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PARALLEL THINKING FOR CREATIVE TEAMS

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Abstract

The research measured the impact of risk control training and parallel thinking training on the ability of safety practitioners to generate 'solutions' to health and safety 'problems'. Parallel thinking training appeared to potentiate the risk control training and dramatically improved the performance of teams working on OHS problems.

Creativity and Teamwork

Creativity, teamwork and innovation are now an important focus for management (eg Senge, 1992; Peters, 1994; Semler, 1993). The recent report by Ernst and Young LLP (Mavrinac, et. al., 1995), commissioned by the US Department of Labour, supports practices such as employee involvement, empowerment and quality programs and the training that goes hand in hand with these systems.

How do we bring about creativity and teamwork? We propose that teaching teams about thinking and creativity can be useful to improve and change the way teams work. The tools we propose are Edward de Bono's tools for Parallel Thinking and Creativity (de Bono, 1993). But how well does teaching teams how to use tools to interact in a better way compare to the need for training in specific skills such as occupational health and safety risk control? What is the importance of training in a thinking tool when we've all this serious material to consider?

Occupational Health and Safety and Risk Control

With the introduction of new safety regulations an organisation (unnamed) provided specific training in Risk Control to help their workforce work with these new systems. We evaluated the effectiveness of this training. Prior to the Risk Control training some of the workforce were trained in Parallel Thinking (a method for creative thinking in teams). We evaluated the effect of the Parallel Thinking training and the effect of combining this training with the Risk Control training.

Background

In previous studies we investigated the impact of Parallel Thinking on university students (Bachelor of Engineering, Bachelor of Technology and Graduate Diploma in Occupational Hazard Management). The studies showed that training in Parallel Thinking improved the ability of individuals and teams to create solutions for OHS case studies (Culvenor & Else, 1994). The improvement was in terms of the number of solutions people could develop and with regard to how well those solutions mitigated the hazards involved.

The research showed that providing people with better tools to work in teams rather than more information or knowledge helped them design more effective accident prevention measures. The training contained no information or knowledge about safety however performance in safety problem solving improved. The hypotheses to be tested in this new study are as follows.

Null Hypotheses

That the performance (on a risk control task) of teams in a control group will be the same as that of teams trained in Risk Control or Parallel Thinking.

That the performance (on a risk control task) of teams trained in both Parallel Thinking and Risk Control will be the same as that of teams that receive only Risk Control training.

Alternative Hypotheses

That Risk Control Training will have a positive impact on a Risk Control task

That Parallel Thinking Training will have a positive impact on a Risk Control task

That training in Parallel Thinking and Risk Control will have a greater effect than Risk Control training alone.

Study Group: Safety Practitioners

The subjects were employed in a safety role. Safety was central to their function and most of the subjects had several years experience in the safety area.

Method

The goal of the project was to measure the effect of three training interventions.

1. Parallel Thinking (one day)
2. Risk Control (two days)
3. Parallel Thinking Training and Risk Control Training (1&2)

In total approximately one hundred and fifty people took part in the study and were randomly allocated into these groups.

Method of Comparison

We modified an OHS design test created for previous studies to evaluate the training (Culvenor & Else, 1994). The test required teams of subjects to generate solutions to accident case studies.

The design test was administered at the completion of each type of training. The control figures were obtained from a test of a random sample of the subjects who attended the Parallel Thinking training prior to the training beginning.

Creative Team Tasks

The tasks were all based on a series of fictional accident case studies. Each case was a short description of an event. In the creative part of the test, the task was to generate 'solutions' to the 'problem'. There was a time limit for this task. The subjects worked in teams of three on the problems. The results here are a report of the outcome of this part of the test.

Subjects also completed decision making tasks and worked individually as well as in teams. However this paper does not present the results from analysis of the individual tasks or decision making tasks.

Number of Teams

Control Group	5 Teams
Risk Control Training	31 Teams
Parallel Thinking Training	7 Teams
Combined Risk Control+Parallel Thinking	9 Teams

Risk Control Training

The Risk Control training addressed the matter of risk and prevention based on a safe-place approach (below). The training was two days in duration and involved an interactive style of learning that included case studies.

To capture a common understanding of what is meant here by risk control and the type of information the training contained the following terms used in the risk control training are defined.

Definitions

Hazard	A potentially damaging energy.
Control Mechanism	The mechanism or system that normally maintains control of the hazard.
Transfer Mechanisms	The means by which the hazard and the recipient become coincident in time and space (may coexist).
Accident	A loss of a control of a hazard.
Exposure (E)	The amount of time that potential recipients of the damaging energy are exposed to the hazard (could be measured in units other than time)
Probability (P)	The probability per unit of exposure that a control loss will occur.
Frequency (F=PE)	The combination of exposure and probability.
Consequence (C)	The outcome of an accident (could be measured in $ or another unit)
Risk (R=FC)	The combination of frequency and consequence.
Risk Reduction	Measures that address one or more of the components of risk.

Note: For a more extensive discussion of the notion of energy damage see Gibson (1961) and for a further explanation of risk and the energy damage model see Viner (1991).

Safe-Person Strategy

A Safe-Person Strategy is one that focuses on appropriate human behaviour to avoid the control loss. This strategy is supported by the domino model of Heinrich (1959). This model often traces the cause of accidents back to faulty human behaviour and characteristics and thus tends to lead to controls that focus on behaviour modification.

Safe Place Strategy

A Safe-Place Strategy is one that creates an environment that is safe owing to the removal of the hazard or by passive control of the hazard. Passive control means control that does not rely on appropriate human behaviour.

Safe-Place strategies are those considered by many authors as the most reliable (eg Kletz, 1991, Viner, 1991). The most fundamental and reliable safe-place strategy is the elimination of the hazard.

Parallel Thinking Training

Parallel and Creative Thinking

Dr de Bono is well known for inventing the term and tools of lateral thinking. These are tools for generating ideas and changing perceptions. More recently Dr de Bono invented the Six Thinking Hats method (de Bono, 1985) described below. The method attempts to generate an outcome of parallel thinking. Parallel thinking is a notion of cooperative team thinking rather adversarial thinking and a focus on exploration and design rather than analysis.

Nature of the Six Thinking Hats Tool

The six coloured hats represent six modes of thinking and are directions to think rather than labels for thinking. That is, the hats are used proactively rather than reactively.

Green Hat	Creativity, alternatives, possibilities
Yellow Hat	Benefits, values, opportunities
Black Hat	Caution, risks, judgement
Blue Hat	Control, managing the thinking
Red Hat	Emotion, feelings, intuition
White Hat	Information, facts, data

These words describe the kind of thinking we do now! There is no new content in the type of thinking (other than lateral thinking that can be used as part of the Green Hat). It is the structure of thinking that the system alters.

A jumbled heap of building materials is not a building; yet the content may be the same. A dismantled Eiffel tower would be an unimpressive heap of steel sections and rivets. Adding more material to the heap would not make it any more impressive. With structure that heap becomes a famous landmark. Adding information and sorting the information into boxes with analysis does little to build a useful structure. Structures and specific tools for thinking turn muddled heaps of information into landmark thinking. The Six Hats method attempts to build our jumbled thinking into a powerful structure for thinking.

Teams: Organisation, Signal and Focus

Each hat is used proactively as a focussing tool rather than simply a label for thinking after the event. The hats are used to organise the thinking and can operate as a 'thinking menu'. When used in teams the method acts to broaden and structure the team's thinking.
Reference of the hats allows people within the team and the chair or facilitator to signal the type of thinking that is needed by referring to the hat terminology and image.

By far the main purpose of the hats and the notion of parallel thinking is to create cooperative thinking within the team.

Results

Impact of Risk Control Training

As Figure 1. shows team performance on the creative task is similar for teams in the control group(c), risk control training(rc) group and parallel thinking training(pt) group.

We are unable to reject the null hypothesis that these groups are the same. These groups are independent. There are no repeat measures.

(nc=5, nrc=31, npt=7, F(one-way anova)=0.75, p=0.48)

That is, the Risk Control training (and the Parallel Thinking training) appears to have had no impact of the creative ability of teams.

This result was disappointing. One would hope that specific training in Risk Control would lift performance in the area of generating solutions to OHS problems. The provider of the training indicated that they would expect people to improve on this type of task after the training. The main purpose of the training was to improve skill in developing risk control solutions for OHS problems.

Impact of Parallel Thinking Training

In the case of the Parallel Thinking Training the teams recorded a small improvement in mean performance compared to the control group (Figure 1.). However it was still not possible to reject the null hypothesis that the performance was the same (as noted above).

During the Parallel Thinking training the training appeared successful. In the past (Culvenor & Else, 1994) such training has been shown to improve performance by approximately 100%.

When the teams were working on non-safety problems during the training they seemed to be using the tools well in a cooperative and fluent way. It was a great surprise to watch these teams slow down or 'crash' when confronted with the safety problems in the test.

Impact of Receiving Both Parallel Thinking and Risk Control Training

As Figure 2. shows, the teams that received Parallel Thinking Training as well as the Risk Control training produced approximately 60% more solutions when compared to those who only received Risk Control training. The null hypothesis that the performance of these groups was the same can be rejected. Although these groups are independent and there are no repeat measures in this comparison those teams who received both forms of training had completed the test once before. However other unpublished studies we have conducted to evaluate the effect of practice on this test have revealed that minimal learning takes place simply by completing the test twice.

(nrc=31, n(rc+pt)=9; t=3.4, p(one tail)=0.001).

Discussion of Possible Explanations

Parallel Thinking as a Catalyst to Learning

No meaningful difference in the creative performance of the teams was found following separate training in Risk Control or Parallel Thinking. However those teams with the benefit of both types of training improved considerably.

The Parallel Thinking training took place before the Risk Control training. A possible explanation for the improved performance could be that the training in Parallel Thinking proved an effective catalyst for learning or a model for learning. That is the Parallel Thinking tools increased learning potential. Indeed without this catalyst to increase the

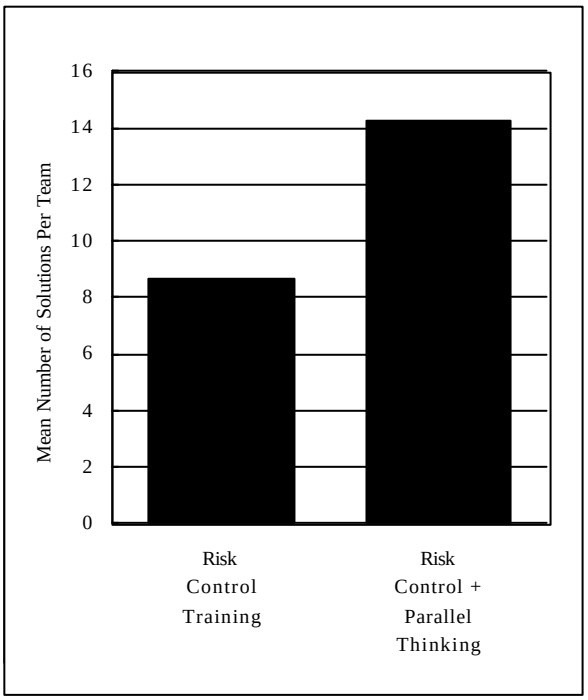

FIGURE 2
IMPACT OF RISK CONTROL TRAINING AND PARALLEL THINKING TRAINING, SHOWING AVERAGE NUMBER OF SOLUTIONS GENERATED BY TEAMS OF THREE PEOPLE

potential, the training in Risk Control was ineffective.

Risk Control Training Broke Existing Paradigms

As mentioned previously the Parallel Thinking training appeared to run well and yet the results were poor when teams applied the techniques to safety problems During the training subjects were observed to perform well at a wide range of tasks in a cooperative and fluent way. However the purpose of the study was to investigate the ability of this 'general' training in thinking to improve performance in a specific area (safety). We found no improvement in this specific area despite having found improvements in previous studies.

The conclusion we are now moving toward is that this group with extensive experience in safety could not make fluent use of the Parallel Thinking tools because they were bound by well-entrenched concepts about the topic of safety. That is, they had great experience in the safety area and there was little point being creative since they already knew the answer. So why should these teams trained in Parallel Thinking be better able to use these tools and be more creative following the Risk Control training in comparison to those who only had the Risk Control training?

The Risk Control training may have showed the subjects that their safety paradigm was too restrictive or inappropriate. With their old framework of knowledge replaced with a new framework they were perhaps better able to use the Parallel Thinking tools in a fluent way.

Conclusion

For subjects experienced in OHS, both specific separate training interventions, Risk Control and Parallel Thinking, did not increase team creativity when teams sought to solve OHS problems.

Adding Parallel Thinking training to Risk Control training improved the performance of teams working on OHS problems. Parallel Thinking appeared to potentiate the effect of the Risk Control training.

Organisations conducting specific OHS training, especially where the training is promoting a significant paradigm shift, should consider using training in general thinking tools such as Parallel Thinking as a catalyst to improving subsequent training. Edward de Bono's tools may provide a mechanism for improving the uptake of the specific training.

When organisations are undertaking training to improve team performance then it may be vital, especially in creative tasks, to show the integration of new techniques learnt in training with tasks that teams normally have to undertake.

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