

The Effect of Lateral Thinking Training on Innovative-Adaptive  
Cognitive Style

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Supervisor: Dr A. M. Kellerman.

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I hereby declare that this minor dissertation is my own work and that I have not submitted it, nor any part of it, for a degree at any other university.

Signed by candidate

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## Abstract

Lateral thinking has become an important topic in business and one of the apparent solutions to the dilemma of acquiring more creativity in the organisation has been to train employees in lateral thinking. This study had three objectives. To determine whether delegates attending lateral thinking training acquired more lateral thinking skills and knowledge than those without this training. To determine whether lateral thinking training impacted on style of thinking and to determine whether preferred styles of thinking facilitated the acquisition of lateral thinking skills.

An experimental group was trained in lateral thinking. Subjects were tested on their lateral thinking skills before and after training. Subjects were also tested to assess their cognitive style before training and six months thereafter. A control group was tested in a similar fashion.

The pre- and posttests were analysed. A significant improvement in lateral thinking skill was found in the experimental group but no similar change was observed in the control group. There was no change in the the cognitive style of either the control or experimental groups as a whole.

The conclusions from this research are that lateral thinking training is effective in teaching lateral thinking skills and techniques but that these skills and techniques do not impact on cognitive style. Individuals with an innovative style of thinking seem to learn lateral thinking more readily.

This suggests that strategies for training and development concerned with improving creativity should not focus on improving the individual's way of thinking, but should focus on situation specific needs, training individuals in the skills needed to deal with these circumstances.



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## CHAPTER I

### INTRODUCTION

This study was prompted by the efforts of a multinational company to increase the level of "innovation" within the organisation. As in many large companies, the term innovation was never specifically defined and was used interchangeably with "creativity" when referring to those behaviours which initiate changes which the organisation desired.

The organisation's concerns about innovation had grown as competition for market share increased and the growth rate of many of the traditional markets in which the organisation had an interest, began to decelerate. There appeared to be two broad strategies which would lead to the growth the company wanted. One was to embark on a programme of acquisitions, a costly process, the second was to launch new products which would develop into market leaders. However, neither strategy appeared to be progressing at the rate that was desired.

In its search for some method of accelerating progress, the company chanced upon Pinchot's (1985) concept of intrapreneuring, an approach to encouraging managers to use entrepreneurial skills within a corporate environment. It appeared to be the missing link. In an effort to ensure that intrapreneuring behaviours were maximised throughout the worldwide organisation, executives were directed to set at least one intrapreneuring objective in their annual objective setting process. This directive resulted in much activity which, at least at face value, appeared to foster intrapreneuring.

One programme that appeared to be related to innovation and intrapreneuring was lateral thinking. The company had two instructors trained in lateral thinking and began offering lateral thinking training to almost any group or individual who requested it. The training was not focused on any particular category of employees, nor was there any specific organisational goal which was to be addressed.

After some months and considerable costs in travel alone, debate began to emerge as to the efficacy of lateral thinking training. Many of those who were trained seemed to find the process valuable, while others believed it to be purely academic. However, there was no systematic evaluation of the training which could substantiate or negate either argument.

It became clear that what was needed was to determine the precise value of lateral thinking training and how it might be best employed.

## CHAPTER II

### ADAPTION-INNOVATION THEORY AND LATERAL THINKING

#### The Importance of Initiating New Responses within Organisations

The individual's ability to initiate new response patterns which result in new ideas, new products or new methods, is of critical importance to organisations which function in a competitive environment.

Adaption-Innovation theory (Kirton, 1976) suggests that this behaviour is the product of an aspect of personality which is relatively stable and hence not easily affected by acute interventions such as training. De Bono's theory of patterning systems (1967), purports that human cognitive functioning which inhibits the generation of new ideas and the implementation thereof, can be overcome through learning and applying lateral thinking.

This enigma, in which one theory proposes training as a solution while another predicts it to be of little value in solving ostensibly the same problems, needs to be resolved.

So often it seems as if organisations are struggling to stay abreast of changes in the environment. Since the late sixties, scientists, have been concerned about the effects of certain chemicals on the ozone layer. Yet, only after widespread publicity resulted in significantly decreased sales, companies took

action to change the formulation of these products. Ignoring the specific effects of these products on the ozone layer, many companies could have avoided financial losses if they had researched new formulations earlier or communicated the non-toxicity of their products to the community at large in a more effective manner. So why was there a delay?

The problem is more pronounced where bureaucracy is greater. Large corporations, like railways and post offices, are often unable, if not reluctant, to respond to client needs. While a simple explanation is that red tape limits the flexibility of employees, it is employees (managers, supervisors and workers) who implement the rules, systems and procedures which constitute red tape. It seems that many individuals prefer the security of familiar response patterns rather than the risk associated with initiating new, unexplored approaches (Gryskiewicz and Shields, 1983).

Pinchot (1985) has encapsulated the problem. Referring to business in the United States, he writes, "We must continuously innovate just to stay where we are. Indeed the faster the rest of the world learns to adapt and change, the faster we must innovate to stay ahead" (p.8). Pinchot has proposed that innovation refers not only to generating new ideas but to implementing these ideas too. Frequently new ideas are produced but not implemented because of a low risk attitude and bureaucracy. Inevitably business finds itself in a paradox. It needs systems, procedures and individuals who are content to implement these, while simultaneously it needs people who are willing to take the risk of innovating and who are apparently frustrated by bureaucracy. This latter group of people seem motivated by everything that the large bureaucracy does not offer! Pinchot has argued that "innovators" are motivated by achievement rath-

er than the accumulation of wealth. They shun authority, preferring an environment which allows them independence. They are intuitive people who choose to rely on their own judgement rather pursuing systems and paying attention to the minutia of organizational procedure. Innovators are dedicated to their personal vision, paying little heed to objections to their intentions. They are confident, self assured and not unduly affected by resistance to their innovations. Ultimately, the bureaucracy in organizations tends to frustrate these people which culminates in their leaving. Pinchot has proposed that a major issue for many organizations is how to attract and retain innovators.

#### Intrapreneuring

Pinchot's (1985) solution is intrapreneuring. In essence, intrapreneuring means identifying innovators and providing them with the conditions to effectively use their skills in an environment which they find satisfying. He has proposed that such an environment can be developed by communicating a clear vision of what the company requires, replacing red tape with responsibility, correct career path placement for intrapreneurs and encouraging managers to become intrapreneurs. He suggests that an individual can become an intrapreneur at any point in a career and that the behaviours which characterise an innovator are not heavily dependent on the individual's personal history.

Pinchot (1985) has encouraged organizations not to force managers to become intrapreneurs but to allow self selection, not to impose projects upon intrapreneurs but to permit them to pursue their own projects, to remove political barriers to this type of behaviour and to foster cross functional exchange of ideas.

The prospect of intrapreneuring seems an attractive solution to the dilemma of rapid change, but it raises a number of pertinent questions. If an organization begins a formal campaign of encouraging innovators to come forward, will they find sufficient people with these characteristics? People with styles of thinking which differ markedly from the norm do leave the organization (Kirton and McCarthy, 1988). How does the organization acquire sufficient numbers of innovators in this event? Pinchot (1985) has suggested that they can be developed which implies that training is one answer to the problem. But many of the personal characteristics Pinchot attributes to innovators appear to be aspects of personality. Can everyone be trained to be an innovator? These questions need to be answered before investing heavily in training and raising management and employee expectations.

Whether or not individuals can be trained to be innovative hinges on whether innovative behaviours are a component of personality or are skills which can be learned and internalised, much like riding a bicycle is or playing golf.

#### A Definition of Initiating Behaviour

The organisation needs new initiatives in the form of improved methods, products and services to ensure its competitiveness. The source of these new initiatives is human behaviour. Such behaviour has been labelled with numerous terms. De Bono (1985b) has noted that the word creativity has frequently been used to describe behaviour in which new or unusual ideas are generated. He has indicated that this can lead to confusion as the verb to create is also used to mean to fabricate, for example, to create a noise. Nevertheless, while de Bono

frequently uses the term lateral thinking to describe the covert behaviour underlying the overt generation of novel ideas, he continues to use "create" as well, seemingly interchangeably. Pinchot (1985) has used the term innovation to describe similar behaviour while Basadur, Graen and Green (1982) have used creative problem-solving. Furthermore, Kirton (1976) distinguishes between two different styles of thinking each of which are capable of creating new responses.

In order to avoid confusing the different concepts, the term initiating behaviour will be used to describe those behaviours which attempt to generate and implement new ideas within the organisation.

#### Adaption-Innovation Theory

According to adaption-innovation theory (Kirton, 1976), problem-solving and decision-making behaviour and the degree to which initiating behaviour is incorporated into such activities, is determined by cognitive style, a component of personality. Hence, cognitive style is unlikely to be affected by a training intervention.

#### Cognitive Style

A problem or decision that is to be made exists within certain parameters. These may be formally prescribed in the form of rules, procedures, guidelines and laws, or they may exist in less tangible form, for example, norms, values, traditions and assumptions. The situation parameters define a paradigm. Problem-solving and decision-making behaviour varies along a continuum, which

extends from adaptive at the one extreme to innovative at the other (Kirton, 1976).

Adaptors tend to approach problem-solving and decision-making within the existing paradigm. They look for ways of improving current methods and systems. Innovators solve problems and make decisions by attempting to change the paradigm. For example, where traditionally discounts have been offered to all clients in the hope that it would stimulate sales, the adaptor may attempt to improve sales by reviewing the periods during which such discounts are offered, the percentages offered and which products are discounted. The innovator, on the other hand, may endeavour to improve sales by using the discount as a bargaining element in negotiations with clients.

Adaption-innovation theory emphasizes two points. Firstly, adaptive and innovative behaviours are determined by cognitive style and both are creative. Adaptors direct their creative efforts toward integrating new and unexpected stimuli into existing paradigms, thus extending the paradigm (Kirton, 1978b). Innovators show little concern for the existing paradigm and channel their creative efforts toward finding solutions which are outside of the conventional framework.

Secondly, cognitive style must be differentiated from level of creativity. Using a sample of 415 sixth form students, Kirton (1978b) correlated scores on the Kirton Adaption-innovation Inventory (KAI) with five intelligence and general creativity tests. KAI scores (lower scores are more adaptive, higher scores more innovative) correlated weakly with the other tests supporting the hypothesis that style of creativity and level of creativity have little relationship. In a similar study, Goldsmith (1987) concluded "...Kirton's argument is broadly

supported. Two factors emerged from the analysis, one dominated by the KAI and the other by [Something About Myself]. These may be labelled in accord with Kirton's theory as 'style' and 'level'" (p.321).

The innovator adaptor distinction is non-pejorative, neither style is preferred over the other (Kirton, 1976). Innovative solutions are not always the most appropriate. Adaptive solutions may be relevant as often as innovative ideas. Where a company has experienced continued growth for an extended period of time, the business may have become complex. The priority in this case may be the integration of diverse concepts rather than continued change and adaptive skills are more relevant to this task. Clearly, as a company develops it needs innovative and adaptive responses and both innovators and adaptors can be change agents (Kirton, 1984).

Research supports these perceptions of innovators and adaptors. Goldsmith (1984) has found significant correlations between high scores on the KAI (i.e. scores tending toward the innovator extreme) and sensation seeking, suggesting that innovators seek stimulation in varying contexts, disregarding existing structures. Moreover, innovator oriented scores have correlated positively with scores on measures of risk taking, suggesting a tendency to challenge. As expected Goldsmith found a weak negative correlation between scores on innovation and scores on measures of dogmatism. Goldsmith (1985) also reported a significant correlation between scores on innovation and scores on the intuitive pole of the Myers-Briggs intuition-sensing dimension and has recorded that:

A consistent picture emerges of the intuitive innovator who pays little attention to routine details, welcomes the new and different,

and generates many novel ideas, contrasted with the equally creative sensing-adaptor, who watches the details, works routinely and steadily, preferring standard solutions to problems (p.102).

### The Kirton Adaption-Innovation Inventory

Kirton (1976) developed a scale, the Kirton Adaption-Innovation Inventory (KAI), which locates individuals on a continuum of cognitive style. Kirton reported a normal distribution of scores, which means that most people are neither purely innovator nor adaptor but are likely to exhibit a combination of both types of behaviour, with one style dominating.

Factor analysis (Kirton, 1976) has revealed that the scale is composed of three factor traits, each correlating with the overall KAI score.

Sufficiency v Proliferation of Originality. Individuals located toward the adaptive pole on this factor, generate fewer ideas than innovators. They are able to produce a limited number of ideas of a practical nature, a tendency which seems quite satisfying to the adaptor (Kirton, 1977a).

Those located to the innovative pole tend to produce numerous new ideas and seem to take pleasure in this activity. Many of the innovator's new ideas will not be pragmatic and hence never utilised, a fact which seems of no consequence to this type of person.

Efficiency. People with more adaptive scores on this factor may show a preference for precision, reliability, systematic organisation and thoroughness. They readily pay attention to detail and conduct logical, in depth analyses.

Innovators are not inclined to perform in this manner. They are initially inefficient and dislike routine, maintenance tasks.

Rule/Group Conformity. Those scoring below the mean tend to prefer to operate within clearly defined parameters, according to rules and seeking consensus. As such they constitute good team players who are prudent, disciplined and conforming. The more innovative are independent, resolute and seemingly insensitive to group norms and expectations. They prefer to generate and work on their own ideas.

Of particular significance is the proposition in this theory that in order to initiate new responses the individual requires more than just the ability to generate new ideas, the individual also requires independence, self sufficiency and an imperviousness to existing norms. The initiator needs to be more concerned with implementing a new idea than achieving perfection.

#### Cognitive Style and Organizational Performance

How the organization responds to changes in its broader environment and how individuals relate to one another may be determined by the distribution of adaptors and innovators within an organisation.

#### Relationship Issues between Adaptors and Innovators

Differences in behaviour can be noticed where individuals are more than six points ( $\approx$  SD) apart on their scores as measured by the KAI (Kirton, 1977a), and may express irritation at each others' idiosyncrasies when more than 12 points (1 SD) apart.

Innovators are seen by adaptors as abrasive and insensitive (Kirton, 1976; 1977a) because of their disregard for group values and customs. They may be perceived as trouble makers and rebels because of their endeavours to introduce untried ideas. Innovators perceive adaptors as being dogmatic, inflexible, conservative and wedded to the current system (Kirton, 1976; 1977a).

Superior-subordinate Relations. Innovators have suggested that adaptors are yes-men, individuals who readily agree with their bosses wishes despite their own feelings or what is clearly needed (Kirton, 1977b). Adaptors do quickly reach consensus with others, including their bosses, but the reason does not appear to be because they are yes-men, rather it seems due to their preference for working within the current paradigm. Adaptors learn and accept the acknowledged parameters of the business in which their superiors have a vested interest and hence agreement is more easily reached.

Gerhardt and Cashman (1979) noted a greater degree of cohesion in groups reporting to leaders who were innovators, but that these leaders experienced less control over the group. The explanation appears to be that where a team works within a given paradigm there is a sense of cohesion in some part due to acknowledged roles, norms and responsibilities. Innovative leaders may be insensitive to the accepted roles and group behaviour and attempt to introduce changes sporadically. The cohesive team's resistance to these efforts may be interpreted by the leader as a personal lack of influence.

Proposals for change. As the work context changes, for instance, customer profiles change, organizations become more complex, competition increases and technology makes inroads into the business, the organization must make corresponding changes in the way it operates. However, these initiatives are frequently hampered by delays, objections to the detail of the proposals or rejection of the individual proposing changes (Kirton, 1984). This resistance to change occurs because adaptors discern the stimulus for change within the existing paradigm, while adaptors search for stimuli outside of it.

Hence solutions focused on extra-paradigmatic stimuli tend to be rejected by more adaptive groups while proposals aimed at intra-paradigmatic stimuli are seen as inappropriate by innovator groups. Frequently, it is not simply the proposal which is rejected, but the proposer as well, due to the prejudiced perceptions that adaptors and innovators may have of one another.

#### Cognitive Climate

The distributions of innovators and adaptors within organizations tends to be skewed toward one or other pole, indicating a group preference for a particular cognitive style (Kirton and McCarthy, 1988). This preference for a style within a group is referred to as cognitive climate. If individual cognitive style is a component of personality and therefore relatively stable, then cognitive climate cannot be explained by learning and experience, but must be attributed to a form of natural selection. Individuals with similar cognitive styles are generally recruited and where the style varies too greatly from the group norm, that individual will experience pressures which culminate in him or her leaving (Kirton and McCarthy, 1988).

Anomalies do occur. Individuals with different styles from that of the host group will be observed. Kirton and McCarthy (1988) have proposed that these individuals may be transient group members who have just joined the organisation or who are in the process of leaving. A further explanation is that they may have found a niche. For example they may be needed for their highly developed technical skills and are consequently tolerated by core group members. Skewed distributions may be found within sub-groups, for example, marketing, sales or manufacturing which can impact on inter-group relations (Kirton, 1980). Where a company as a whole is experiencing difficulties, the proposed solutions from groups with different cognitive climates are likely to differ and the potential for inter-group conflict increases. As pressure to solve the problem increases, so adaptor and innovator oriented groups retreat toward extreme behaviours and the level of conflict escalates. However, Kirton has proposed that the potential for conflict may be reduced if adaptors and innovators grow to understand how and why their behaviour differs, and the value of the different styles of behaving and thinking to the organization.

#### Implications for Initiating Behaviour

In terms of this theory, initiating behaviour may be limited by a number of factors. The individual's own cognitive style may be one such limiting factor. The prevailing cognitive climate may discourage this type of behaviour, while differences between leader and subordinate play an inhibiting role as well.

It appears that an organization which manifests less than optimal levels of initiating behaviour may have an inappropriate cognitive climate. The solution to this lies in altering the mix of cognitive styles through planned selection rather than training.

In terms of adaption-innovation theory, the role training plays is largely confined to assisting group members to understand differences in cognitive styles within the work group, to stimulate already existing abilities to generate new ideas and possibly to provide coping skills to those who infrequently need to play an "innovative" role.

Furthermore, this theory suggests that Pinchot's (1985) idea of intrapreneuring is not likely to succeed, unless a largely adaptive group can be persuaded to accept the actions of individual innovative intrapreneurs. This is a tautological proposal as the very essence of the problem is that the prevailing cognitive climate will not tolerate different cognitive approaches.

#### Lateral Thinking and the Theory of Patterning Systems

An alternate explanation of initiating behaviour is that it is learned behaviour. It has been suggested that such behaviour is not governed by personality (Ettlie and O'Keefe, 1982), and can be significantly modified through the acquisition of relevant attitudes, knowledge and skill, either in a non-deterministic fashion through experience, or in a formal manner, for example, through training.

From the premises of the theory of patterning systems, de Bono (1967) has argued that individuals can learn to overcome the limitations which individual cognitive processes place on initiating behaviour, by using lateral thinking.

#### The Mind as a Self-organizing System

De Bono (1978) has noted that there are ample opportunities for the introduction of new ideas, in spite of which there are disproportionately few examples of where this has happened. This may be due to any combination of a number of reasons. The environment, possibly through pressure to deliver objectives, may discourage behaviour which seeks to generate new ideas. Complacency in the corporate environment may promote a fatalistic attitude placing the company at the mercy of the market. Executive style may discourage risk taking. Government bureaucracy, market size and legislation may hamper initiating behaviour. Nevertheless, the greatest limitation on such action is failure to perceive opportunities.

Failing to perceive opportunities is due to the manner in which the mind processes information (de Bono, 1971). The mind is an information handling system in which data organizes itself rather than being consciously organised by the individual (de Bono, 1971). This self-organizing process is an information handling system which de Bono has called "a patterning system". De Bono (1971) has argued that through perception, information is received. This information is imprinted on the mind, forming a pattern, much as hot liquid which falls on ice will create a channel. The patterns are determined by the sequence in which information is received and constitute a template which determines how future information is assimilated. Because the pattern has a definite logic it dictates expectations. "A pattern is anything where items of information hang together and so give an expectancy" (De Bono, 1971, p. 19).

### The Value of a Patterning System

De Bono (1971) has proposed that patterning has advantages for the individual. The world presents a myriad of stimuli, which cannot be assimilated and interpreted simultaneously. The individual has to focus on those few elements which are of immediate importance, and the mental patterns act as a template to filter and interpret data. Patterns, in as much as they determine expectations based on previous experience, facilitate anticipation of both noxious and positive consequences, for example, a dark alley triggers the anticipation of attack, enabling the person to take avoidance action or a customer asking questions about how soon a product could be delivered initiates anticipation of intent to purchase. It facilitates code communication. The pattern contains the detail of a concept which can be labelled with one word without which one would have to describe each element in detail. It facilitates an awareness of spatial and temporal relations and constitutes the foundation of personal beliefs.

### The Disadvantages of Patterning Systems

De Bono (1971) has noted that patterns have disadvantages too. Because they are formed unconsciously, one is not aware of their boundaries and consequently unaware of how such boundaries constrict perception. Patterns form the basis of implicit assumptions. When moving from one context to another, one runs the risk of basing expectations on inappropriate assumptions. Finally, patterns are resistant to change which may result in one using redundant assumptions in a fast changing environment.

### The Nature of Lateral Thinking

Because the individual's thoughts, concepts and behaviours are a product of a patterning system, "an idea can never be the best arrangement of available information" (De Bono, 1971, p. 38). The very essence of lateral thinking is to change existing, redundant concepts and perceptions which continue to govern thinking (De Bono, 1985). This aim is largely achieved through two broad processes, escape and provocation.

#### Escape

Escape means identifying the dominant ideas and assumptions underlying any particular concept and severing these restrictive bonds. A simple riddle may highlight the process of escape. A cowboy travels by horse in a westerly direction, riding for 24 hours. He leaves on Sunday. After a 24 hour visit he returns. The return leg endures a further 24 hours and he arrives on Sunday. How can this be explained? While the assumption is held that Sunday is a day in the week, the riddle cannot be solved. Only when one escapes from this notion does it become clear that Sunday may also be the name of the horse. Escape demands believing that there are alternatives and investing energy in a search for alternatives beyond the first few that are uncovered. It means broadening the context and escaping from conceptual prisons (de Bono, 1971).

#### Provocation

Provocation is the process of clearly deferring judgement and generating ideas. It involves looking to see where ideas will lead rather than what they mean. It generates a direction rather than following one. No matter how absurd the statement, if used as a provocation, ideas can flow from it. For

example, the statement 'cars should have square wheels', when used provocatively should not be evaluated and the abnormality of the statement must be ignored. What should be observed is that square wheels inhibit movement, which gives rise to the question of how to reduce the friction between tyre and tarmac on everyday vehicles.

Lateral thinking is a style of thinking by which the limitations imposed by patterns can be avoided and new ideas produced.

#### The Difference between Vertical and Lateral Thinking

Vertical and lateral thinking are two extremes of a continuum:

Lateral and vertical thinking are two opposite poles but there is a spectrum between them. Any particular mental step may fall somewhere along that spectrum. It may be pure lateral thinking or pure vertical thinking, but it is usually something in between (De Bono, 1971, p. 5).

#### Characteristics of Lateral Thinking

Lateral thinking is generative. It does not recognize any solution as adequate but searches for new solutions, never trying to prove, but simply exploring. Lateral thinking is based upon the movement idiom as opposed to the judgement idiom in vertical thinking. The movement idiom is a way of thinking which not only defers judgement, but demands that a thought is pursued to see where it will lead. Lateral thinking is contrary to normal habits of thought and consequently it demands confidence that the exercise may lead somewhere valuable.

### Characteristics of Vertical Thinking

Vertical thinking is selective, judging and evaluating. It sets out to prove and establish relationships, searching for specific answers to specific questions. Vertical thinking is the type of thinking which is promoted by formal education. It depends heavily on the ability to analyse events into component parts, and those into subcomponents. At each stage analysis needs to be complete, accurate and precise. The purpose is to identify an answer to a problem and once an acceptable answer is found further search becomes superfluous.

### Lateral Thinking and Personality

Quite clearly initiating behaviour cannot be solely determined by the acquisition of skill and knowledge. De Bono (1971) has recognised the existence of different personality types, "the creative temperament" with an affinity for generating new ideas and "an implementer" with a propensity for analytical thinking.

### The Creative Temperament

The creative temperament values an idea for its newness and originality quite apart from the actual pragmatic value of the idea. This type of personality has difficulty in dealing with routine and the conventional. It appears that interest in the idea itself is sufficient to grasp attention of this type of personality and de Bono (1971) has suggested that there is a tendency to be impractical and a reluctance to test the idea. Such people may be difficult to work with, finding trouble in getting their ideas accepted or working within a team. They do seem to have a strong ego with the confidence to pursue ideas which are usually outside of the norm (de Bono, 1971; 1967). De Bono has ex-

plained that the creative temperament is independent of intelligence. "This capacity [for generating new ideas] does not seem to be related to sheer intelligence but more to a particular habit of mind, a particular way of thinking" (1967, p. 20).

### The Implementer

De Bono (1967) has suggested that there is an extreme type of personality which compulsively tries to control what goes on in the mind. This type of personality prefers everything to be logically analysed and integrated. There is an attempt to achieve an extraordinarily high level of precision and accuracy. The implementer is thorough and pragmatic. Though this individual appears to work upon other peoples ideas it may not be because of an inability to generate new ideas, but because of a sense of urgency which moves him or her to action.

However, in spite of the existence of these temperaments, de Bono (1971) has insisted that lateral thinking can be learned, and can become a habitual way of thinking, requiring no extra effort and which can be learned, irrespective of personality or level of intelligence (de Bono, 1967). He has acknowledged that some will be better than others at lateral thinking and that individual capacity will be of assistance in learning. Furthermore, he has said that lateral thinking is not needed at every turn in daily life and that much of the time various types of vertical thinking will be needed. However, he has been emphatic that the individual can learn to discriminate when a particular type of thinking is needed and how to think in those circumstances much like an actor changes roles from real life to that of the personality represented on stage (de Bono, 1985b). Closely linked to this philosophy are the methods of learning lateral thinking.

### Lateral Thinking Training

De Bono (1971; 1967) has been adamant that lateral thinking is not simply a series of techniques to be used to generate ideas in a given context. It should become a habitual way of thinking. This is the fundamental aim of lateral thinking training and the methods used are specifically intended to achieve this goal. The lateral thinking training process focuses on three areas: attitude, technique and skill and the use of an operational word "po".

#### Attitude

Attitude, in this context, refers to an awareness of the limitations of vertical thinking and the benefits of lateral thinking. This attitude would include a realisation that one forms unconscious assumptions on a particular subject. Moreover, it must be understood that concepts develop without deliberate thought and that these concepts limit the individual's range of responses. An appropriate attitude would incorporate comprehension of the difference between vertical and lateral thinking and when each is relevant. There should be an awareness of the dangers of precluding the search for further ideas because of content with what is already available. Attitude, as it is used in this context, includes the need to avoid conceit over an idea and the realisation of the necessity of using ideas and modifying them over time (de Bono, 1971).

#### Techniques and Skills

Techniques and skills enable the individual to learn and practice lateral thinking even if there is little agreement with the principles upon which it is based. Because de Bono (1971) has developed a variety of techniques it permits

people to select those with which they feel more comfortable and to ignore others. It is not essential, and quite unlikely, that each and every technique will be learnt and utilised. Techniques and skills in lateral thinking are the vehicle through which lateral thinking is learnt. While they can be used in specific settings, fundamentally, they provide the means for practising and internalising lateral thinking habits.

De Bono (1971) has described five categories of techniques. The first category of techniques aim to simplify the recognition of current ideas which inhibit finding alternatives. Dominant ideas are the thoughts, solutions or options which seem unavoidable in some circumstances. For example, it may seem impossible to a manufacturer to sell his products unless he uses one or all of the three major chains of retailers. Tethering factors are similar to dominant ideas, but whereas dominant ideas govern the organization of thought, tethering factors are more subtle issues common to all ideas but hardly made explicit. Many organizations assume that goods must be of a high quality. This is a tethering factor. Polarizing thoughts dissect an argument into two opposing issues, for example, if a foreign sports team tours South Africa it is pro apartheid, if it does not it is anti apartheid. In some situations, boundaries are self imposed. A Belgium company may falsely assume it cannot sell its products in France by interpreting a national boundary as an economic boundary.

The second category sets about initiating change through avoidance. De Bono (1971) has referred to these techniques as an attitude in which one consciously attempts to forget the current idea. This can be achieved by challenging (de Bono, 1985a) the issue and asking "why?". Why do they have to sell through the existing trading channels, why can they not use alternative sources, why are

there insufficient alternative sources? It can be achieved through the simple rotation of attention. By systematically concentrating on the positive aspects, then the negatives and then any other area, this effect can be achieved. Changing the point of entry is another technique (de Bono, 1971). Instead of searching for the next step, one can project into an ideal future and then search for a means of achieving that state. By querying the function or purpose of a particular object or process, the underlying concept can be changed (de Bono, 1985a). Similarly, by finding elements of a concept, alternatives may be uncovered.

Attempting to change the direction of thought from within the subject matter represents the third category of techniques (De Bono, 1971), and is based on use of the movement idiom and provocation. Provocations can be established in many ways. Distortion is one method and exaggeration is another. For instance, aeroplanes conventionally have the cockpit positioned at the front of the fuselage. A provocation would be that aeroplanes have cockpits positioned to the rear of the fuselage. The movement idiom is used by considering possible benefits of the provocation, for instance, it may be safer for the pilot, what difficulties would have to be managed, how the provocation differs from the conventional and what principles are suggested by the provocation (de Bono, 1985a).

The optimal use of provocations demands deferred judgement and continuous search for new ideas. Provocations must be bizarre. Provocations which are too close to the conventional do not appear to have the same generative power as those which are unusual.

The random use of discontinuity represents the fourth category. In this category of techniques the regular chain of thought is interrupted. This can be done through the chance introduction of external stimuli, for example, simply walking around a toy shop and allowing observations to stimulate the generation of ideas. Similarly, in talking to others new ideas can be introduced.

Discontinuity can be deliberately sought and this represents the final category of techniques. One can consciously make an analogy of the subject and then work through the analogy. Random input is a specific technique within this category, in which one randomly finds a concept and then through associations with the concept, its features or functions, generates new ideas (de Bono, 1971).

#### Po

De Bono's 'new operational word' is po. Fundamentally, it should be classified as part of the provocation techniques, but de Bono (1971) has referred to it as one of the components of lateral thinking method. "Po bears the same relationship to lateral thinking that 'No' does to logical thinking" (de Bono, 1971, p. 50). He writes that po is a part of words such as 'suppose', 'potential', 'poetry' and 'possible', all of which may be associated with the movement idiom. The prime purpose of the word is to act as a conditioned stimulus, initiating appropriate lateral thinking attitudes and frames of reference. Hence de Bono (1971) recommends that it is used prior to statements of provocation, so that the judgement idiom is avoided and the movement idiom is invoked.

Implications of Lateral Thinking Philosophies  
for Organisational Performance

Lateral thinking and vertical thinking are the two extremes of a continuum, which describes the way in which individuals think. Lateral thinking is not valued above vertical thinking. Both types of thought are needed on different occasions, however, vertical thinking is used most frequently. In most cases an individual's thought will be characterised by a combination of both types of thinking.

Irrespective of personality, the individual can learn how and when it is appropriate to use lateral thinking. However, as lateral thinking is not intended to be used solely as an idea generating technique but as a habitual way of thinking, it is important that the individual learn to discriminate when to use lateral thinking.

Consequently, it could be expected that upon the completion of lateral thinking training, the individual should have an improved capacity to use lateral thinking. As the individual employed a blend of lateral and vertical thinking prior to training, the ratio of use of lateral thinking in comparison with vertical thinking should be altered in favour of lateral thinking.

If this argument holds true, then lateral thinking training is a strategy of value to organisations who wish to stimulate initiating behaviour.

### Research on Training Initiating Behaviour

The assumptions implicit in lateral thinking training are that if the trainee perceives the potential benefits of this type of thinking, there will be an incentive to continue to practice it in daily life, and to ultimately internalise the skill. While this is an attractive logic, there is no empirical evidence to support the efficacy of this specific methodology.

There is some support that training intended to improve initiating behaviour, which is commonly referred to as creativity training, has an effect on behaviour (Mansfield, Busse and Krepelka 1978).

However, research into "creativity training" is plagued by conceptual and methodological problems. It is often conducted in laboratory environments while in real life situations sample size is frequently too small to make meaningful generalizations. The criteria for creative behaviour in many research endeavours is ambivalent and single trainer situations confound efforts to establish the relationship with a specific independent variable. Moreover, there is little evidence to support the contention that the newly learned behaviours are transferred to the working environment and become permanent.

Tests of divergent thinking have been used to show positive gains (Mansfield et al., 1978) but these apparent gains are seldom reflected in real life achievements. This apparent contradiction may be explained by Kirton's (1976) research which indicates that there are at least three sub components of cognitive style, sufficiency vs proliferation of originality; efficiency or thoroughness and rule/group conformity.

Innovators show a low preference for structure and efficiency, in other words, precision, system and detail. Often, training intended to improve the individual's ability to generate and implement new ideas concentrates on improving proliferation of originality without attempting to alter preferences for thoroughness and structure. However, should courses invest effort in this area, these constructs appear to be integral parts of an individual's personality and it seems unlikely that they can be easily changed (Kirton and McCarthy, 1988).

#### Complete Process Creativity Training

Basadur, Graen and Green (1982) have noted that a further flaw frequently found in research on training in "creative problem-solving" is that "complete process creativity training" has not been studied. Research has concentrated on the effects of techniques such as brainstorming.

Complete process training is based on the assumption that initiating behaviour passes through three phases. Problem-finding is the first phase in which the individual needs to perceive an opportunity to use creative behaviour. Failure to perceive the discriminant stimulus for creative problem-solving behaviour will not result an appropriate response, even though the relevant skills may be well developed.

The next phase is problem-solving where there is an effort to generate viable solutions. Finally, there is the phase of implementation during which the ideas generated, must be put into effect.

Each phase in this complete process should be characterised by ideation and evaluation (Basadur et al., 1982). Ideation, which appears to be similar to de Bono's (1971) concept of the movement idiom, refers to the ability to generate many ideas and the willingness to invest energy in searching for alternatives when it seems that no more are at hand.

Evaluation, which is akin to de Bono's (1971) judgement idiom, is the process of assessing the value or worth of an idea or suggestion. It includes determining whether a proposal will fit into an existing framework and whether the investment of time and resources is worth the anticipated return.

Ideation and evaluation should occur at each phase of thinking. Most people find the ideation steps more difficult. This is because people are educated to evaluate (Basadur et al., 1982). There are differences in individuals' capacities to execute the "complete process of creativity". Basadur et al. have proposed that training should be aimed at bolstering specific individual weaknesses, that is, ideation for those who find generating ideas more difficult and evaluation for those who find analytical and judgemental behaviour more elusive.

Basadur et al. (1982) researched the effects of complete process creativity training in an applied setting. 32 engineers, managers and technicians were selected randomly and assigned to experimental and control groups. Another 13 were selected and assigned to further control group, to complete a Solomon Four type experimental design. Basadur et al. hypothesized that training would result in increased preference for ideation, increased practice of ideation, improved problem finding performance and improved problem solving performance.

The effects of training were assessed through questionnaire and content analysis of taped interviews immediately after training and two weeks later. They found support for the hypotheses that training and preference for ideation in problem solving were related, but not in problem finding. In addition support was found for the hypotheses that training would impact on the practice of ideation in finding and solving problems. While there was support for the proposal that problem finding performance would be improved by complete process creativity training, problem solving performance did not improve. The researchers concluded that:

There is evidence of changes in cognitive (e.g. time spent in different modes of thinking), attitudinal (e.g. openness to ideas), and behavioural (e.g. number of negative judgements made on ideas, not jumping to conclusions) processes. All three arenas appear actively involved in this training. Because the effects of training are more likely to endure when multiple aspects of behaviour are influenced, the authors are encouraged by this generalizability (Basadur et al., 1982, p. 65).

However, it is not clear why, although the training affected preference for ideation in problem solving, it did not impact on preference for ideation in problem finding. It may be that the individual's focus of perception is governed by more enduring constructs which are impervious to acute interventions such as two days of training. Furthermore, problem solving performance was not improved. An explanation for this is that problems are maintained by the existing structures, and to improve problem solving behaviour demands an increased level of confidence and self assuredness over and above improvements in behaviour associated with ideation.

Basadur, Graen and Scandura (1986) have argued that "...unless attitudes toward divergent thinking are positive or become positive, such training is not likely to result in changes in behaviour back on the job" (p. 612). This means changing well established beliefs and assumptions, and possibly a component of perception. Basadur et al. (1986) have attempted to change such attitudes through training. Their research focused on two aspects of this attitude, a preference for ideation and the tendency to make premature judgements. The research, a quasi-field experiment conducted with 65 manufacturing engineers, supported their hypothesis that training results in increased preference for ideation and deferred judgement. What is of significance is that the tendency to defer judgement began to extinguish after ten weeks, suggesting the tentative nature of the change in attitude.

Basadur and Finkbeiner (1985) have noted that the concept of ideation is a complex one. They perceive it as comprising both cognitive and attitudinal dimensions, each having a passive and active component. Passive attitudes refer to a low tendency for premature critical evaluation while the passive cognitive dimension is an understanding of how to defer judgement. Active attitudes trigger ideation and are characterized by a high value of the ability-to generate novel ideas. Active cognitive understanding triggers ideation. It is the practice of extended effort and the actual use of techniques.

No explanation has been provided as to how these attitudes and cognitions are formed and maintained, but implicit is the assumption that knowledge is the key to changing attitudes and cognitive processes.

### Implications for Organizational Performance

The research supports the contention that appropriate training can result in the acquisition of skills in "creative problem-solving". Moreover, there is some support for the suggestion that "attitude" to "creative problem-solving" can be changed through training. However, it does appear that such attitudes and behaviour may extinguish without appropriate schedules of reinforcement. There is, therefore no conclusive evidence that training can result in a permanent change in attitude to creative problem-solving or ongoing use of creative problem-solving skills.

### The Relationship between Lateral Thinking and Cognitive Style

De Bono (1971) has recognised two different personality types, the creative temperament and the implementer. These personality types bear similarities to Kirton's (1976) innovator and adaptor, although de Bono does not explicitly describe these personalities as opposite extremes of a continuum.

Vertical and lateral thinking bear similarities to innovative and adaptive cognitive styles as well. However, whereas Kirton (1976) has proposed that cognitive style is an element of personality, de Bono regards lateral thinking as a way of thinking which can be learned and applied by everyone, irrespective of personality. He regards lateral thinking as having the potential to have "...a permanent effect on that person's attitude towards creativity." (De Bono, 1985b, p. 162). Furthermore, while de Bono has acknowledged that there will be individual differences in capacity to learn lateral thinking, he appears to assign little importance to contextual issues which may inhibit the practice of

lateral thinking. It does appear that de Bono perceives the individual's skill at lateral thinking as being the key to increasing the frequency of initiating behaviour in an organisation, whereas Kirton perceives personality and cognitive climate as being key.

If lateral thinking had been described as a series of techniques to facilitate the generation of new ideas, the process would be congruent with adaptation-innovation theory. However, because it has been suggested that lateral thinking results in a habit of thought which can become a permanent feature of an individual's thinking this suggests that cognitive style can be changed.

#### Lateral Thinking Training and Cognitive Style

If lateral thinking training is effective and results in a change in attitude, and if lateral thinking becomes a habitual way of thinking rather than a series of responses to a specific stimulus, then one would expect a change in cognitive style. Should there be no observable change in cognitive style, this would suggest one or more of at least four alternative explanations.

Firstly, there may have been a passive change in attitude to "creativity". In other words, the subject may have acquired a more favourable view towards the topic but does not act differently. Such a change would mean that lateral thinking training is of value to the organisation in as much as it promotes an understanding of the need for more initiating behaviour, but does not necessarily facilitate increased frequencies of occurrence of initiating behaviour in the individual.

Secondly, change may have occurred but it is not of sufficient magnitude to register a change in cognitive style. In such a case the value of the training as a solution to insufficient initiating behaviour must be questioned.

Thirdly, skills and attitudes may have been acquired, but these behaviours are only manifest in response to specific discriminant stimuli with particular schedules of reinforcement. In this case value from an increase in initiating behaviour can only be derived if a series of specific stimuli and schedules of reinforcement are introduced in conjunction with the lateral thinking training.

Fourthly, there may have been the predicted acquisition of lateral thinking skills, but failure to practice the skills resulted in the skills extinguishing. This would be the consequence if no schedule of reinforcement was introduced subsequent to the training.

#### Possible Consequences of Changes in Cognitive Style

Should cognitive style show a significant change after lateral thinking training, then it can be assumed that either personality has been affected, or that cognitive style is not totally a component of personality.

While such changes would apparently reinforce the value of lateral thinking training to the organisation, the implications of this powerful form of training has to be considered as well. The individual's performance, with its particular combination of adaptive and innovative behaviours has benefits for the organisation. Permanent changes to behaviour patterns could negatively impact the positive aspects of performance. More importantly, such changes could

impact on relationships outside the workplace. Innovators and adaptors can have negative perceptions of each other which impact on relationships (Kirton, 1977a). However, it is likely that a level of understanding is ultimately reached and the relationship achieves a stability. A change of the prevailing cognitive style of one or more parties would destabilize the relationship affecting family and social groups.

Clearly, there is an incongruence between the philosophies underlying lateral thinking and the theory of cognitive style. This incongruence needs to be resolved for the benefit of human resource practitioners who need to determine appropriate strategies in applied settings and for the benefit of further research into the subject of training and initiating behaviour.

## CHAPTER III

### THE STUDY

#### Objectives of the Study

The literature suggested that training aimed at improving initiating behaviour, such as lateral thinking training, can result in the acquisition of skills (Basadur et al., 1982; Mansfield et al., 1978). Kirton (1977b), however, has argued that training will not result in a change in cognitive style, a change which is essential for skills to become an enduring aspect of the individual's behaviour and consequently to impact performance and that cognitive climate (Kirton and McCarthy, 1988) cannot be readily changed through acute interventions such as training seminars.

Nevertheless, even though lateral thinking training may not be of value as a means of increasing the frequency of initiating behaviour, the question remains, how might such training be employed most gainfully? Moreover, lateral thinking training may be of more value to some styles of thinking than others. An association between innovators (Kirton, 1976) and lateral thinkers may be expected, if qualitative descriptions of the respective styles of thinking are compared. Such an association may be of importance to training in initiating behaviour as it suggests that a greater return on investment would be made by training certain types of people, as opposed to a strategy of across the board training.

The purpose of this study is to determine the value of lateral thinking training in altering the frequency of initiating behaviour within a given company.

Consequently, this research focuses on three objectives:

To determine whether subjects who have completed lateral thinking training have acquired relevant skills.

To determine what effect, if any, the acquisition of these skills would have on cognitive style.

To determine if "innovators" perform better in lateral thinking training than "adaptors".

#### Method

##### Design of the Experiment

A quasi-field experiment (Cook and Campbell, 1976), with experimental and control groups, and pre- and posttests was used.

Two tests were employed, one, the Lateral Thinking Knowledge Test (LTKT), was used to assess the acquisition of lateral thinking skills and knowledge, the other, the KAI (Kirton, 1976), to determine changes in cognitive style. The LTKT was administered immediately before and after training in the case of the experimental group, and with a three day interval between administration of the pre- and posttests, in the case of the control group. The KAI was administered

with the IITKT before the commencement of training and then six months later. The experimental group attended a two day lateral thinking seminar, while the control group received no treatment. Members of both groups attended various other training programmes during the six months between first administration of the KAI and last.

### Participants

Participants were drawn from a subsidiary of the multinational company described in the introductory chapter. The company employs 160 people on average, and the participants represented a cross section of employees from management, professional and clerical ranks.

A sample of 'convenience' (Kerlinger, 1986) was used for the experimental group. Three lateral thinking seminars had been scheduled and those attending were used as subjects in the experimental group. None of the subjects attending the training had been chosen because of specifically diagnosed performance problems.

A random sample of 25 individuals who met the same criteria as those attending the training, that is, they had not received any training in initiating behaviour previously, they were literate (a minimum education of Std. eight was used as the criteria for literacy) and they were permanent employees of the company, was drawn from the remaining employees. This sample constituted the control group.

### The Administration of Lateral Thinking Training

Because competence in lateral thinking requires both skills in using lateral thinking techniques and a specific attitude, this training is conducted in a specific manner.

Each technique is introduced very briefly after which delegates are assigned short exercises of five to ten minutes in duration, (de Bono, 1971; 1985a). The exercises take the form of suggestions, ideas or provocations, on which the specific technique is to be practiced. For instance, delegates are asked to find the positive aspects, the negative aspects and what is interesting regarding the suggestion that everyone who wants to be promoted should wear a yellow shirt (de Bono, 1985a).

The exercises may be completed individually or in group discussion. Extended effort in generating ideas is important, as is deferred judgement. At the end of each exercise, individuals or groups, as the case may be, share their ideas with the other seminar delegates. Five or six exercises are completed for each technique.

De Bono (1971) has recommended that most exercises should be unrelated to the delegates business requirements. Some may be indirectly relevant, but actual work related problems are not addressed until the final module in the training. By using exercises which are remote from the demands of the job, the trainee is able to avoid emotional involvement in the problem which may otherwise interfere with learning the techniques and acquiring the appropriate attitude. De Bono has proposed that through this approach to training, people will become aware of the existence of alternatives and how they may be uncovered through effective use of lateral thinking techniques.

De Bono (1985a) recommended that theory relating to lateral thinking not be discussed during the training sessions. He has argued that this only serves to confuse trainees. The main vehicle for learning lateral thinking is the lateral thinking techniques.

The training took 14 hours to complete, spread over two days. During this time 13 techniques were addressed. Table one contains the lateral thinking training agenda. All the techniques used are from de Bono's (1985a) recommended training.

#### Instrumentation

##### The Kirton Adaption-Innovation Inventory

The Kirton Adaption Innovation-Inventory (KAI), is a measure of cognitive style (Kirton, 1977b). The scale consists of 32 items. While there is no time limit for completing the test, Kirton (1977b) has recommended that 5 - 10 minutes is enough to complete the inventory.

Administration. The KAI was administered to small groups in seminar rooms. Instructions on how to complete the test, which are printed at the top of the front page of each KAI response sheet, were read to the group by the test administrator.

Table 1

Lateral Thinking Training Agenda

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Techniques and Exercises

---

Welcome and introduction to lateral thinking

Plus, Minus and Interesting

Direct Alternatives

Concepts and Functions

Purpose and Importance

Dream Desire

Movement and Provocation

Escape

Random Input

Harvesting

Shaping

Assessing

Implementing

General Applications and Practical

Summary and Conclusions

---

Each item is a statement to which subjects must respond indicating the degree of ease or difficulty found in conforming with the statement. For example item 3 refers to a person who "enjoys detailed work" (Kirton, 1977b, p.39).

The KAI is constructed as a form of Likert scale. Alongside each item is a line of 17 dots representing a scale extending from "very easy" to "very hard". Responses are made by placing a cross over the dot corresponding to the subject's perceived degree of ease or difficulty experienced in conforming with the statement. To avoid a response set, some items are reverse scored.

Scoring. Tests are scored by assigning a value from one to five to each item according to the scoring key, printed on the second page of the response sheet (Kirton, 1977b). The values are totalled to provide a score on each subscale. The subscale totals are summed to provide the overall KAI score.

The KAI has a theoretical mean of 96 and a range of 32-160. The general population scores are set at a mean of 95.33 with a SD of 17.54 (Kirton, 1976).

Reliability. Kirton (1977b) reported that the KAI has proved to be robust under varying conditions. Research has been conducted on the KAI in the U.K., Italy, U.S.A., New Zealand, and Ireland, in which Cronbach Alpha measures have been reported ranging from 0.76-0.91 indicating a high level

of internal reliability. Moreover, test-retest studies in New Zealand, the U.S.A. and Italy have revealed measures of 0.82, 0.84 and 0.86 respectively. An assessment of the reliability of the KAI for this South African research sample had to be made.

#### The Lateral Thinking Knowledge Test

De Bono (1971; 1985a) has provided clear guidelines on how to train lateral thinking but has not offered any method of assessing the efficacy of training. However, it is important to establish whether or not skills have been learned in the training session. Failure to internalise or implement skills in work situations, may be due to poor schedules of reinforcement or a lack of opportunity to use them, but unless these skills have been learned first, they cannot be transferred to the work place or become a natural part of overt or covert behaviour. If skills are not learned then it may be assumed that the training has not been successful. On the other hand, if skills have been learned but not transferred to the work setting, then at least one source impeding the transfer of skill to the work place has been eliminated.

In this study a means of assessing lateral thinking training was needed. This process was not intended to measure an underlying psychological construct, but the ability to demonstrate effective use of a skill.

Torrance and Presbury (1984) noted that while tests of creativity have frequently been used for the evaluation of creativity, other methods, such as the assessment of the products of creativity or behaviours, have been used too. The essence of lateral thinking training is to teach the attitudes and skills (De Bono, 1971) that facilitate lateral thinking. As this training converges its

efforts on short exercises, it seemed logical that on completion of the training, individuals should be able to demonstrate the movement idiom (an integral part of lateral thinking training), to a greater or lesser degree, when presented with a similar stimulus, that is, a short exercise removed from the reality of specific job demands.

Based on this assumption, an instrument to assess the effect of lateral thinking training on the acquisition of skill was developed. A number of short exercises were extracted from De Bono's Lateral Thinking training programme (1985a). These were assembled in the form of an open ended questionnaire (see Appendix A) as a qualitative attempt to ensure content validity rather than construct validity while using an accepted method of evaluating the acquisition of skills and knowledge (Kirkpatrick, 1976).

Administration and Scoring. The instructions for completing the test are printed on the front of each questionnaire. In addition, the administrator explained the purpose of the test to the respondents and dealt with voiced concerns. The administrator explained that research was being conducted which was not concerned with right and wrong answers, simply the thoughts which the questions provoked. Subjects were informed that the questions had been specifically selected so as to avoid any relationship to job problems. The subjects were given forty-five minutes to complete the test, but were informed that this time limit was to be seen as a guide as to how long it should take to complete the test rather than as a strict time limit. (The time frame had been established in a pilot study).

The test consists of eleven items. Each item may be assigned a maximum of five points and a minimum of one, thus resulting in a maximum possible score of 55 and a minimum of 11. The points are assigned to each item according to a scale based on the concept of behaviourally anchored rating scales (see Appendix A).

In this study, two raters were instructed in the scoring procedure. First they received a briefing on the basic principles of lateral thinking. Next, they were instructed in the use of the anchored scale and asked to score a "dummy" protocol. The raters compared scores and discussed differences. The raters were then independently presented with all the protocols in random order and asked to score each. An average of the two scores was used to represent achievement on the test.

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Introduction

In order to facilitate reading, the results of this research and the discussion thereof have been combined into a single chapter.

There are three areas upon which to focus in order to evaluate empirical evidence of changes in cognitive style, lateral thinking and associations between styles of thinking and performance on lateral thinking tasks. Firstly, it is important to establish that the samples employed in this research do not differ significantly from each other on important dimensions. Secondly, the psychometric properties of the instruments used must be reviewed to determine the implications for interpreting results. Finally, the experimental and control groups must be systematically compared.

#### Description of the Sample

In order to draw effective conclusions from the results of this research it must be established that the experimental and control groups, which are both samples of convenience, do not differ significantly on critical dimensions. Differences in age and education may be potential causes of variances in performance where learning is a factor, while length of service and type of work

performed, may explain observed similarities in cognitive climate (Kirton and McCarthy, 1988).

Data on the educational levels and jobs occupied by subjects in the two research groups is presented in Table 2. The data is expressed in terms of observed frequencies in different nominal categories. Due to the non-parametric nature of this data and to the small frequencies observed in some categories, the Kolmogorov-Smirnov test (K) was used to determine if significant differences existed between experimental and control groups. K values of 1.02 and 1.11 were calculated for the differences in distributions between groups on job and educational categories respectively, neither of which was significant at the 0.05 level for two tailed tests (Meddis, 1975).

Table 3 contains data on age and length of service for subjects in both the experimental and control groups. Values of  $t$  for independent groups were calculated using the Epistat (Gustafson, 1984), a statistical software package, in order to compare the experimental and control groups. Neither the  $t$  value for age nor length of service proved significant at the 0.05 level for two tailed tests.

Consequently, even though these groups represent samples of convenience, it may be assumed that they are matched sufficiently to make comparisons.

#### Psychometric Properties of the Measuring Instruments

In order to accurately interpret the observed results, the measuring instruments must demonstrate an acceptable degree of reliability.

Table 2

Observed Frequencies in Education and Job Categories  
of Experimental and Control Groups

---

Variables	Groups	
	Experimental	Control
<hr/>		
Education		
10 years	-	6
11 or 12 years	13	6
Post School		
Certificate	3	4
Post School		
Diploma	2	-
Degrees	3	-
Total	21	16
Jobs		
Clerical/Sales	10	13
Supervisory and		
Professional	7	2
Managerial	4	1
Total	21	16

---

Table 3  
Age and Length of Service Variables for  
Experimental and Control Groups

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Groups	N	Age		Service	
		M	SD	M	SD
Experimental	21	33.71	4.27	4.38	2.22
Control	16	35.19	8.41	5.25	2.60
t		0.70		1.10	

---

### The Kirton Adaption-Innovation Inventory

The mean, the standard deviation, range and Cronbach Alpha were calculated for both pre- and posttest conditions (table 4). The mean, standard deviation and range for both pre- and posttests differ from Kirton's general population statistics, but this is not uncommon (Kirton, 1977b). The reliability as measured by the Cronbach Alpha score on both test conditions is at an acceptable level which means that results derived from these tests can be used without undue reservation.

### The Lateral Thinking Knowledge Test

The mean, standard deviation, range and the coefficient for the correlation between raters is contained in table 5. The correlation was obtained using Pearson's Product Moment and indicates a high degree of agreement between raters on both pre- and posttests. Bearing mind that the validity of the LIKT has been qualitatively established, the consistency of scoring between raters suggests that the results may be safely used to determine the efficacy of lateral thinking training.

### Comparison of the Groups

The performance of the research groups have been compared in three ways. Firstly, scores on the KAI for both experimental and control groups, pre- and posttest were analysed. Secondly, the results of the LIKT for both groups on pre- and posttests were compared and finally the performance on the LIKT pre- and posttest was correlated with performance on the KAI pretest.

Table 4

Sample Variables on Kirton Adaption-Innovation  
Inventory Scores

---

Test	N	M	SD	Range	Cronbach
Pretest	37	93.92	12.04	75-133	0.76
Posttest	26	89.91	9.99	72-114	0.66

---

Table 5  
Sample Variables on the Lateral Thinking  
Knowledge Test

Test	N	M	SD	Range	r
Pretest					
Rater 1	37	20.19	4.95	11-32	
Rater 2	37	20.22	5.05	12-32	0.96
Posttest					
Rater 1	37	25.14	8.07	12-43	
Rater 2	37	24.54	8.18	12-42	0.99

Pre- and Posttest Performance on the KAI

Were lateral thinking training to have resulted in a change in habitual ways of thinking, a significant change in cognitive style should have been observed after the training. Using the Student's t-test for related samples, calculated by means of the Epistat (Gustafson, 1984), pre- and posttest differences on the KAI means of the control and experimental groups respectively, were compared. Similarly, using the Student's t-test for independent samples, between group differences on the KAI means were compared. The results of this analysis are contained in table 6.

No significant differences at the 0.05 level between the control and experimental groups' means, on either the pre- or posttest, were found, assessing the value of t for two tailed tests (as no prediction of direction is made). Furthermore, no significant differences at the 0.05 level between the means of pre- and posttests were found for either experimental or control group, using a one tailed test (the prediction in the direction of more innovative scores is implied).

As there was a six month interval between pre- and posttesting, this result suggests that the cognitive style, as represented by KAI scores, are relatively stable and not easily impacted by an acute intervention such as lateral thinking training. This finding is congruent with Kirton's (1976) theory which purports that cognitive style is a relatively stable element of personality. However, there are other possible explanations for this observation.

During the interval between the initial and final testing, there was a loss of

Table 6  
Pre- and Posttest Scores on the Kirton Adaption-  
Innovation Inventory

Groups	N	Pretest		Posttest		t
		M	SD	M	SD	
Experimental	14	90.43	8.54	92.57	10.91	0.95
Control	12	89.08	7.66	86.17	7.96	1.20
t		0.42		1.68		

subjects from both the experimental and control groups. There were six subjects who could not be persuaded to complete posttest response sheets and five subjects who were transferred or who left the company. It could be argued that these subjects may have been more receptive to lateral thinking training and consequently have changed cognitive style which would have impacted on the group mean. It does, however, appear unlikely that only those few subjects who left the experimental group would have shown significant changes in cognitive style.

A further possible explanation is that the lateral thinking training either was ineffective and did not result in any learning or as much learning as could have occurred and consequently there was insufficient acquisition of skill to impact cognitive style. This explanation may be addressed through the findings of the performance of the groups on the LITKT.

#### Pre- and Posttest Performance on the LITKT

Should lateral thinking training have been effective in imparting relative skills and knowledge, it would have been expected that the experimental group show a significant change on pre- and posttest scores and that, unless such a change was due to maturation, the control group should not have manifest any similar changes.

Using the Student's t-test for related samples the pre- and posttest means for the experimental and control groups respectively, were compared. Table 7 contains the results of this analysis which indicate that a significant difference between the experimental group's pre- and posttest scores was observed, while

no such difference was found between the control group's pre- and posttest scores.

Moreover, while there was no significant difference between the means of the experimental and control group on the pretest, a significant difference was found to exist between groups on the posttest scores.

These results suggest that the lateral thinking training was at least effective in imparting skills and knowledge which could be applied in response to a given stimulus, the LITKT. One alternative argument is that the observed changes would have occurred in spite of the training, however, this argument seems to be negated as the control group showed no similar change.

Had there been a significant difference between experimental and control group means on the pretest, there may have been support for the argument that the experimental group was predisposed to learn more about lateral thinking than the control group. However, no such differences were observed.

There are two broad limitations on the degree to which these results can be generalized. Kerlinger (1986) has argued that this method of assessing the efficacy of training may not measure anything other than the respondents ability to answer a questionnaire in a predetermined fashion. Accordingly, the results obtained from the LITKT cannot be interpreted to support de Bono's (1971) contention that lateral thinking training results in a change in attitude toward lateral thinking. These results simply support the proposition that lateral thinking training can result in the acquisition of specific skills.

Table 7  
Pre- and Posttest Scores on the Lateral Thinking  
Knowledge Test.

Groups	N	Pretest		Posttest		t
		M	SD	M	SD	
Experimental	21	21.02	5.52	29.26	7.68	5.72*
Control	16	19.13	3.99	19.03	3.95	0.12
t		1.16		4.85*		

\* p<0.05

Secondly, the generalizability of these results are limited by the size and homogeneity of the sample used. This means that the conclusions about the efficacy of lateral thinking training pertain to the sample within this study.

#### Cognitive Style and Performance on the LITKT

De Bono (1971) has suggested that anyone can learn lateral thinking, despite differing personalities. Such learning may be mediated or hampered by a number of variables such as level of education, intellectual ability and motivation to learn. Consequently, not everyone acquires an equal degree of competence in the use of lateral thinking.

Cognitive style, on the other hand, is a relatively stable trait. This means that individuals come to lateral thinking training with differing cognitive styles and hence different preferences for generating ideas, differing levels of readiness to ignore conventional modes of behaviour and tendencies for systematic analytical thinking (Kirton, 1976).

As characteristic innovator (Kirton, 1976) behaviour and lateral thinking show qualitative similarities, it may be expected that innovators would more readily learn lateral thinking than adaptors and hence tend to perform better on the LITKT than adaptors, particularly as the LITKT does not attempt to measure the quality of ideas generated. In essence it may logically be expected that higher KAI scores would predict performance on the LITKT.

Table 8

Correlations between Lateral Thinking Knowledge  
Test (LIKT) Scores and Kirton Adaption-Innovation  
Inventory (KAI) Scores

LIKT	KAI Scores			
	SO <sup>1</sup>	E <sup>2</sup>	R <sup>3</sup>	Total <sup>4</sup>
Pretest	0.13	0.27	0.26	0.33
Posttest	0.09	0.34*	0.49*	0.47*

\*  $p < 0.05$

<sup>1</sup>Sufficiency v proliferation of originality.

<sup>2</sup>Efficiency.

<sup>3</sup>Rule/group conformity.

<sup>4</sup>Total score on the KAI.

To test this expectation pre- and posttest scores on the LIKT were correlated with total KAI scores and the scores on the KAI subfactors (Kirton, 1977b), sufficiency v proliferation of originality (SO), efficiency (E) and rule/group conformity (R), using Pearson's Product Moment. The table of correlations is contained in table 8.

There was no significant correlation between the total KAI score and the LIKT pretest scores while a moderate but significant correlation between the total KAI scores and LIKT posttest scores was found. This may be explained in as much as the initial presentation of the LIKT represents a situation in which there is the presentation of a stimulus to which the appropriate response is unknown. Once the appropriate response set is learned innovators respond more readily than do adaptors.

On neither the pretest nor posttest did the subfactor SO correlate significantly with performance on the LIKT. This supports Kirton's (1977b) observation that while innovators show a preference for generating ideas, adaptors can generate new ideas when called on to do so.

Notably, there were significant correlations between the LIKT posttest and the E and R subfactors of the KAI. As higher scores on these subfactors indicate less of a preference for systematic thinking and conformity, this observation suggests, within the confines of this study, that cognitive styles which tend to be independent of group norms and pressures and which show less concern for accuracy and precision will more easily learn lateral thinking.

Ferguson (1959) has warned that the existence of a significant correlation is not sufficient to indicate causality between the two correlated variables. However, as the acquisition of lateral thinking skills could not be associated with significant changes in cognitive styles, yet a significant positive correlation between cognitive style and lateral thinking learning has been found, the indication is that certain cognitive styles have a predisposition for lateral thinking compared to others.

This raises an important question vis a vis de Bono's (1971) proposal that lateral thinking can become a habitual way of thinking. It suggests that lateral thinking training may not result in a change in habit of thought, but rather that the reverse occurs: those with a particular habit of thought, or cognitive style, more readily acquire lateral thinking skills. This would constitute a similar paradigm to the process of acquiring any other skill, for example the acquisition of sports skills. Playing golf is not a dichotomous variable. While anyone can learn to play golf, some people play better golf than others. However, it would seem that those with particular psychomotor abilities tend to more readily acquire golfing skills and improve their competence. In other words skills training improves a "raw" ability.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

Due to the small relatively homogeneous sample used, the results cannot be safely generalized beyond the limits of this study. Nevertheless, this field experiment points to a number of pertinent issues, particularly as regards the use of lateral thinking training within this organisation, and which, if researched on a larger scale, may be of value on a broader scale.

Within the groups that were studied, lateral thinking training was effective, in as much as relevant skills and knowledge were learned. However, the acquisition of these skills and knowledge does not appear to have affected any significant change in cognitive style.

Furthermore, it does seem that within the groups studied, cognitive styles associated with behaviour which appears independent of group influences and which shows less concern for accuracy, precision and system, have a predisposition for learning lateral thinking skills.

This has implications for the use of lateral thinking training.

#### Implications for the Use of Lateral Thinking Training

If it has been determined that the current cognitive climate is inappropriate in terms of the demands which the organization must address, and that a greater frequency of initiating behaviour is needed, then lateral thinking training,

alone, is not a solution. Indeed, training as many individuals as possible within the organisation in lateral thinking appears to be an exercise in which the costs outweigh the benefits.

However, lateral thinking training may play a meaningful role if it is used to address specific issues.

Quite clearly certain jobs demand the use of initiating behaviour. Ideally these positions should be filled by people with a cognitive style suited to initiating behaviour. Lateral thinking training could be appropriately used to develop the abilities of incumbents of these positions given that conditions reinforce such behaviour and that individuals have not yet realized their full potential.

Frequently adaptors and innovators (Kirton, 1976) are required to work together. Where these individuals differ noticeably in their respective cognitive styles, interpersonal conflict may arise (Kirton, 1980). Lateral thinking training may be used as part of an effort to reduce such conflict by facilitating understanding of different styles of thinking and the importance of these styles to the total group.

Finally, some positions demand occasional lateral thinking efforts, which may mean that an individual is required to meet infrequent job demands for which he or she does not have the relevant skill or predisposition. In this case lateral thinking training may provide the necessary skills to cope with these demands.

Areas for Further Research

Quite clearly this total study needs to be substantiated by research on a scale which allows broader generalization. Certain other questions do arise in addition, though.

Firstly, lateral thinking training is only one method of training initiating behaviour. Other methods must be researched as well. While it appears unlikely, there may be more powerful techniques which can result in a change in cognitive style. This gives rise to a question of ethics.

If there are methods which can result in changes in cognitive style, should they be utilised. People have private lives which exist beyond the parameters of their involvement at work. Any permanent change to an element of personality therefore affects not only their performance at work but the way in which they interact outside of the work context.

It would seem that matching an individual's strengths to demands in the working environment and then developing these strengths is the appropriate answer.

Appendix A

Lateral Thinking Knowledge Test: Questionnaire and Anchored Rating Scale

University of Cape Town

Lateral Thinking Questionnaire

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Lateral Thinking Research Project

Name: \_\_\_\_\_

Exercise: I/II

Date: \_\_\_\_\_

This exercise constitutes part of the research being done by the company on the effectiveness of lateral thinking training. You have 45 minutes to complete this exercise. We're really only interested in the way you think, not in right or wrong answers. Consequently, it is important for you to explain how you arrived at your ideas, suggestions or comments for each question. If some questions seem odd, please bear in mind we have tried to avoid drawing responses about work related issues in order to avoid biases or prejudices.

1. What are your thoughts on the following suggestions?

a) Lunch breaks should be reduced by 15 minutes.

b) Children should receive a weekly wage for attending school.

2. What ideas do you have on the following situations? Try to briefly explain how you arrived at these ideas.
  - a) Ideas on why a 13 year old boy who starts coming home late at night and refuses to say where he's been.
  - b) Alternative ways of rewarding people for working harder.
3. Explain what substitutes we could introduce for:
  - a) Technikons.
  - b) Till receipts.
4. Select an aspect of your job. Describe a vision, dream or desire of what it should be like. Describe ways of achieving this.

5. What ideas do you have on the following thought provocation? "The price of petrol is to be doubled."

6. Provide some solutions for the following situation.

We sell office equipment. We provide after sales service. Recently we have received many (genuine) complaints on delays in responding to calls for service.

7. What are your thoughts on the following suggestion. Policemen are rewarded for the number of offenders they catch.

8. How can we make hotels more attractive to people who wish to conduct conferences?

Lateral Thinking Anchored Rating Scale

5. The individual responds in a manner which clearly indicates that he or she searches beyond the conventional and tries to find escapes from the limitations imposed by social values and norms. For example, a snack is an illusionary meal.
4. Responses on items are characterized by numerous alternatives which are conceptually different from each other. For example, snacks could be fruit, savouries or sweets.
3. The individual supplies a number of alternative responses to an item although they are not necessarily conceptually different. (They may be different elements of the same set, for example, a fruit is an orange, pear or apple).
2. The response is typified by a limited number of alternatives. The writer appears to see only one meaning in the item presented. Responses are governed by values. (Should or shouldn'ts, ought and oughtn'ts).
1. No response is given to an item or a single response is provided, accompanied by an evaluative comment explaining why limited responses only are possible, (such as good, bad, right or wrong).

REFERENCES

- Basadur, M., & Finkbeiner, C. T. (1985). Measuring preference for ideation in creative problem-solving training. The Journal for Applied Behavioral Science, 21, 37-49.
- Basadur, M., Graen G. B., & Green S. G. (1982) Training in creative problem solving: Effects on ideation and problem finding and solving in an industrial research organization. Organizational Behavior and Human Performance, 30, 41-70.
- Basadur, M., Graen, G. B., & Scandura, T. A. (1986). Training effects on attitudes toward divergent thinking among manufacturing engineers. Journal of Applied Psychology, 71, 612-617.
- Cook, T. D., & Campbell, D. T. (1976). The design and conduct of quasi-experiments and true experiments in field settings. In M. D. Dunnette (Ed.), Handbook of Industrial and Organisational Psychology (pp. 223-326). Chicago: Rand-McNally.
- De Ciantis, S. M. (1987). Management Style and Thinking Style. In W. J. Reddin (Ed.), Effective Management, New Delhi: McGraw-Hill.
- De Bono, E. (1967). The Use of Lateral Thinking. Harmondsworth, England: Penguin Books.

- De Bono, E. (1971). Lateral Thinking for Management. Harmondsworth, England: Penguin Books.
- De Bono, E. (1978). Opportunities. Harmondsworth, England: Penguin Books.
- De Bono, E. (1985a). Lateral Thinking. Notes presented at Lateral Thinking Training seminar, Management Centre Europe, Brussels.
- De Bono, E. (1985b). Six Thinking Hats. Harmondsworth, England: Penguin Books.
- Ettlie, J. E., & O'Keefe, R. D. (1982). Innovative attitudes, values, and intentions in organizations. Journal of Management Studies, 19, 163-182.
- Ferguson, G. A. (1959). Statistical Analysis in Psychology and Education (pp. 101-126). Kogakusha: McGraw-Hill.
- Gerhardt, J. R., & Cashman, J. F. (1979). The Measurement and impact of creativity in work groups. Journal of Creative Behavior, 14, 216-217.
- Goldsmith, R. E. (1984). Personality characteristics associated with adaption-innovation. The Journal of Psychology, 117, 159-165.

Goldsmith, R. E. (1985). Personality and adaptive-innovative problem solving. Journal of Social Behavior and Personality, 1, 95-106.

Goldsmith, R. E. (1987). Creative level and creative style. British Journal of Social Psychology, 26, 317-323.

Gryskiewicz, S. S., & Shields, J. T. (1983). Targeted innovation. Reprinted from Issues and Observations, Nov., 1-5.

Gustafson, T. L. (1984). The Epistat [Computer programme]. Round Rock, Texas: Tracy L. Gustafson.

Kerlinger, F. N. (1986). Foundations of Behavioural Research (3rd ed.). Tokyo: CBS.

Kirkpatrick, D. L. (1976). Evaluation of training. In Craig, R. L. (Ed.). Training and Development Handbook: A Guide to Human Resource Development, (2nd ed.), 18.1-18.25, Johannesburg: McGraw-Hill.

Kirton, M. J. (1976). Adaptors and innovators: A description and measure. Journal of Applied Psychology, 61, 622-629.

Kirton, M. J. (1977a). Adaptors and innovators and superior-subordinate identification. Psychological Reports, 41, 289-290.

Kirton, M. J. (1977b). Kirton Adaption-Innovation Inventory Manual. Hatfield, United Kingdom: Occupational Research Centre.

- Kirton, M. J. (1978a). Adaptors and innovators in culture clash. Current Anthropology, 19, 611-612.
- Kirton, M. J. (1978b). Have adaptors and innovators equal levels of creativity? Psychological Reports, 42, 695-698.
- Kirton, M. J. (1980). Adaptors and innovators in organizations. Human Relations, 33, 213-224.
- Kirton, M. J. (1984). Adaptors and innovators - Why new initiatives get blocked. Long Range Planning, 17, 137-143.
- Kirton, M. J., & McCarthy, R. M. (1988). Cognitive climate and organizations. Journal of Occupational Psychology, 61, 175-184.
- Mansfield, R. S., Busse, T.V., & Krepelka, E. J. (1978). The effectiveness of creativity training. Review of Educational Research, 48, 517-536.
- Meddis, R. (1975). Statistical Handbook for the Non-Statistician, Maidenhead: McGraw-Hill.
- Pinchot, G. (1985). Intrapreneuring. New York: Harper & Row.
- Torrance, E. P., & Presbury, J. (1984). The criteria of success used in 242 recent experimental studies of creativity. The Creative Child and Adult Quarterly, 9, 238-243.