

Big C versus little c Creative Findings: Domain-specific Knowledge Combination Effects on the Eminence of Creative Contributions

Introduction

Research into creativity is not new. Creative thinking has been of interest to scholars for centuries. Despite the long history of research, it has only been in recent years that the importance of the area has started to gain increased significance and attention. The rapid pace of environmental change, and the need to develop a society that is open to that change, has necessitated the need for sound research into the field. In our turbulent global environment, this need to understand the creative process is intensifying.

Given the increasingly rapid rate of change, one area of particular importance for the study of creativity is how to encourage and enhance creativity in our youth. The father of modern creativity research, Guilford, recognized that the understanding of creativity has particular importance in relation to education systems. However, despite the early assertions by Guilford (1968), many educational systems are becoming more, not less, standardized (Furedi, 2006; Goldberg, 2004; Hargreaves & Goodson, 2006; Hughes, 2004; Platt, 2004). This results in a paradoxical problem. In a world requiring high levels of creative thought, education systems are encouraging processes that result in a less creative graduate. Much of this problem is due to our lack of understanding of the creative thinking process.

The aim of this article is to re-define the concept of creative thinking in a way that provides a basis for differentiating between the degree, or eminence, of different creative ideas. This provides crucial insights into the creative thinking process and how it can be enhanced. In re-defining the concept of creative thinking the article draws upon what is now a quite extensive literature, and integrates the various underpinnings of that research in relation to three important conceptual developments: a) divergent thinking, b) the degree, or relative eminence, of creative ideas, and c) domain-specific knowledge. The merging of these three conceptual areas provides the basis for the development of a model that defines the different types of creative thinking processes, and acts as a basis for its understanding and improvement.

Defining Creativity

Historically there has been little understanding of the word creative or its importance. Since Guilford (1968) sparked renewed interest in the area there has been significant research aimed at providing more meaning to the word. One area of agreement in both practitioner and academic definitions is that creativity involves originality. As far back as the 1950's Bruner (1957), defined creativity as 'effective surprise', and, as stated by Runco and Charles (1992), "Of the various facets of creativity, originality is probably the most widely recognized" (Runco & Charles, 1992, p.537). However a definition of creativity that only accounts for originality causes a problem, namely, any idea, no matter how bizarre and inappropriate to the situation, would be encompassed. Original, or divergent thought processes alone, therefore do not fully account for a person's ability to develop ideas that will become creative breakthroughs.

Subsequently, academics have extended the definition of creativity to include the concept of appropriateness. Rothenberg and Houseman (1976) define creativity in terms of originality and value. Sternberg and Lubart (1996) define creativity as the ability to produce work that is both novel and appropriate. For an idea to be creative it is therefore widely accepted that it must contain the two elements: originality and appropriateness (Jackson & Messick, 1967; Mumford & Gustafson, 1988; Runco & Charles, 1992; Kasof, 1995; Amabile, 1995; Ford, 1996; Mumford & Simonton, 1997; Runco, 2004). Subsequently, the following diagram (Kilgour, in press) is proposed to illustrate the creativity of an idea.

Basic Creative Combinations Diagram

		Appropriateness	
		Low	High
Originality	Low	Not Creative	Not Creative Existing Solution
	High	Not Creative Bizarre Idea	Creative Idea

While it is agreed that a creative idea must be original and appropriate, this still leaves many important questions unanswered: how does a person develop a creative idea?, what is the creative thinking process?, how do we define differences in the relative significance of creative ideas?, and do the thinking processes differ when a person is developing a minor or a major creative idea? It is not enough to know what a creative idea is, in order to answer these questions we must understand the creative thinking process itself. One prominent line of reasoning regarding the creative thinking process is that developing original and appropriate ideas requires some type of recombination process. This is where a person takes two previously unrelated ideas and combines them. This results in originality, as those ideas were not combined in that way before, and appropriateness, if the new combination is relevant to the situation. This contention is not new, indeed, since Guilford's (1968), pioneering research into the concept of divergent thinking, most researchers have acknowledged the importance of recombination of ideas as central to the process of creativity.

“Most current theories of creative problem solving stress the importance of the combination and reorganization process” (Mumford, Whetzel, Reiter-Palmon, 1997, p.11). In their study of creativity Coney and Serna (1995), stated that the essence of creative thinking was the process of merging disparate mental elements to develop a new and appropriate combination. In support of this there has been some evidence that the ability to combine and reorganize memories is related to creative success. Owens (1969) - “...skills in combining and reorganizing those parts was positively related to patent awards and superior's evaluation of creativity obtained 5 years later” (as cited in Mumford, Whetzel, Reiter-Palmon, 1997, p.11). Hence, much of the research into the creative thinking process focuses on the processes of

creation, synarticle, or modification of ideas (Engle, Mah & Sadri, 1997; Mumford, Baughman, Maher, Costanza & Supinski, 1997). Finally researchers, (Mumford, Mobley, Uhlman, Reiter-Palmon & Doares, 1991; Scott, Longergan & Mumford, 2005) have noted that the creative process involves the creation of new memory structures either through the combination of distinct concepts, or the new combination of elements of existing concepts.

Creative Thinking Definition

This previous research leads to the following definition of creative thinking processes;

Creative thinking is the process of merging thought categories, or mental images, either across or within domains, in ways that have not been done before, in order to develop an original and appropriate solution to a situation or problem.

This definition encompasses many of the areas of at least partial agreement in the literature, and also addresses another area of debate (Sternberg & Lubart, 1996) - whether or not there is a difference in the creative process when developing major versus minor creative ideas. This is important as many creativity researchers are not focusing on the same construct.

There are two types of creative ideas being researched in the creativity literature, researchers such as Gruber, (1974) and Simonton, (1984), look at highly creative ideas, major creative breakthroughs, that are widely recognized and then study the people who developed them. Others such as Wiley (1998), and Ward, Patterson, and Sifonis (2004), look at ideas generated by 'ordinary' individuals under experimental conditions: such as developing a new space creature for a science fiction book. While some would argue that developing an idea for a new type of space alien under experimental conditions is not the same as developing ideas such as the aeroplane or the computer, others however, would argue that while the significance of the ideas may differ, the process underlying those different levels of creative idea are the same (refer Csikssentmihalyi and Epstein, 1999).

It is important to determine which view is correct. Are all creative ideas essentially dependent upon the same thought processes or do major and minor creative ideas depend upon very different thought processes? If the processes required to produce different types of creative ideas differ, we need to understand those differences if we are to develop them in our societies.

The creative thinking definition above contends that there is a difference in the thought processes required to develop different types of creative ideas: major versus minor, and that difference is dependent upon the types of domains that are combined. The creative thinking definition provided above provides a basis for analyzing this issue by accounting for differences in the magnitude of creative ideas with the words: 'either across or within domains'. In other words it provides a basis by which the difference in the eminence of creative ideas can be identified, measured, and explained - that is through an analysis of how ideas are combined, either within or across domains.

Eminent big C Creative Ideas versus Minor little c Creative Ideas

Looking at how domains are combined as a basis for determining the significance of creative ideas has some existing basis. "Ghiselin (1963), noted that psychological processes underlying the production of major contributions, ... may not be equivalent to the processes underlying the production of minor contribution" (as cited in Mumford & Gustafson 1988, p.28). Besemer and Traffinge (1981) discussed differences in significance by stating that major creative products transformed the manner in which the audience perceives the world. Mumford and Gustafson (1988), suggested that the difference between eminent contributions and minor contributions may be that the former entailed the integration and reorganization of cognitive structures, while the latter was related more to the extension of existing cognitive structures. Perkins and Salomon (1988) noted that connection of similar ideas resulted in incremental developments that differ from that of major discoveries. Gardener (1993) distinguishes between everyday small c creativity and big C creative breakthroughs. Weisberg (1999) discusses differences in creative ideas, as true creative ideas being a break from what has come before. Hence, it is acknowledged that there is a significant difference between types, or eminence, of creative ideas. It is therefore the contention of this article that how, and what, cognitive structures, or domains, are integrated can provide a basis for understanding those differences.

Cognitive Differences in Big versus Small C Idea Development

One piece of research that can assist in understanding the cognitive differences in big C versus little c creativity is that of Schilling (2005). Schilling proposes, in her 'small-world' network explanation of cognitive insight, that insight occurs when an atypical association is

made through random associations. While Schilling notes that insights help us to solve both day to day problems, and acts as a basis for major scientific breakthroughs, the network model provides a basis by which connections of category elements based upon their degree of atypicality can explain major versus minor contributions. Ideas that are the result of more distant, or atypical, connections will result in more novel ideas than those that are the result of more typical connections, or part of the same category. Essentially, in relation to Schilling's small world theory of insight, an insight or aha moment occurs when a person makes a previously unconnected unusual, or atypical, association. Then this new combination provides a short-cut for a whole lot of new connections between memory pathways to occur.

One additional point is needed to be made from the Schilling (2005) article in relation to the relative eminence of creative ideas. As described in her article, a new connection for a child might be a significant new insight leading to a range of new connections, while that same insight would not be viewed as significant to an adult. In other words, what is a significant, atypical connection for one person may be a known typical connection for someone else. This emphasizes the differences between individual and societal level creativity. A person may be making a creative connection that is a new combination at an individual level, but that is not new to society. For an idea to result in a big C breakthrough atypical memory connection must be made between memory categories that have not been associated in that way from a societal perspective.

Age and Creative Eminence

An additional significant piece of work related to the eminence of creative ideas, is the work of Lehman (1953). This work is cited here as it provides an insight into the importance domain specific knowledge might play in the degree of eminence of the creative idea generated. The work by Lehman analyzed the age at which individual's accomplished different types of creative achievement and "...found that major contributions were most likely to occur in young adulthood, whereas minor contributions and net productivity were most likely to peak in middle age" (Mumford & Gustafson, 1988, p.29).

A conceptual review of the literature undertaken by Mumford and Gustafson (1988) identified a range of potential reasons for the Lehman finding. Included in their findings were that major achievements may be: a) linked to young people's redefinition and reorganization of concepts

due to a need to incorporate findings that were not explained well in the current field, b) the concern by younger people to develop findings that fit in with broader societal needs, c) the limited experience of people new to a field meaning young people are more amenable to restructuring new information and combining it with the domain, and d) the fact that young adulthood is a time of significant change and accommodation. All of these four points point toward the importance of young peoples' emphasis on making very different, or atypical, combinations in their early career path. If those combinations are also atypical from a societal perspective, significant creative breakthroughs may occur.

Hence, combining the separate conclusions reached by Ghiselin (1963), Besemer and Traffinge (1981), Mumford and Gustafson (1988), Gardener (1993), Perkins & Salamon (1988) and Weisberg (1999) - that minor and major creative contributions may be the result of different cognitive process, with the research of Schilling (2005) and Lehman (1953), it is posited that the extent to which new ideas involve the combination of highly dissimilar domains, is a reasonable basis for the analysis of the degree of creative contribution of an idea. It does not, however, fully explain another finding by Lehman; why major contributions reduce, and minor contributions peak, in middle age.

The Mumford and Gustafson (1988) article put forward a number of arguments related to the finding that major contributions reduce and minor combinations peak in middle age, including; a) the findings by Neugarten (1968), and Gould (1978), that middle age brings an awareness of death and the focus on more attainable goals b) middle aged people have a strong knowledge of the issues facing the domain and therefore are in a position to address those problems, and c) well-developed cognitive structures may limit divergent combination of ideas due to their stability and automaticity of use (Barsalou, 1983). These findings, particularly points b and c, also support the contention that there are differences in cognitive processes undertaken in the development of major and minor contributions, and these differences relate to how domain knowledge is combined.

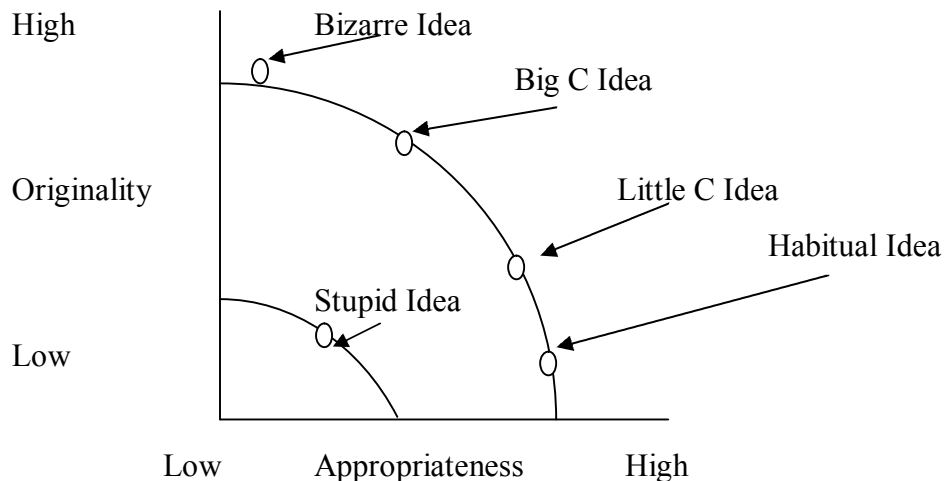
So while it is accepted that creative ideas are the result of some sort of divergent thinking process, combined with reorganization or combination processes, the process may differ for different degrees of creative outcomes. Authors, (Briskman, 1980; Ghiselin, 1963; Gardener, 1993; Sternberg & Lubart, 1996) refer to this concept of varying degrees of significance of

creative ideas, using the terms ‘eminent’ versus ‘minor’ creative ideas. For the purposes of this article the terms big C, and little c, creative ideas are used.

Defining Big C versus Little c Ideas

Nevertheless, there have been few attempts to define exactly what constitutes an eminent creative contribution versus ideas of a more limited contribution, or if, and how, their development requires different cognitive strategies and processes. The best way to describe the difference between the significance of creative ideas may be a continuum that relates the accepted creativity constructs - originality and appropriateness, with the concept of domains. For an idea to be creative it must be perceived as being appropriate to the domain (Ford, 1996; Amabile, 1996). Additionally, the degree of perceived originality will vary dependent upon how similar that information is to an existing domain knowledge. The following diagram is proposed.

The Creativity Frontier



The Creativity Frontier

The above creative frontier diagram illustrates the basis for defining the degree of eminence of creative ideas. Big C ideas involve combining memories from different domains in a way that results in highly original and moderately-highly appropriate responses. As these ideas are

likely to go beyond the current thinking in the field, they might not initially be viewed as highly appropriate. Small c ideas involve combining memories from similar domains in new ways that result in ideas that are highly appropriate but that will be viewed as only low to moderately original responses. Ideas that are merely the repetition of existing knowledge will be neither original nor appropriate - habitual idea. Ideas that are the result of combining new domains in ways that result in highly originality but inappropriate will be viewed as merely bizarre ideas.

While creative ideas require at least some degree of recombination that is different from what has been done before, the frontier positions combinations that involve memory categories within the same domain of knowledge as less original than those that combine highly dissimilar domains. These highly dissimilar domain combinations will change the parameters of the field itself, as these ideas will link cross domain knowledge.

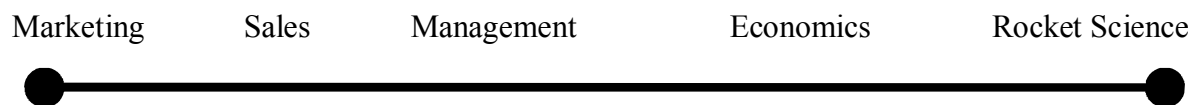
Subsequently, in line with the conceptual underpinnings of Lehman (1953), Ghiseling (1963), Besemer and Traffing (1981), Mumford and Gustafson (1988), and Gardener 1993, big C creative ideas and little c ideas may be the result of different cognitive processes. Additionally, in line with the domain based definition proposed, it is contended that big C ideas are the result of the combination of category memories from dissimilar domains, while small c creative ideas are the result of combining ideas from within the same domain in a new way. Essentially the difference in eminence of ideas relates to the extent to which the ideas merge dissimilar versus similar domains.

Domains and Creative Thinking

A domain has been described as the conventional wisdom regarding a particular field of research, or as the rules, practices and language of a recognized area of action (Ford, 1996). Domains are constantly changing due to new creative ideas, for example Stone Age people would not have viewed the moon and the tides as relating to similar domains, but we are more likely to relate those two concepts today. In addition there are obvious connections between various areas of conventional wisdom or study, for example, marketing and sales. Therefore, the concept of a domain may be best described as a continuum of related concepts, with some domains more closely related than others. This provides a description of domains of

knowledge that can assist in developing a sound understanding of the creative thinking process.

The Domain Continuum



Ideas that are the combination of dissimilar domains are likely to be viewed as highly original because other people would not have made that distant connection. Whether those ideas are viewed as creative or not will depend upon the extent to which the ideas are accepted as appropriate within the field (Ford, 1996). Therefore, creative thinking is initially a process of divergent thinking, and subsequently, of idea evaluation, refinement, and finally expression. However, the vast majority of 'new' ideas are probably the result of people making connections between mental elements that would fall within the boundaries of a societal domain rather than combinations from very disparate domains. Indeed, Schilling's (2005) 'small world' network model proposes that the world is indeed a small place and, given that there are certain central nodes in memory, then most nodes will be connected by a relative short path length. Subsequently, while highly significant breakthroughs may require the connection of different domains - undoubtedly similarities will exist across them.

Therefore, this difference between the combination of similar and dissimilar domains acts as the basis for the generation of big C or little c creative outcomes. The cognitive processes and strategies that result in dissimilar versus similar domain combinations may be significantly different. However, it is important also to make the distinction between creative thinking processes and creative outcomes, and this is largely dependent upon memory category combinations versus domain combinations.

Categories and Domains

There is a difference between memory categories and domains. Categories are essential for understanding the individual cognitive processes that may or may not result in creative

outcomes. Everybody has their own category knowledge that will differ at least slightly from that of other people because it is learned based upon their individual experience of the world around them. These categories will be similar, but not identical, to domains of knowledge, and it is these societal ‘domains’ which will be used to determine whether an idea is creative – both original and appropriate.

Individual Creative Thinking Processes versus Societal Creativity

An individual may undertake creative thinking processes in so far as they are merging mental elements, or thought categories, from their memory to create a new combination. However, from a societal-domain perspective those ideas may not be original and therefore will not be viewed as creative. Boden (1991) discusses this in relation to psychological (P) and historical (H) creativity. Here P creativity is where an individual develops a new idea, irrespective of whether anyone else has developed that same idea. As long as the idea is new at an individual level it is P creativity. H creativity is ideas that are entirely new to humanity and hence no one else has made that combination prior to that H idea. From a measurement and developmental perspective it is important to recognize that there could be a significant difference between creative thinking processes and creativity.

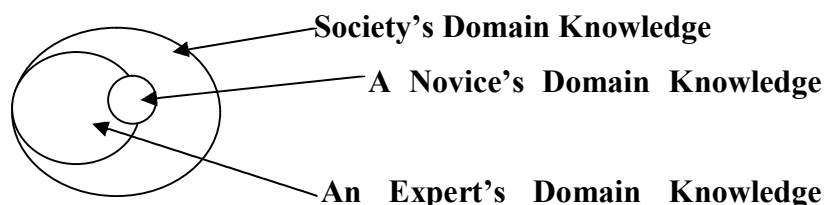
Creative thinking processes might be occurring, but the results from those internal processes might not result in creative outcomes. Essentially, there is a need to recognize the difference between individual creative thinking processes and society-level creativity. An individual could be combining their own thought categories in new and original ways, but if these idea combinations are not new to the domain they will not be perceived as creative by society.

Measuring Individual Creative Thinking Processes versus Societal Level Creativity

Ideas can be gauged as to their degree of creativity based upon the extent to which they differ on the two attributes, originality and appropriateness. However, a limiting factor will be the fact that domains of knowledge are not fixed entities and knowledge of domains differs from person to person. Because groups of people will have differing levels of domain knowledge that they use to evaluate the degree of originality and appropriateness of ideas, each group will have a slightly different view of the degree of both the originality and the appropriateness of an idea (Hocevar, 1981).

This contention is in line by the findings of Koslow, Sasser & Riordan (2003) who found that different types of advertising employees had differing views on what constituted appropriateness. At a societal-level, with total knowledge of a domain, hypothetical ideas could be evaluated objectively as to the degree to which they bring in information from more distant domains. However, this is purely hypothetical, since we cannot evaluate ideas based upon the sum total of society's knowledge at any moment in time.

Domain Knowledge Boundaries



Everyone's individual domain knowledge will differ and be a subset of society's aggregate domain knowledge. This causes difficulties for the measurement of creative ideas. When we evaluate creative ideas we do so based upon our existing knowledge of the domain - our related memory category. Subsequently, the more knowledge we have of a domain the less likely we are to evaluate the ideas of novices as original. This is because of the greater likelihood that we already possess knowledge of a similar solution. Therefore, even if those novices are combining domain knowledge in a new way at an individual level, and therefore undertaking creative thinking processes, the expert might not acknowledge those processes. We evaluate creative ideas based upon our own domain knowledge and not based upon the creative thinking processes that are being undertaken at an individual level by the idea generator.

Domain Specific Knowledge Based Evaluation of Originality and Appropriateness

If a person knows of a solution and someone else provides that solution as a creative response then that idea would be evaluated as unoriginal and therefore, uncreative. If they were unaware of that response they would evaluate it as original. Subsequently, the measurement of 'originality' is often a subjective evaluation that does not necessarily reflect an idea generator's creative thinking processes. Using expert judges to evaluate creativity requires a

determination of how the judge's knowledge biases their evaluation of a respondent's creative abilities.

Additionally, the appropriateness criterion is also a subjective criterion (Koslow, Sasser & Riordan, 2003). Any response will be evaluated based upon the judge's existing domain knowledge. An expert in one particular domain is likely to evaluate the appropriateness of an idea based upon how it fits in with their domain-specific evaluation criteria. Therefore, a creative marketing response might not be evaluated as appropriate by an expert accountant - using cost based criteria, whilst another marketer might evaluate that same response as appropriate - using customer retention criteria.

At an individual level, highly original ideas will be ideas that merge ideas from domains that are not similar for that individual. Additionally, as groups within society organize themselves into areas of common interest and research, experts in any field will have relatively similar domain knowledge boundaries. Subsequently, we would expect ideas that combine generally accepted dissimilar domains to be viewed, at an aggregate level, as highly original. For a new idea to be a big C creative idea it must be original and appropriate at a societal domain level.

Domain Boundaries

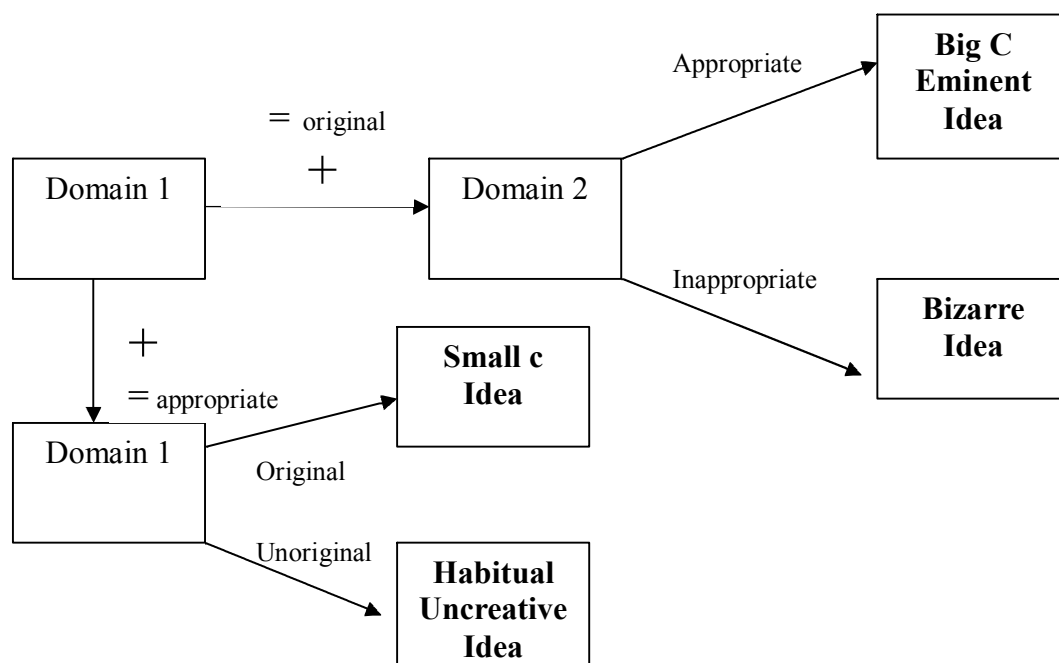
The obvious limitation of this theory relates to the definition of the boundaries of the domain. All ideas and concepts are related to some extent, and it is the extent of accepted difference between domains at any moment in time, at a societal level, that will influence the degree to which a new idea is viewed as original or not. It is a sad fact that the second person to develop the time machine will not be viewed as creative as the first creator, even if they developed the idea completely independently of each other, despite the fact, that as stated by Simonton (2003), these multiple discoveries are usually the result of socio-cultural processes. Indeed, Simonton (2003) noted the phenomenon of multiple discovery; where two or more scientists come up with the same concept simultaneous. Famous examples of multiple discovery include calculus and the theory of evolution (Simonton, 2003).

Putting together concepts that in the past were not viewed as similar will result in the need to change how people organize their thoughts on a domain, and therefore will be viewed by others as highly original. If those ideas can also be shown to suit the context of the domain in

which they are being applied, they will also be seen as highly appropriate. In trying to measure the degree of creativity of ideas we therefore need to account for the fact that an idea could be viewed as inappropriate because judges do not have the appropriate alternative domain knowledge with which to evaluate that new idea. This concept, in relation to the importance of field gatekeepers, is discussed by Nakamura & Csikszentmihalyi (2002). In their systems model of creativity the receptiveness of the field is viewed as a critical contributor to creativity. “Everyone is familiar with the case of a creative idea being ignored because the knowledge of the field lags behind that of the creator” (Nakamura & Csikszentmihalyi, 2002, p.339).

These factors have several implications for the study and measurement of creative thinking. First, eminent big C creative processes differ from minor small c creative processes - in that the former combine divergent domains at a societal level, while the latter combine similar domain knowledge in a new way. Second, an individual might be undertaking creative thinking processes, but these might not result in societal level creativity. Finally, that the measurement of creative thinking must account for these factors as well as the fact that judges must not only evaluate the creative response, but also the reasoning behind that response as to its appropriateness. The first of these aspects is illustrated in the following model. It is important to note that this is a societal level model.

Big C Eminent Creative Ideas versus little c Minor Creative Ideas – Societal Level Model



The model above illustrates the four combination options available to a person when generating an idea. What type of idea results from the idea generation process will be determined by whether combinations are made between ideas from within a domain, or ideas from different domains. Additionally, the extent to which those ideas are original or unoriginal ideas, from a societal perspective, will also influence the type of response that is generated. There are four categories of potential response; big C eminent ideas, bizarre ideas, small c ideas, and habitual uncreative ideas. It is important to note that the model is a societal level model. Essentially, the type of response that is generated will depend upon the cognitive thought processes that a person undertakes. It is also contended that these thought processes can be selected as cognitive strategies, and also learnt. This contention is given support by the increasing body of research showing the effectiveness of creative thinking techniques.

Cognitive Strategy Choice and Creative Thinking Techniques

The contention that big C creativity results from the combination of unusual domains and is a process that can be taught is given support by the research by Clapham (1997), which found that ideation skills are the primary elements measured in tests of creativity, and research shows that creative thinking skills can be enhanced through training. The growing body of research into the effectiveness of creativity training (Stokes, 1999; Scott, Leritz, & Mumford, 2004; Clapman, 1997; Lemon, 2005; Nickerson 1999). supports the contention that there are processing commonalities required for creative thinking and that these might be internally selected cognitive processing strategies. In a quantitative review of the effectiveness of creativity training, Scott, Leritz, & Mumford (2004) concluded that such training was effective across a range of settings and target populations and the effectiveness of the training appeared attributable to the training providing strategies for respondents to apply when generating creative ideas. Indeed, Ward, Patterson and Sifonis (2004) have shown that the way people approach a creative idea generation can be varied. It seems plausible therefore to posit that creative thinking may be dependent upon the cognitive processing strategy selected by the individual, and that these strategies can be enhanced through the use of training.

Therefore a method to increase creativity would be the use of creative thinking techniques that facilitate dissimilar domain combinations processes deliberately. In order to encourage

the generation of big C ideas, distant domain combination processes would be taught. Alternatively, to encourage the generation of small c ideas, within domain combination processes could be taught.

One such technique that encourages the combination of divergent domains is synetics, Gordon (1961). Synetics encourages divergent thinking by forcing respondents to make distant category connections. It is also evident that other creative thinking techniques have a similar influence on creative outcomes. Creative techniques, such as word associations or the use of metaphors, Wells, Burnett & Moriarty (2003), might well force a respondent to think across categories. The alternative to these divergent cross domain cognitive strategies, encouraged by these techniques, is the normal cognitive process whereby a respondent moves down their existing memory pathway to find a solution. Hence there are two cognitive strategy options: strategy one – cross memory connections, and strategy two within domain memory searches. For strategy one the response would be more original, but appropriateness scores would be lower, and the reverse is the case for the second strategy.

Two Types of Cognitive Processes Strategy: Cross Memory Connections Versus Domain Memory Searches

It is posited that it is relatively easy to select, or switch, between the two different types of creative thinking processes during a creative thinking task, as long as the respondent knows how. If, for example, the task was to generate a list of round objects, then strategy one would involve domain thinking processes that merely involved searching their existing memory categories, starting with a common reference point, such as ‘round’ and presenting all related thoughts in that category that come to mind, for example, round ball, tennis ball, squash ball. For strategy two, where cross category memory combinations need to occur, a respondent can bring in random unusual categories to link with the task question, for example, round could be combined with the idea ‘house’ results in doorknob, round window. Doctor and round results in swivel chair base, pills, making the rounds, etc. This would result in the combination of dissimilar domains.

Cognitive process selection relates to the proposition that a respondent is able to apply different processing strategies to a task – either cross category thinking processes or within domain information searches. Moreover the strategy that we apply may cause us to access

more remote associations given instructions, or deliberate processing. Indeed, research by Tourangeau and Sternberg (1982) indicates that when people develop ideas based upon metaphors or analogies brought up in a category search; for example a car might represent freedom or pollution, they developed more novel ideas.

Differences in Creative Thinking Processes for big C and small c ideas

The difference between these two cognitive strategies is important as it leads to the contention that there are very different, and deliberate, choices of thinking style, which can be used to solve a problem, based upon the type of outcome that is required. If we want a readily acceptable, defensible solution, then within domain thinking strategies should be used. If we want a radical solution, then cross domain thinking strategies should be applied. Stating that we can apply different thinking strategies to different tasks, even within the field of creative thinking research is not new. It has long been recognized that there are difference between types of creative thinking processes. Kirton (1976) discussed the concept of adaptability (the ability to do things better) and innovation (the ability to do things differently). Indeed, it may be that the requirements for big C versus little c creativity are in many respects contradictory to one another:

“The concept of incremental innovation is clearly different from the notion of radical change or a shift in paradigms. In fact, incremental innovation may actually serve to retard the development of decidedly new ideas, solutions, or products by focusing on minimizing variation in processes, products and services. This may be one reasons why Nystrom (1990) found that the most innovative division in his study also had a low orientation toward quality” (Tesluk, Farr & Klein, 1997, p.38).

Scott and Bruce (1994) also noted that systematic problem solving had a negative impact on innovative behaviour. However, despite the significant difference between incremental creativity and transformational creativity, most studies of creativity do not make any distinction between them in their measurement, and there has been little research into any differences. It is the contention of this article is that the best way to illustrate the difference between types of creative outcomes is to look at how domain knowledge is combined. Within-domain combination processes will result in small c creative ideas, and dissimilar-

domain combinations will result in bizarre or big C creative ideas. The first process requires convergent thinking and domain-specific knowledge, the second divergent thinking and knowledge of a range of different domains. Big C creative processes will change the parameters of the domain while small c ideas will expand the current domain.

Conclusions

In conclusion while individually we are all capable of original ideas, as we make new combinations based upon our own domain-specific knowledge, most of these ideas will not be new at a societal level. Therefore, we are all capable, to differing extents, of creative thinking processes, but very few of us will have societal level creative ideas. Fewer still will have the resources or expression skills to attain support and recognition for those ideas and achieve creativity. However, it is contended that through the use of cognitive strategies we can enhance the likelihood of generating different types of creative ideas.

In relation to big C and small c creativity, these two processes may require very different cognitive strategies. Small c creativity will require an extensive process of evaluation and re-evaluation of the existing information within a domain. From this analysis re-combinations and reorganization of information could lead to different combinations of existing domain knowledge. A focus on past information as the basis for idea development suits situations that require solutions that will be accepted, and where immediate implementation is a priority. This is the situation faced by many organizational personnel and academic researchers, "... relevant factual information may represent a fundamental requirement for creative problem solving in organizations" (Mumford, Whetzel, Reiter-Palmon, 1997, p.10).

Generating big C creative ideas may require a completely different focus than that of small c idea generation. To encourage big C thinking we would need to encourage people to look outside the domain to develop solutions that may initially not be viewed as appropriate by others. This type of thinking is hard to assess and high risk, but also high reward. However, it is critically important that we are able to make this distinction in the processing requirements as currently much of our education and training environments encourage within domain thinking strategies rather than across domain strategies. How we are teaching may well be limiting the potential for big C breakthroughs.

Over the last decade and a half Mark Kilgour has worked extensively throughout South-East Asia in both private consultancy and academic positions. His main areas of research include major thought processing theories such as categorization and cognitive structures and their application to learning, promotion, and creativity. He has also taught and researched in the area of international marketing and cross cultural training. He developed the Tourism and Hospitality program for the Chartered Institute of Marketing. His work has been published and presented in conferences in the US, Singapore, Taiwan, Malaysia and New Zealand. His Creative Framework has been taught in Singapore and Germany, and was the basis for his doctoral thesis. He recently returned to NZ to complete his doctorate and currently lectures in a variety of marketing and international management papers.

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