor underlies much of our everyday experience and this holds true across a wide range of languages (Evans and Green, 2006).

How Metaphors Combine to Promote Creative Cognition

Conceptual blending theory gives many indications as to how metaphors can combine to create novel thoughts (creative cognition) in the Clean Language process. Gilles Fauconnier and Mark Turner (2002) proposed that meaning is built directly in context with language as a guide and that meaning construction is a context-bound highly complex process. Meaning Construction is the process where language 'prompts for' novel cognitive representations. In other words sentences work by giving 'partial instructions' on how to construct

temporary conceptual domains. Consider for a moment the computer desktop. There are icons on the screen that represent files, folders, a trash can and so on, all located on a 'desktop'. This desktop is a complex blend allowing the user to perform sophisticated tasks without a detailed knowledge of computer programming. It works by drawing on our embodied knowledge of offices, files, folders and waste-paper basket. Fauconnier and Turner's (2002) theory proposes that through the blending process various metaphors in differing contexts can generate a relatively unlimited number of outputs thereby enhancing the Creative Cognition Process

An Application of Metaphor-Symbolic Modelling and Clean Language

In their book Metaphors in Mind (2000) Lawley and Tompkins developed a system called Clean Language for enabling clients to focus on metaphorical representations as they work through a problem. The process is based on their observations of the (recently deceased) therapist David Grove (who pioneered the method). It has Systems Thinking and Cognitive Linguistics as a broad theoretical underpinning. (Systems Thinking is an approach that looks at how a range of issues can be interdependent as opposed to having linear relationships; see Checkland, 1994.)

Clean Language is used with clients in therapeutic, coaching and educational settings (www.cleanlanguage.co.uk 2009). Using a limited set of questions the facilitator's input is kept to a minimum and the client is encouraged to remain in their 'metaphorical landscape'. (Metaphor landscape is a term used by Lawley and Tompkins, 2000 to illustrate a number of interrelated metaphors in a client's experience.) The process is said to enable tacit knowledge to become explicit, and the client to become more aware of the model of 'reality' they are working from (Lawley and Tompkins, 2000). In the UK alone hundreds of people

have been trained in this process and it is being applied mainly in the therapeutic and coaching fields.

Clean Language directs the client's attention to the metaphors they may be using unconsciously by repeating key phrases of theirs and then asking open questions (for a list of the specific Clean Language Questions see Appendix I). Below is a small excerpt (from Lawley and Tompkins, 2000) of a session showing how Clean Language works (the client's phrases are shown in italics).

> Facilitator: And what would you like to have happen?
>
> Client: I would like to have more energy.
>
> Facilitator: And you would like to have more energy and when you would like more energy that's more energy like what?
>
> Client: It's like I'm behind a castle door.
>
> Facilitator: And is like you are behind a castle door and what kind of castle door is that castle door?
>
> Client: It's a huge door that is very thick and heavy and very old with big studs.
>
> Facilitator; And is there anything else about that castle door that's heavy and very old with studs
>
> Client: I can't open it and I get very tired trying to open it.

The principle difference in this method over other types of facilitation is that specific questions encourage the client to describe their experience in metaphorical terms. For example, the question 'What kind of...?' often elicits an answer where a target (in the above case, the lack of energy) is expressed in terms of a source (behind a castle door). The facilitator also pays particular

attention to the metaphors the client uses and how those metaphors are organised (Lawley and Tompkins, 2000). This information is used to direct further questions.

Researching Metaphor in Action

Several hundred people in the UK and Europe have trained in the use of Symbolic Modelling as a problem-solving tool. There are many claims as to its effectiveness, however, there is little peer-reviewed research in the area. A search in Business Source Premier, Psych Info and Psych Articles yielded only one paper (Business Communication Quarterly, March 2002). No validity or reliability studies of the method were revealed in the search.

The population of past participants in this metaphor training are ideal for researching the use of metaphor in creative cognition. The researcher decided to survey this population as to their experience of metaphor in action. A self-report questionnaire modified from a survey by Schredl and Erlacher (2007) in their study 'Self-Reported Effects of Dreams on Waking Life Creativity' was used. The results were compared with a control group. In line with recommendations in the literature, Creative Cognition was studied as a complex (Csikszentmihalyi, 1999).

The following hypotheses were proposed:

H1: There will be a significant difference in the self-reported Creative Cognition of participants trained in Clean Language compared with a control group not trained in Clean Language.

H2: There will be a significant difference between the self-reported Creative Cognition reported for the period before being trained in Clean Language versus the Creative Cognition reported after Clean Language has been learned.

Method

Participants

A database of approximately 250 people who trained in Symbolic Modelling was used to recruit participants to the test condition. The test condition consisted of 80 participants with 73% living in UK/Ireland and 16.3% living in mainland Europe, and the balance outside of these areas. The average age was 49.8 years, 56.3% of the sample were female and exactly half had trained as Executive Coaches. There were fewer participants in the control group as it was drawn from a smaller data base. There were 132 participants in the control group and they were recruited from a database of a national training organisation. 66% of the participants in this condition were female and the sample had an average age of 44 years. 88% resided in the UK or Ireland and 7% in mainland Europe.

Design

This research engaged a mixed between and within subject design. The between group design was chosen to compare the test group with a control group. The within group design enabled a comparison of the test group's perception of the change (if any) in their Creative Cognition from the time before they received the training to when they began using Clean Language. Questions were presented in a random order and half were stated in the positive and half in the negative to reduce the possibility of a response set.

Research Tools

A questionnaire was developed by the researcher from a similar survey by Schredl and Erlacher (2007) in their study entitled 'Self–Reported Effects of Dreams on Waking Life Creativity' (for full details of the questionnaire see Appendices II and III). It was compiled using 18 declarative statements based on the participants' experience of addressing situations they faced. The

statements were rated using a six point Likert scale with Strongly Agree placed at one extreme and Strongly Disagree at the other. The option of 'neither agree nor disagree' was not given in order to avoid central tendency. Exemplar statements are shown below (Fig. 3).

Figure 3: Exemplar Statements

	Statements
1	Many of the ideas I come up with are ineffective
2	I am good at coming up with unexpected answers to the situations I face
3	The ideas I generate add value
4	I'm not good at seeing new problem-solving opportunities
	Response
	Strongly Agree, 1; Agree, 2; Somewhat Agree, 3; Somewhat Disagree, 4; Disagree, 5; Strongly Disagree, 6.

The 18 statements were presented to the control group in the above format. The test group were presented with two sets of the above statements in modified format. In the first format the phrase 'Before I trained in Clean Language' preceded each statement. The statements were presented in this way in order for the participants to rate their current perception of their abilities before their introduction to the method. In the second set of questions the phrase 'When I use Clean Language' preceded each statement. This phrase was used in order to keep the participant reminded as they went through the questionnaire to answer according to their current use of the method.

An online survey method called 'Survey Monkey' was used to collect the data which was then exported into SPSS. This online method was used to preserve anonymity, ease participation and reduce the resource requirement around collating the data as it is presented in Microsoft Excel format. The participants needed access to a computer connected to the internet and no other tools were necessary. A minimum amount of demographic data was collected in an effort to keep the survey short and to increase completion rates. Age, place of

residence and gender questions were asked, however the questionnaire would have benefited from the addition of ethnicity questions.

A self-report mechanism was chosen on the basis that it was the most practical way of testing the application of Clean Language training in an ecologically valid way (Carson, Peterson and Higgins, 2005) focusing on participants' responses as they applied Clean Language to challenges they faced. An online survey method was chosen for a number of reasons: the method was reported from the pilot as easy for the participants to use and it helped preserve anonymity. From the researcher's point of view it was an efficient way of gathering data from a large, geographically dispersed group.

Procedure

Participants in the test condition were recruited from a database of the two main training organisations in Clean Language. A pilot was first conducted with 8 participants in the test condition and 11 in the control. Constructive feedback from the participants in the pilot was incorporated including minor changes to make the instructions clearer to participants (see Appendices II and III). Past participants of training in Clean Language programmes (250 approx.) were sent an email with a link to an online survey tool (see a copy of the email invitation in Appendix IV). The number involved was the total number of available email addresses to the training companies in question. Agreement to participate was gained on the first page of the survey which was based on a pre-approved format provided by the University of Leicester's Psychological Research Committee (see Appendices II and III). In all participants were give two weeks to respond and 86 (n = 86) completed questionnaires were collected (response rate 34% approx.). At the same time an invitation was sent by another training organisation on the researcher's behalf to participate in the control condition. The potential participant could choose to complete the survey in their own time and unsupervised. The email gave a brief introduction to the researcher and the

purpose of the study to both groups. Participants with a minimum of two days training in Clean Language were chosen on the basis that module 1 of the training (two days in length) was the least amount of training necessary to gain a grounding in the method. An email invitation was sent by a national training organisation to approximately 350 past trainees who had not trained in Clean Language.

Ethical Issues

Ethical Consent was applied for in July 2009 through the University of Leicester online ethical approval application process. Ethical approval was received on the 27 July 2009 from the University's Psychological Research committee (see Appendix V).

At the beginning of the study the background, title and the names of the researchers were provided to the participants (see page 1 of questionnaire). The reason for the research and details of what participation involved was outlined on the online questionnaire and participants were further encouraged to ask any additional or clarification questions of the researchers. Due to the fact that no face to face interviews were conducted demand characteristics were reduced. Informed consent was requested on a yes/no basis. If the respondent chose 'no' Survey Monkey was set up to exit from the questionnaire and thank the participant. Two potential participants in the control condition did not give consent and were therefore excluded.

It was made clear to participants on the introduction page of the online survey that they could exit the survey at any time and an 'exit this survey' button was available on each page to participants. Participants could also choose to withdraw by navigating away from the page at any time. There were 36 non-completed questionnaires in the test condition and 30 in the control. If respondents requested they were offered a copy of the results of the survey.

Results

Exploratory Data Analysis

The raw data of the questionnaires was checked against the data input into SPSS (see Appendix VI) to see if there were any obvious inconsistencies, incompleteness or obvious errors (Morgan et al., 2004). The data was also examined for missing values and the decision was taken to use only fully completed questionnaires. This decision was based on feedback from some respondents who began the survey but for one reason or another were unable to complete on their first attempt but began again later indicating that they had made more than one attempt. The Creative Cognition scale is perceived to have face or content validity as it is based on scales used in a similar survey by Schredl and Erlacher (2007) in their study entitled 'Self-Reported Effects of Dreams on Waking Life Creativity'. On this basis the items used in this study reflect and define the concept they are measuring (Hair et al., 1998). The data was checked for outliers using a box plot and for normal distribution using a scatter plot. The 18 items obtained a Cronbach's alpha of .68. The scale's internal reliability was increased with the removal of four items. A further three items were removed to ensure that all item-to-total scores were above .30, as per the recommendations of Robinson and Shaver (1973), who argued that an item is likely to load on another construct if this figure is below .30. Following these removals the scale's Cronbach's alpha increased to .730 (see Table 1 below). The remaining data was found to be independent and the variances of the dependent variable in the two populations were equal (using Levene's test). The conditions were therefore met to use an independent t-test to analyse the data.

Table 1: Sum of the Means and Standard Deviation for Each Group

The summated score for the creative cognition scale shows:

Group	N	Sum of Mean Scores	Standard Deviation
Control Group = Condition One (e.g. I often pay attention to the wider implications of a challenge)	131	51.4	.56
Test Group = Condition Two (e.g. When I use Clean Language I often pay attention etc.)	80	54.12	.44
Test Group = Condition Three (e.g. Before I was trained etc.)	80	47.3	.58

The summated scores above show the test group reported a higher degree of Creative Cognition (54.12) when they use Clean Language than the control group (51.4). An independent t-test of the mean Creative Cognition scores for the test group using Clean Language (M = 4.92, SD = .44) and the control group (M = 4.64, SD = .56) differed significantly (t (211) = 4.06, p<.001). This supports the first hypothesis: There is a significant difference in the self-reported Creative Cognition of participants trained in Clean Language compared with a control group not trained in Clean Language.

A paired t-test indicated that test group in Condition Two (when employing Clean Language) reported on average significantly higher levels of Creative Cognition than Condition Three (before training in Clean Language) (t (86) = 6.36, p<.001). The scores support the second hypothesis: There is a significant difference between the self-reported Creative Cognition reported for the period before being trained in Clean Language versus the Creative Cognition reported after Clean Language has been learned.

Table 2(below) shows both the item measurement assessment for each of the matched items in the questionnaire. Also show are the items that were removed to improve internal reliability and reduce the likelihood of one construct loading on another.

Table 2: Item Measurement Assessment

	Component		
	Control	Test A	Test B
I am good at coming up with unexpected answers to situations I face	0.560	0.006	0.294
I typically generate lots of possible solutions to problems	0.513	0.386	0.175
The ideas I generate add value	0.564	0.122	0.152
I am good at developing solutions so that they are widely accepted	0.526	0.204	0.628
I'm not good at seeing new problem solving opportunities (r)	0.625	0.194	0.295
I'm not good at figuring out which ideas are the best (r)	0.535	0.283	0.191
Often my ideas are not taken on board by others (r)	0.438	0.378	0.386
I am unable to come up with many solutions (r)	0.531	0.132	0.411
Many of the ideas I come up are ineffective (r)	0.496	0.473	0.237
I often pay attention to the wider implications of a challenge	0.459	0.460	0.190
I can combine the best of a number of ideas together	0.490	0.608	0.063

Items Removed

I tend to focus on areas of a problem other people have not paid attention to

I find it useful to build on existing ideas of my own or others

I am good at judging whether ideas will work

I don't like focusing on the small details of a problem (r)

I don't find tried and tested solutions the best (r)

I don't like spending too much time on any one solution (r)

I don't like working on solutions on my own (r)

Table 3 (below) shows the mean scores for the matched questions used in each of the conditions of the study. Respondents reported different levels of Creative Cognition.

Table 3: Creative Cognition Statistics

Mean scores for each question

No	Question	Control Condition	Test A 'Before'	Test B 'When'
1	I can combine the best of a number of ideas together	4.91	4.95	4.51
2	The ideas I generate add value	5.16	5.43	4.68
3	I am good at developing solutions so that they are widely accepted	4.63	4.65	4.19
4	Many of the ideas I come up are ineffective	4.54	5.26	4.05
5	I'm not good at figuring out which ideas are the best	4.35	4.73	4.04
6	Often my ideas are not taken on board by others	3.97	4.53	4.25
7	I am good at coming up with unexpected answers to situations I face	4.44	5.34	4.31
8	I typically generate lots of possible solutions to problems	4.63	4.49	4.10
9	I am unable to come up with many solutions	4.82	4.88	4.42
10	I often pay attention to the wider implications of a challenge	5.00	4.89	4.37
11	I'm not good at seeing new problem solving opportunities	4.57	4.98	4.39

Discussion

This study found that participants (n = 80) who had engaged in at least two days training in Symbolic Modelling reported a greater level of Creative Cognition when compared to a control group (n = 126).. While this study did find a moderate but significant effect the results do not point to a greater effect size than other creativity techniques (Miga et al., 2000). In fact as Clean Language is a relatively new method (wide-scale training has only developed in the past ten years) it may not be any more successful, from a Creative Cognition point of view, than well-established methods. Results from this study do suggest, however, that it compares well with existing Creative Cognition training techniques. To be fair, none of its proponents makes a specific claim to suggest that it is designed especially for the purpose of increasing Creative Cognition.

As training has been defined as the effort to change knowledge skills and attitudes, a finding of a change in attitude may be particularly useful in putting into context another significant finding of this research. There was a quite large and significant reported effect in the test participants' Creative Cognition between the 'before I trained in Clean Language' and 'when I use Clean Language' conditions. The change in the participants' perception of their ability may point to a change in attitude around their ability rather than just a change in skills or knowledge. Changing attitudes relating to an individual's creative ability is widely reported as an enabling factor in the effort to increase Creative Cognition (Barron, 1991; Nikerson, 2006; Seligman, 1991). This evidence may point to an improvement in attitude being a central benefit to the Clean Language training process. However, as the size of this effect is much greater than the difference between the current test group and the control group, it could point to confounding variables. The reconstructive nature of long-term memory may also call this finding into question. As this research is exploratory

in nature further study is necessary to investigate this phenomenon in greater detail, possibly with the help of a longitudinal design. It is widely acknowledged that there are multiple components of creativity including abilities, attitudes, intelligence, skills, cognitive styles and context (Amibile, 1983; Nikerson, 1999). Any change in perceived ability could therefore be explained through a range of factors as is common in studies with high ecological validity. While results from this study may indicate a very worthwhile improvement for the test population, it would be unwise to draw clear conclusions based on self perception and long-term memory.

The finding in this study is in line with research in a number of creativity training studies such as Torrance (1974) who found that training increased Creative Cognition significantly in at least 50% of the children tested. Mansfield, Brusse and Krepelka (1978) also found a number of creativity training techniques successful. These techniques included Brainstorming (Osborn, 1963) and another metaphor-based technique called synectics (Gordon, 1981). Further support for the notion of training creativity was found by Miga et al. (2000) who compiled a meta analysis of eight studies and showed a modest effect size ($r = .27$, $p>.05$). In a more recent report Scott, Leritz and Mumford (2004) found significant effects across differing dimensions of creativity. These dimensions were divergent thinking, problem solving, performance and attitudes

Blending Theory (Fauconnier and Turner, 2002) provides a robust explanation as to the type of cognitive process that may be employed in the Creative Cognition processes (Evans and Greene, 2006). Questions in the Clean Language process prompt for and encourage clients to use blends of metaphors (for example Facilitator: 'When you feel angry that's like what?').

Nevertheless, there are other explanations given as to the process involved in Creative Cognition. Hampton (2001) places much less emphasis on the context in which new thoughts are produced and argues that the emergence of the creative thought process comes from a special combination of categories in language. Drawing on Ripps (1995) it is proposed that when two concepts are combined in most cases the output inherits attributes from both concepts. So, for example, if all fish have gills then Scottish fish will have gills also. However, as Rosch and Mervis (1975) point out, common attributes that hold true for a category may not hold true for all the members of that category. Figure 4, for example, shows attributes that are often but not universally true. In the results above participants scored Clean Language particularly highly on questions that emphasised the acceptability of solutions produced (Table 3, questions 3 and 6). Further research into the specific aspects of novelty and acceptability may demonstrate how inheritance of attributes may be especially important in the Creative Cognition process.

Figure 4: Common Attributes of the Category of Birds

Birds	Attribute
	Wings
	Feathers
	A beak
	Lays eggs
	Migrates in winter
	Is lightweight
	Is able to fly

Question 7 in Table 3 (above) points to the unexpected nature of the type of solutions generated using the Clean Language process. This property of the

solutions is known in the literature as Emergence (Emergence is where attributes that could not have been predicted beforehand come from a process). Hampton (2001) has taken evidence from the combination of novel categories to show how novel concepts can emerge. Take the example of pet birds. Emergent properties from this category such as 'are small', 'can talk' and are 'colourful' are not necessarily part of the category of pets or birds. Kunda, Miller and Claire (1990) also found that the combination of concepts such as 'Harvard educated' and 'is a carpenter' produced emergent properties. If any unusual combination of concepts can aid the Creative Cognition process then contrary to the metaphor-blending theory it is the novel combination of concepts which aids Creative Cognition.

Seven questions were removed from the scale used in this research. Such a result points to two especially likely scenarios: either the questions themselves do not adequately reflect Creative Cognition or the Clean Language process is not especially creative. Problems with the questions may point to the difficulty there is in measuring creativity, and further testing of the questions is necessary to establish their validity and reliability. The deletion of such questions may also indicate that metaphor does not increase Creative Cognition under all circumstances. The Cognitive Linguistics literature also casts some light on to how our cognition may be restrained by embodiment (Lackoff and Johnson, 1999). In rejecting the mind/body split proposed by Descartes it is claimed that we have a unique species view of the world and that our understanding of reality is mediated by the nature of our bodies. One example of the kind of constraints to our cognition from our embodiment is in the visual system. The human system has three colour receptors whereas goldfish and pigeons have four and consequently our experience of colour and of the world around us is constrained in this way.

The fact that our experience is embodied has consequences for the type of thinking we do (Varella, Thompson and Rosch, 1991). The concepts we have access to are influenced by our experience of what is possible from our view of what reality is like. It is argued that what we perceive and conceive is derived from our bodily experience. In a critical text, The Body in the Mind, Mark Johnson proposes that image schemas such as container and balance are meaningful because they derive from pre-conceptual experience (Johnson, 1987). Mandler (2004) has proposed that a child's pre-language experience (from two months) provides the structure for the semantic architecture which later structures cognition. Infants pay attention to objects, like containers, in their environment and form meaningful patterns from them. The image schema for container, for instance, suggests a relationship between two entities; the container and some entity within. The image schema of a container is meaningful because of our understanding in everyday experience of the spatial experience like water in a glass. In this schema the word suggests that if for example the container is moved so does the entity within. Mandler (2004) suggests that these experiences are the bedrock of conceptualisation. When we think of being in a state like love we think of love as the container and an entity within. Should our Creative Cognition be limited in this way then it is a significant barrier to truly novel thinking.

There are a number of problems with the definition of creativity and in turn with its measurement (Carson, Peterson and Higgins, 2005). Most writers would agree that solutions must be both new and useful, however, new in one context may not be new in another (Csikszentmihalyi, 1999). Attempts to measure creative output have included the appointment of an expert panel to review ideas produced by participants (Howe, 1992). However, such experts are open to contradiction and may not recognise a truly creative idea (Runco and Sakamoto, 2006). Another challenge to the measurement of creativity is that

new ideas may not be accepted immediately within a particular field until some time later. Darwin, for example, was widely criticised when his ideas were first made available (Boden, 2000). In fact the challenge of measurement is so widespread that within the literature it is known as the 'measurement problem' (Sternberg, 2006).

Nevertheless results from this exploratory study broadly support the notion that Clean Language promotes Creative Cognition. Lawley and Tompkins (2000) claim that training participants to prompt for the expression of metaphor aligns with existing thought processes to create new knowledge. They also claim that by encouraging clients to represent items in their experience in a different way (i.e. the target and source mechanism of metaphor; see Fig. 1 above) it allows for a different thought process to the one the client normally uses. There is widespread support for the notion that encouraging new modes of expression can facilitate creativity (Morgan, 1980; Sternberg, 2006).

This study could have been improved in a number of ways. Longitudinal research with a number of groups who have been tested for creative ability (using psychometrics) could provide greater insight into the specific benefits of Clean Language. Using pre and post tests of a number of groups involved in the Clean Language training process would enable the measurement of specific changes in attitude (if any). It would also allow a measurement that does not rely on the participants' memory. Additional demographic data would enable greater exploration of the differences between groups as they used the process. A concurrent study of a group who were being trained in other Creative Cognition processes could also provide a very interesting basis of comparison. Tests on specific aspects of the Creative Cognition process (problem finding, for example) may well cast further light on the Creative potential and provide valuable data to further both theory and practice.

Other opportunities for future study include comparing the output of Symbolic Modelling trained groups to control groups in laboratory settings. Standardised Creative Cognition and problem solving in a laboratory setting (using the Nine Dot Problem for example) would enable researchers to control for a much wider range of variables (Runco and Sakamoto, 2006). Controls could be introduced by matching the groups for creative ability and recruiting a sample that was representative of the wider population. It would allow data to be gathered 'live' without the need to rely on self reports by giving the participants similar tasks pre and post Clean Language training. In this way comparisons could be made with studies such as this one in order to triangulate responses with more ecologically valid methods. It would also be interesting to research specific tools within the Symbolic Modelling process in order to establish which ones contribute most to Creative Cognition. 'Establishing necessary conditions' for example (a tool for researching the limitations to creative solutions) may prove more useful than other critical analysis tools. This type of research may contribute to and inform the practice of Creative Cognition.

There were a number of limitations to this study. The self-report approach has a number of weaknesses including the possibility that those who have invested in Symbolic Modelling training may report enhanced effects in order to reduce cognitive dissonance. The lack of an objective measure of creativity further limited the findings. The study did not identify which specific techniques in the use of metaphor add the most value or indeed which type of problem is most suited to this type of approach. However given the exploratory nature of the research it was a useful starting point. The author further believes that this exploratory research provides a strong case for further study in the application of metaphor to Creative cognition. The paper adds further weight to the notion that creative thought can be enhanced through training.

Conclusions

1. This study found that there was a significant self-reported increase in Creative Cognition between participants trained in Clean Language and a control group. This evidence supports the notion that Creative Cognition can be enhanced through training and specifically through training in the use of metaphor. The result also suggests that Creative Cognition is a trainable competence.

2. The study also found a significant difference between how participants currently perceive their Creative Cognition and how they perceive their Creative Cognition before they learned the technique. This finding may point to a change in attitude about creative ability among the participants.

3. Creative Cognition (defined as thinking to produce new and valuable output) is an important part of organisational sustainability and competitive advantage, highlighting the need for study in this area from an organisational point of view.It is argued that metaphor (the process of explaining a target item in terms of a source) forms the basis of all human cognition and there is a widespread call in the literature for further research into both Creative Cognition and the use of metaphor especially in 'real world 'situations.

4. Some practical Creative Cognition (lateral thinking, brain storming etc.) tools seem to work regardless of the lack of theoretical or research underpinning. Nevertheless development of theory and evidence could pave the way for enhanced practice. New advances in Psychology and especially Cognitive Linguistics aid further insight into the processes involved.

5. There are many challenges to the study of Creative Cognition including diverse opinions on how it is measured. There are a number of necessary conditions for creativity such as attitude, intelligence, skills knowledge and context, and it is difficult to understand the relationships between them. Some researchers have therefore suggested creativity be researched as a 'complex' (whole).

6. The Symbolic Modelling/Clean Language training process currently focuses on the use of metaphor in the personal development field. Research in the area may validate its use, enhance its development and pave the way for new applications such as the advancement of Creative Cognition in organisational settings.

7. There are a number of mainly complementary theories as to the cognitive processes involved in creating new thoughts. These processes include the blending of existing metaphors to create new ones, the creation of new categories and the contribution of pre-linguistic imagery. Conversely these processes also constrain our thinking and may limit Creative Cognition.

8. While this exploratory research made a contribution to the study of metaphor in action it has a number of limitations. Self-report mechanisms have been widely contested and the study did not specify in what context Symbolic Modelling is most useful or indeed which specific aspect of the process is most creative. Further research opportunities such as testing symbolic modelling in control conditions identifying which aspects of the process are most creative and in which context were proposed.

Word Count; 8,349

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