

THE CHANGE MEDIATION PROGRAM (CMP)

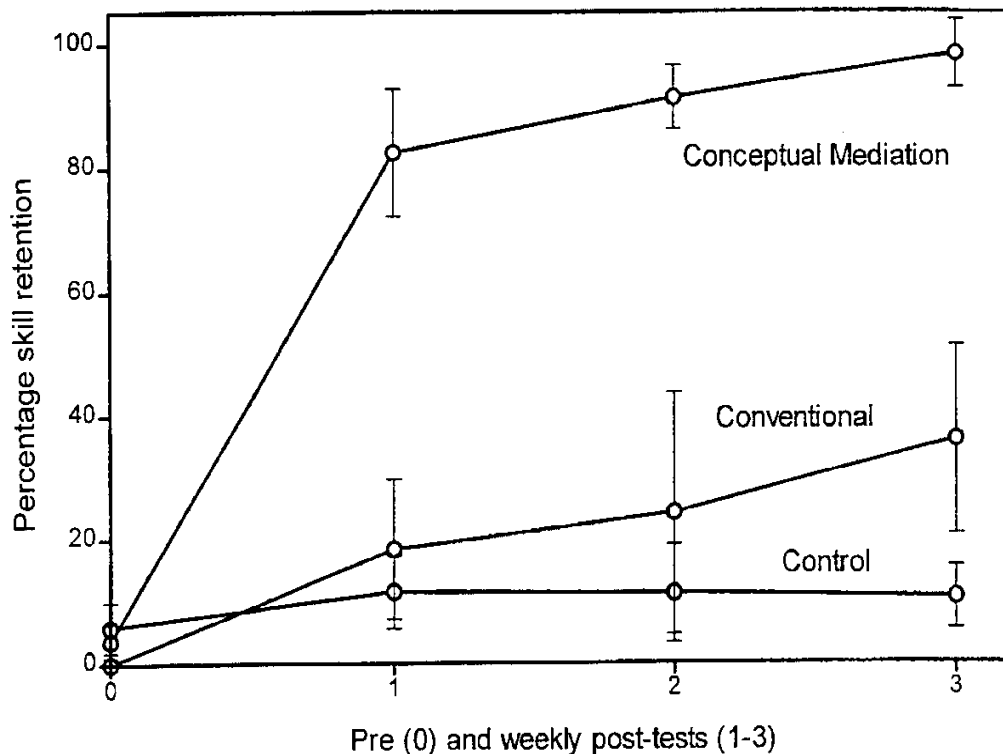
OLD WAY/ NEW WAY® and *CONCEPTUAL MEDIATION*™

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CHANGING HABITS, SKILLS AND MISCONCEPTIONS EFFICIENTLY AND EFFECTIVELY.

It has been shown that where students and their teachers are taught and use this program that student's learning is significantly improved. The beneficial outcomes of this program are significant improvements in academic results, student behaviour, positive attitudes toward school, time on task, and improved self-esteem. The Conceptual Mediation Program is an application of Mediation Learning Theory (Lyndon 2000).

**Improvement in skilled performance (mean \pm se) using
Old Way / New Way versus conventional error correction
(based on all available subjects, n = 34)**



The graph shows the improved learning outcomes achieved when individuals use a mediational learning strategy to change habits skills or misconceptions.

Introduction

A new theory of learning and associated methodologies that specifically address the learning difficulties experienced by all individuals whenever change is required in their prior habits, skills or concepts has been developed (Lyndon, 1989, 1995, 1998, 2000). The new theory and new methods provide a distinctive pedagogy that addresses major issues of learning. When an individual seeks to change already acquired habits, skills, or concepts the approach to such change is by necessity a mediational process that places special demands on the learner. The term, mediation, is here used to mean that an individual consciously attempts to bring about a reconciliation of his or her conflicting habits, skills or concepts.

Mediational Learning theory describes and explains the critical role in conceptual change of psychological phenomena such as proactive inhibition, retroactive inhibition, accelerated forgetting and unlearning. Proactive inhibition is best understood as the effect of conflicting prior knowledge on new learning. Despite a person's best efforts to change, prior habits, skills or concepts quickly regain control over an individual's performance.

Accelerated forgetting is a fundamental characteristic of human memory. It is an essential aspect of the perceptual process that is activated whenever there is *conflict* between what is already known and what is being taught. It is now understood that proactive inhibition causes the accelerated forgetting of any new but conflicting habit, skill or concept, despite the practice of the newly learned habit, skill or concept.

Mediational Learning theory explains how we may redirect accelerated forgetting and thus control the learning process. This is achieved through mediational learning strategies such as Old Way/New Way (Lyndon, 1989), which is used to change habits and simple skills; Skill Mediation (Lyndon, 1998), used to change complex educational, work or sports skills; or Conceptual Mediation (Lyndon, 2000), which is used to change an individual's misconceptions in, for example, mathematics or science.

What do we mean by "change" and how is it related to the concept of "learning"? Learning is defined as a measure of the changes that arise in individuals as a result of experience or practice. Change or learning then may occur simply as a result of experience and its casual repetition. This process results in the development of what are commonly referred to as habits. Habits are automated aspects of our behaviour that are, in general, context specific. Despite what common sense may suggest to us, habits are behaviours that do not transfer particularly well to new situations or contexts.

Changes may also arise as a result of a conscious choice to deliberately practise a particular activity. This usually results in the development of what we call a skill. Skills, like habits, are automated aspects of our behaviour but unlike habits they are normally free of contextual constraints. Thus a skill can be applied in a variety of settings and under a great range of physical conditions. Skills are highly transferable and reliable aspects of our behaviour.

When, despite the best of available support, someone has difficulty changing a habit or a skill or acquiring a new way of thinking, it is often said that they are experiencing learning difficulties. This program provides a new explanation of such learning difficulties, a phenomenon regularly observed by teachers and industry-trainers in the course of their work.

Our perspective is new in that the experience of learning difficulties is seen to be a normal and universal characteristic of human cognitive development, rather than one arising from dysfunctional perceptual processes.

The natural tendency of the mind to conserve prior learning in the face of relevant new experience has been the subject of extensive psychological research since the turn of the century. This research provides firm support for the view that learning difficulties arise as a natural outcome of powerful conserving processes that are initiated predominantly as a consequence of conceptual conflict.

Conventional help for individuals experiencing learning difficulties often fails to achieve sustainable improvements. The hard won improvements of one day are often gone the next. Although conventional intervention involving careful elaboration or reteaching of the desired skill and the encouragement of additional practice produces significant short-term improvements in performance, these are often not maintained in the long term. This age-old problem now has a new and a relatively simple solution.

There is a robust phenomenon associated with the experience of learning difficulties; it is referred to as proactive inhibition [PI]. This phenomenon is best understood as the effect of prior learning on new learning. The major characteristic of PI is that despite practice of a new habit, skill or idea, the existing old habit, skill or idea has the power to intrude into individual performance and, over a short period of time, actually comes to dominate that performance.

Accelerated forgetting is a fundamental, albeit remarkable, characteristic of human memory. It is initiated in the normal course of experience as an essential aspect of the perceptual process and permits

the rapid acquisition of relevant new information. This capacity is an outstanding characteristic of human learning. Accelerated forgetting, however, is also activated whenever there is *conflict*, that is, a perceived difference between what is already known and what is being taught. Accelerated forgetting is thus activated whenever an individual experiences proactive inhibition.

Proactive inhibition causes the accelerated forgetting of the new but conflicting habit, skill or idea. As a result, accelerated forgetting is one of the major phenomena associated with the experience of learning difficulties.

WORKSHOP ACTIVITY ONE: THE STROOP COLOUR CHARTS

This activity demonstrates the existence of the powerful conserving effect of prior knowledge i.e. proactive inhibition.

THE CONCEPTUAL MEDIATION PROGRAM

Our natural interest in the personal experience of learning, memory and performance is a ready starting point for new experiences and ideas about becoming independent mediators of change. The CMP builds on an individual's existing knowledge and skills, so that they may become successful and motivated learners.

By encouraging individuals to take an active role in sharing their personal experiences and understanding of learning, the program permits confirmation of significant pre-existing ideas, the introduction of relevant new concepts dealing with the nature of learning, and an opportunity to mediate between any conflicting views.

Issues discussed in this program include:

- the nature of the learning experience;
- the relationship of attention and learning;
- the different role and functions of recognition and recall memory;
- the use of efficient learning strategies to improve recall memory;
- the nature of forgetting;
- the distinction between normal and accelerated rates of forgetting;
- the introduction and demonstration of the existence of proactive inhibition and its role as a knowledge protection mechanism;
- the use of conceptual mediation as an efficient strategy for controlling the effects of accelerated forgetting;
- the role of creativity in the learning process;
- the way to become an independent mediator of the natural process of conceptual change.

Individuals are empowered to take control of and accelerate the natural process of change through sharing a common language and learning framework.

The program has had many years of successful application in schools and in the vocational education and training sector. Applications of the methods in industry have proved it to be an efficient and effective approach that addresses the learning needs of both industry-trainers and skilled employees.

The Conceptual Mediation Program explains accelerated forgetting and how individuals can take control of it through using the mediational learning methods of Old Way/New Way [to change habits and skills] and conceptual mediation [to change concepts and knowledge].

THREE KINDS OF LEARNING

The CMP presents a simplified model of human learning. It addresses in a practical way the specific problems associated with changes in habits, skills and misconceptions that are caused by the existence of prior knowledge or experience.

To help explain the recommended methods of the CMP it is useful to classify the changes that occur in individuals in three distinct categories. These will be referred to as learning of the first, second and third kind.

Learning from experience

Personal change or learning may arise simply as a result of experience and its casual repetition. This process normally results in the development of what are commonly referred to as *habit* and *intuition*. Learning of the first kind is automated in the sense that no deliberate conscious effort is necessary for the development of habits and intuitions. Our experiences alone are the sufficient condition for such changes in our nature. Intuitions are an important part of our unconscious explanatory framework. They are in a sense our conceptual habits, derived from the repetition of experience. They inform us as to how things should or ought to be done rather than why things should be done that way.

Habits represent automated aspects of our behaviour or performance that are, in general, context specific, as mentioned earlier, habits do not transfer particularly well to a new situation or context.

Learning from practice

Changes may also arise as a result of *a conscious choice to deliberately practise an activity*. This results in the development of what are called *skills*. Skills, like habits, are automated aspects of our behaviour. Unlike habits they are normally free of contextual constraints. This is because skills are initiated and developed as the result of a conceptual process, not simply an experiential one. Consequently, skills may be applied in a variety of settings and under a great range of physical conditions. Skills are highly transferable and reliable aspects of our behaviour.

Learning through mediation

When an individual seeks to change already acquired habits, skills or misconceptions, i.e., to *relearn* something, the approach to such change is by necessity *a mediational learning process that places special demands on the learner*.

So, we learn or change in three different ways: we learn as a consequence of perceptual experience, through seeing, listening, feeling, and thinking; through deliberate practice; and importantly, through the conceptual process of mediational learning.

Sometimes the change or learning seems easy and sometimes it seems difficult. When we are involved in the process of relearning, we naturally find *attention, remembering, thinking and understanding* difficult. This is when we need to learn by using mediational learning, *learning of the third kind*. The nature of the mediational process and how best to control this kind of learning will be explained later, firstly it will be necessary to outline a number of basic characteristics of brain function.

THE IMPORTANCE OF VOLUNTARY ATTENTION

Given that learning may occur simply as a result of experience and its casual repetition it becomes increasingly important for individuals to control what is learned. It is important to understand that we *control* what is learned by choosing what we *pay attention to*.

When young we are easily *distracted*. New sights and sounds are always catching our attention. When something *distracts* us, like a loud noise or a bright light, we give attention to the source of the distraction even though we may not have wanted to. We call this necessary survival mechanism *involuntary attention*. As we get older we are more able to take more *control* of attention. We *choose* to give attention to things that interest us. We gradually learn how to deal with distractions by screening them out.

In our model of change the process of attention is taken to be a process of selective reactivation and inhibition of memory traces. This dual nature of the voluntary or selective-attention process is necessary due to the interplay of both perceptual and conceptual factors in human performance. It is perceptual in the sense that the physical context of any activity is important to performance, and conceptual in the sense that an individual's reaction to the physical context is based upon prior experience.

Giving voluntary attention to someone or something *is not always easy*. The mental effort given to control voluntary attention is called *concentration*. Learning to control attention is important because what we pay attention to we may learn even when we would prefer not to. This is particularly relevant to the area of skill development and the goal of initial error-free learning.

The learning that occurs at this level is automatic. It is an example of learning of the first kind, i.e., the measurable changes that occur as a result of experience or the casual unplanned repetition of experience.

YOUR MEMORY AND HOW TO "IMPROVE" IT

Perceptual processes in the brain are responsible for the organization of our experiences and the storing of them as memories. These are often referred to as memory traces or at other times simply as traces. The measures of these changes in our memory traces that arise as a result of the perceptual process are referred to as learning. So, learning as such is not seen as a process but rather as a product, a memory trace, and the product is often difficult to retrieve.

Our brain has two very different ways of retrieving or remembering our memory traces. These are referred to as *recognition* and *recall* memory. Knowing how these are different will help us to improve our *control* of memory.

Recognition memory

The essential difference between recognition and recall memory is that recognition is an externally cued and automatic reactivation of existing memory traces whereas recall is a self-initiated and thus a voluntary reactivation of memory.

Remembering that we have seen or heard something before and our ability to read words are examples of *recognition memory* at work. We just *know* that we have seen or heard something before.

When reading a book, if we don't recognize a word we may recognize the letters that make it up. Using these letters we recall the sounds they make and how best these go together. This process helps us to read words we do not immediately recognize.

Our recognition memory is automatic. We do not choose to remember things in this way; it just happens naturally and without conscious effort on our part.

Recall memory

When we remember things that are not present, for example what we did on the weekend or how to spell a word, we are using recall memory. For example when we spell a word easily, we say that we have *automatic recall* of how to spell that word. Sometimes it is not easy to remember how to spell a long or unfamiliar word and we call this *effortful recall*.

Recall memory is naturally effortful. Recall memory only becomes automatic and therefore effortless through practice.

TAKING CONTROL OF RECALL MEMORY THROUGH PRACTICE

We cannot *improve* our recognition memory through practice because it is an *automatic* process of memory trace reactivation. We can however increase the number of things that we recognize by learning about new things, people or places.

When we say we want to improve our memory we are really talking about improving our *recall memory*, not our *recognition memory*.

We have control over recall memory and we can improve our recall memory through the practice of what we have learned. Recognition memory will only give us the feeling that we know something whenever we see or hear it again. ***However, this will not help us in tests because in a test we have to rely on our recall memory.***

Copying

Some individuals believe that copying a word by rewriting it five or ten times, will improve their *memory* for that particular word. They are often surprised and discouraged to find that this is not always so. Copying is an activity that uses mainly our recognition memory. This means that we are not practising the *recall* of the word. So, although copying a word will help us to read this word more easily the next time we encounter it, it will not help us to spell the word from memory.

Creativity

We usually write words from memory rather than simply copying them and this action depends on the use of our effortful or automatic recall memory. If we have not practised the word then recall may be effortful.

Whenever we find a word too effortful to remember we stop trying to recall it and instead become *creative*. The usual thing we do next is to say the word to ourselves. Then, we try to invent the

spelling of that word using the sounds and letters we recognize from saying the word to ourselves. Because most English words are not completely spelt the way they sound the chance of being correct using this approach is very low. We can avoid the problems of effortful recall and creative spelling by the use of a good recall strategy.

WORKSHOP ACTIVITY TWO:

Using the “Look Say Cover Write Check” method to learn the spelling of a word.

This method is an interesting example of how practice influences recall memory.

[a] *Look* at a word and *say* it to yourself. Tell yourself what it is or what it means to you. Doing this will start the practice of your recall of this word.

[b] *Cover* the word over so that you cannot see any part of it. This will stop your recognition memory from working. This forces you to remember it using recall memory alone.

[c] *Write* the word down as best you can from recall memory. Sometimes it will be easy to write down all the letters in one attempt. Sometimes it will be effortful. The word might be too long for you to remember all the letters on the first attempt.

[d] *Check* the spelling of what you have written by uncovering the word. Check to see that you have written the word correctly. If the word is spelt incorrectly then pay attention to the differences. Tell yourself what they are or underline any missing letters. If you have added letters in your own spelling cross them out. When you check your spelling this way you are using recognition memory.

[e] Repeat this process with this same word fully another four times. Even if you have written the word correctly from memory the first time, do not stop there. Practising the recall of a new word once or twice is usually not enough to develop good recall. It will only help you to recognize this word more easily. Practising a new word only three or four times will start to make the recall of the spelling of this word very easy. Practising the recall of a new word five times is usually sufficient to make the recall of this word effortless. It is a good idea to ensure that the spelling of new or difficult words become automatic. Practise the recall of a word using *Look Say Cover Write Check* until you have recalled it correctly *five times* in all.

[f] Sometimes words are too long or too hard to get right the first time. *Don't worry, this is natural.* Leaving letters out or adding a few of our own, only means that we need to practise recalling the word until we have done so correctly five times.

[This is a total of five correct spellings. There wont always be five correct spellings in a row.] This method is not intended to be used as spelling program. It should be used only when words are particularly difficult to recall.

Good spellers seem to be aware of the importance of practice of the recall of what they want to remember. In a study of good spellers learning new or unfamiliar words it was noted that they *avoided copying* any word they were learning to spell.

One good speller left a line between each repetition of the word as she practised its spelling. She began by looking at the model once and then wrote it from recall memory. When asked why she had left a line between each repetition she said, “That’s so I can’t see the word as I write it”. She was successful because she used recall memory when she practised.

Another student wrote his word on the opposite side of the page, again *using recall and not recognition memory*.

THE BRAIN IS DESIGNED TO FORGET

There is no doubt that our brain forgets things. In fact it does this very well and it does so naturally. Many people talk about forgetting as if it were the same as losing. It is easy to see why people would think this way. Forgetting, however, is really a very complicated process involving the organization and storage of our experiences. It is important to realize that the brain is actually designed to forget and that forgetting is an adaptive and essential process without which we could not function as efficiently as we do.

The process we refer to as forgetting is actually a process of *retrieval inhibition*, a process that permits the rapid acquisition of new non-conflicting experience without the intrusion of irrelevant associations. Retrieval inhibition also ensures that incoming information is rapidly assimilated into the existing knowledge framework and then suppressed so that it does not interfere with the ongoing flow of experience. Retrieval inhibition is again involved in the relearning process whenever new experiences conflict with existing knowledge. Here, despite the deliberate practice of an activity, the inhibitory process causes significant difficulties for the recovery of newly established but conflicting memory traces.

Our brain also has two quite different *rates of forgetting*, i.e., rates of retrieval inhibition. There is a slow, normal rate of forgetting and a fast or accelerated rate of forgetting. Knowing the difference will help us take *control* of forgetting.

There are a number of common problems with memory that lead us to believe that we *lose* information. Sometimes we meet someone whose face we remember very well but we cannot remember his or her name no matter how hard we try. Now at times like this we say, "I have forgotten their name", but what we really mean to say is that even though we have *recognized* their face we cannot *recall* their name. It is natural to believe that because we *recognize* someone's face that we should just as easily be able to *recall* the person's name.

We now know that this is not really *losing* the memory. It is just that we have not practised recalling their name. To show that we have actually remembered is quite easy. Ask the person to tell us their name again and usually we *recognize* the name as well. In fact, if the person were to have deliberately given a false name, we would tend to disbelieve them. It is *natural* to have difficulty recalling someone's name when we have not practised it or when we have not seen that person for a while. Practising someone's name using a recall memory strategy like LSCWC, or a mnemonic such as a rhyme will help us to remember, i.e., to recall that name.

Another common example that makes us mistakenly believe that we lose information from memory is forgetting to buy something that you went to the shop for. This is much the same as not remembering someone's name. We forget because there has not been enough practice of recall memory to help us remember all the items we wanted to buy. We will, however, recognize what we forgot to buy when we get home or look at a shopping list.

These events are common enough and are certainly frustrating to all of us but they do not provide evidence that we have somehow lost our memory.

Unpractised memories are only available to us through recognition memory. We know that recognition memory is long lasting and very stable. Most so-called "loss" in our ability to recognize something or someone is due to changes in how the memory is organized in the brain or is due to significant changes in the object or the person.

Memories that have been practised are available to us through *recall memory*. We know that the more we practise something using a good recall strategy the easier it becomes to recall that memory.

We have made the point that practising something five times seems to be enough to develop an almost automatic recall of the memory. As mentioned there are two types of forgetting that affect memories that have been practised. *Notice, however, that this only applies to recall memory.* These two types of forgetting are *normal forgetting*, which happens slowly over time, and *accelerated forgetting* which, as its name suggests, happens much more quickly.

We measure these types of forgetting by the increase in the *effort* needed to recall something that we have practised.

Say that we have learnt a complex new skill such as playing a piece of music, how to solve a difficult puzzle or how to spell an unfamiliar word. If we now stop practising the new skill, normal forgetting starts to occur and slowly we find that it is harder and harder to recall the memory. Normal forgetting takes weeks to change an unpractised memory to one that can then only be remembered by recognition memory. We do not lose the memory it just gets harder to recall, until eventually we can only recognize it. A very important thing about this change in how effortful something is to recall is that if we begin to practise this skill again then the *relearning is much faster and easier than before.*

Even when something is now only recognized, relearning is easier than the first time. Something of what we originally learned, practised and then forgot has been *saved*. We have not lost this memory at all. It has changed in terms of its availability for recall, but it is still available through recognition memory and is accessed through re-experience.

We can take control of the normal rate forgetting by continuing to use and practise the things we want to remember!

Sometimes when we learn something new, or have to relearn, for example, how to spell a word a new way, we experience *accelerated forgetting*. This type of forgetting *only takes a few minutes or hours to work* instead of days or weeks as is the case with normal forgetting.

Just as with any memory that has been practised, it is not just lost. The memory is simply changed [subjected to *retrieval inhibition*] so that it can now only be recognized instead of being voluntarily recallable. This is a very interesting problem for us all.

The process of accelerated forgetting is activated when we are learning a new way of doing something which conflicts with our own way of doing something.

If someone spells the word 'said' in their own way, e.g., "sed", then that person's attempt to learn the correct way of spelling the word will lead to *confusion*. The brain initiates the accelerated forgetting of the correct way of spelling the word in order to stop this confusion. However, of course, this does not help the person if they actually want to remember the correct spelling. Accelerated forgetting is natural and it occurs when someone has their own way of doing something and they try to learn a new or better way. To take control of accelerated forgetting we need to use the Old Way/New Way method.

KEY ELEMENTS IN THE PERSPECTIVE

- A person's *errors* represent the presence of knowledge, not its absence. It is because of this prior knowledge that individuals experience difficulties with learning and maintaining new habits, skills and perspectives.
- An individual's prior habits, skills, knowledge and beliefs are protected from change. They are not subject to relearning as a consequence of re-experience or practice of a new way alone.
- The protective mechanism is known as *proactive inhibition*. This is simply the effect of prior knowledge on new but conflicting learning and the effect is to cause the *accelerated forgetting* of the new information.
- There is evidence of *considerable variation* within the population in the level of proactive inhibition that one inherits. The higher your level of proactive inhibition, the more resistant you will be to conventional correction methods.
- Proactive inhibition does not necessarily prevent learning from occurring; it does however cause confusion and perplexity which may make paying attention to the new information difficult. This factor significantly affects learning.
- Proactive inhibition prevents the association of ideas that are in conflict.
- Proactive inhibition will also inhibit the recall of an idea, which is in conflict with prior knowledge or belief.
- The powerful inhibitory effects of proactive inhibition may be reduced by the use of the OW/NW and Conceptual Mediation

Use of these methods will lead to the semi-permanent inhibition of the "old" habit, skill, or knowledge.

WORKSHOP ACTIVITY THREE:

Demonstration of the application of Old Way/New Way to overcome the persistent incorrect spelling of a word

This method starts by using the very habit, skill or idea you want to change. The method will be demonstrated through its application to the mediation of spelling problems.

When we spell a word our own way or talk about an idea or topic we “prime” our recall memory.

It becomes possible for us to remember additional things and because the idea is in our conscious memory we are able to have an influence on how this knowledge will be reorganized and stored away again when we stop thinking about it.

A reactivated “error” enters our short-term or conscious memory and *it is only at this point that the modification of memory is possible*. Change does not appear to be achievable without some form of reactivation of the error memory.

Using Old Way/New Way

Prior to starting any trial, analyse the “error” and establish rapport with the person.

(i) Ask them to spell the word their own way. Then ask if you can call this the “old way” of spelling the word. It is important that the person acknowledges in some manner the labeling of their way as the old way. Strong resistance to labeling is rare and indicates that you may need to establish better rapport.

(ii) Ask the person if you can show them a “new way” of spelling the word. Consent is a signal that he/she is paying attention.

(iii) Demonstrate the new way and draw attention to the differences and similarities between the old way and the new way. When discriminating between the two, use the labels “old way” and “new way”.

(iv) Ask the person to do it the old way again. It is important to repeat their way of spelling a word before attempting the new way of spelling the word.

(v) Ask the person to write the word the *new way*. Then ask them to tell you the difference between the old and new ways of spelling the word. Not everyone will be able to easily articulate the differences and some help may be necessary. It has been observed that both adults and children require three facilitated discriminations before articulating the differences between the words becomes easier.

(vi) The procedure of asking the pupil to spell the old way, then the new way, followed by articulating the differences and, where relevant, the similarities, is repeated until five such discriminations have been completed. (N.B this is in addition to the original teaching phase). Our research has shown that the five discriminations are both necessary and also usually the optimum number of repetitions for this phase of the procedure. More discriminations may be done, but never less.

(vii) The new way must now be generalized or practised. Six generalizations have been found to be the optimum number. In very young children this may be achieved by simply writing the word the required six times. Novelty during this phase is readily achieved through the use of different writing mediums or by introducing the notion of different letter sizes in writing the word. *A particularly popular strategy with very young children is to ask them to write the word progressively smaller until only they can see it*. For older children and adults simply ask them to write six simple sentences using the new way spelling of the word.

It is preferable for the individual to construct their own sentences. However, it is acceptable to facilitate generalization by suggesting sentences particularly with younger students. This is a matter of judgement. *The last three sentences are the most difficult for learners to construct but also the most valuable in terms of fostering generalization and transfer*.

Don't panic if...

(i) You ask the person to write a word their own way and instead they spell it correctly, look you straight in the eye, and insist that they have always spelt the word that way.

Action: Tell them that it is the new way of spelling the word. Ask if they know another way of writing the word. This will usually elicit the required old way. Occasionally the person is unable to readily recall the old way. In this situation write the old way for them and suggest that **sometimes** when they write this word they spell it that way. Ask them to write the word as shown, then call it the old way and proceed.

(ii) The person writes the word an old way when a new way is required or vice versa (This may occur at any point during the trial).

Action: Simply point out what has occurred and what is required and then continue.

Post-trial guidelines

(i) It has been established empirically that after one trial, the individual has an 80 per cent probability of recalling the new way, a 20 per cent probability of recalling the old way and a 90 per cent probability of self-correcting an old way when it occurs. This latter probability is to a certain extent cue-dependent as is also the case under conventional correction methods. Although it has not been examined specifically it is plausible to suggest that as a result of the improved transfer with Old Way/New Way the degree of cue dependency is much less. There is supportive evidence for this claim in that the person's ability to discriminate between the old and new way is strongly maintained for considerable periods of time after the trials.

(ii) One trial is usually insufficient for full inhibition of the old way, particularly in children. This is due to the phenomenon of spontaneous recovery (Underwood, 1966). As the name implies, what is spontaneously recovered is the old way. We have observed that the effect becomes apparent two to three weeks after trials with a particular concept. Consequently, we advise an additional trial with the same concept after two weeks.

There is no improvement in transfer to be gained from more frequent trials. This makes Old Way/New Way a most efficient program in respect of the time taken to learn a new concept.

If more than three trials appear necessary, then one should re-evaluate both the analysis of what is considered the old way and the procedures being followed.

(iii) As one would expect, new ways benefit from being practised. Although additional trials are unnecessary for approximately two weeks, incidental or deliberate use of the new way is most beneficial. This is particularly so when dealing with complex skills.

(iv) In-between trials, where an old way occurs and self-correction does not follow, the facilitator or trainer may need to intervene. The simplest and best approach is to bring the person's attention to their old way, ask them to produce the new way and to tell you the difference between the two. This has been found to be sufficient in reactivating the new way. If the old way still persists then this indicates that a further re-trial is necessary. Do not, however, be tempted to re-trial before the appropriate time, that is, before two weeks have passed.

(v) Selecting old ways from the person's current written work is a good method for ensuring the meaningfulness of the trials. Words are often selected that, while they may be interesting, have a low frequency of use in their work. This may lead to the need for more trials. Spontaneous recovery is a powerful natural phenomenon.

(vi) During trials, focus is maintained on the discrimination between the old and new ways. Do not bring the person's attention to any *other* errors that may be made.

(vii) It is helpful if the work is neatly set out. This can be achieved by following the format outlined in Figure 1 (a copy of an Old Way/New Way poster made available to teachers trained in the technique).

WORKSHOP ACTIVITY FOUR:

Demonstration of the application of OW/NW on a whole group basis.

The activity known as "Faces" is a very clear example of early learning commonly influencing the performance of people of all ages involved in the task of drawing a human face.

WORKSHOP ACTIVITY FIVE:

General Procedural Sequence for Conceptual Mediation

(i) Present the Conceptual Mediation Program (Lyndon 2000) and ensure that students develop competency in the cognitive strategies described, which they will apply to the learning for understanding of science concepts. A version of this handbook, somewhat modified for use as a general training manual, is included as Appendix 10.

(ii) Having selected a topic, elicit the students' associated knowledge, beliefs and ideas raised by this topic. This can be achieved in a variety of interesting ways such as small group or whole-of-class brainstorming sessions, small-group discussion and poster preparation (for later class presentation), the

preparation of concept maps or more simply by the written response of students to a pre-test on the topic. The construction of a suitable pre-test can be guided by the review of research on students' misconceptions in Driver et al., (1994). The records of these activities are retained by the students and or the teacher for use during future teaching and mediational phases of the program.

(iii) Prior to the presentation of a new theory, particular attention is given to the scientific terminology that will be presented during the explicit teaching of the theory. Wilkinson (1999) has argued that it was essential that the student's own understanding of important terms be elicited and clearly differentiated from the scientific use of these terms. Wilkinson's position was derived empirically during his twenty-five years of teaching prior to his involvement with conceptual mediation, and his perspective is clearly supported by the research of Gilbert (1985), Vygotsky (1987), and Sutton (1992, 1999). The active differentiation of words used in a scientific manner from their common sense usage has become an important aspect of the program, and is now considered to be a necessary condition for the mediation between students' understanding and of the main concepts associated with a particular topic. For example, students' problems with the general notions of force and motion are greatly facilitated by the prior differentiation and mediation between their own and the scientific use of terms such as acceleration, speed and velocity. Some teachers have found it an unusual step to present word lists as a pre-condition to the teaching of a new theoretical framework. However, in this we are also guided by Ausubel's notion of advanced organizers (Ausubel, Novak & Hanesian, 1978). In this instance we are applying the notion very broadly to include the terminology that students will meet in the teaching of the better theory, and that we anticipate they will find confusing.

(iv) Next, explicitly teach the new theory and provide opportunities for students to rehearse important aspects of the theory. This enables later comparison with the old perspectives that are initially presented to the class by the students themselves.

(v) Having elicited students' preconceptions, differentiated commonsense from scientific use of terms, then taught and demonstrated the scientific theory, we are finally in a position to undertake the formal process of conceptually mediating the alternative frameworks. The fact that we have explicitly taught the new theory and also differentiated the appropriate scientific terms from their commonsense foundations is no guarantee that the students will be freely able to recall the relevant scientific ideas. This problem is not one of teachers having inadequately taught the scientific theory, it is instead a problem arising from a conflict in understanding; it is this conflict which leads to accelerated forgetting. This issue, we have argued, may best be resolved through the process of conceptual mediation.

Conceptual mediation involves a progressive process of differentiating old ideas from the new. It is essential for the resolution of the natural phenomenon of accelerated forgetting that the teacher and students undertake a formal practice of the differences between old and new theoretical perspectives. The "old theory", being the student's perceptually constructed preconceptions and alternative conceptions, must necessarily be reactivated prior to and during conceptual mediation. At this stage in proceedings, the material collected during the elicitation of students' ideas can be presented again to facilitate discussion of their "old" perspectives.

The recall of the new theory, and the active differentiation of the alternative perspectives, is repeated in a progressive manner five separate times. By the term "progressive" we mean that when this reflective process is undertaken by the class or by an individual there is a growth in the individual's awareness of how the alternatives differ. There is importantly, also, a corresponding increase in the capacity of the individual to articulate similarities and differences.

As has been observed in other applications of the mediational process, at least three progressive differentiations are necessary for the re-direction of the accelerated forgetting effect to be initiated. This re-direction of the retrieval inhibition from the old to the new knowledge is consolidated over the following two differentiations.

(vi) Once the formal mediational process is completed, the new theory is then generalized to at least six novel applications or problem solving situations.

(vii) The use of a formative test/summative test evaluation strategy has proved to be a useful way of demonstrating to students the value of conceptual mediation. Students readily observe the difference in learning outcomes of either using practice or using mediation for correcting errors made during formative testing of a subject. The CMP promotes the independent use of conceptual mediation by students as a homework strategy to deal with any remaining problematic issues. Specific recommendations are made in the CMP training manual regarding homework and its important role in learning (see Appendix ten).

The conceptual mediation program offers students the opportunity to adopt a metacognitive perspective and to learn specific cognitive skills that facilitate learning for understanding.

WORKSHOP ACTIVITY SIX:

The importance of homework: an example of the importance of effective recall strategies in skilled performance

The CMP provides a model of human memory and learning that permits students an insight into the importance of homework. We cannot fully understand the phenomenon of learning until we understand the phenomenon of forgetting. Learning is understood to be the changes arising in an individual as a result of practice, through the mediation of prior learning or simply through experience.

The brain however is also designed to forget. Forgetting is not simply a process of loss or decay of a memory trace but rather it is a process of *retrieval inhibition*. By this is meant that a memory becomes harder and harder to consciously remember. What was a fresh and interesting experience minutes, hours or days before, becomes what we loosely term a faded memory.

Thus the *measurable changes in our learning* due to changes in our ability to *consciously access* what we have learned, are what we mean by *forgetting*.

We observe two rates of forgetting: a slow rate, affecting the recall of well-practised items usually taking weeks to be noticed and an accelerated rate of forgetting of ideas which are in conflict or of experiences that are not practised, usually being noticeable in less than an hour.

We must carefully distinguish between the learning that occurs due to experience alone, learning which is subject to accelerated rates of forgetting, and the learning that occurs due to the deliberate practice of an item.

When we deliberately and progressively practise the recall of an item we gradually change the status of that memory; it becomes easier to *recall*. It becomes easier to access that memory consciously, i.e., voluntarily.

Students are often misled by their natural capacity to recall items after re-experiencing a situation. It is also their experience that such recall is generally *transient* but this fact they all too quickly forget when it comes to studying for an examination.

The cyclic nature of learning and forgetting creates many problems for both student and teacher.

Many students complain that they do not get any benefit from their homework and to some of them it appears as just "busy work", something imposed on them by their teachers or parents, something which just takes up their valuable free time.

Other students complain that despite doing their homework they do not improve their test results and are thus confused as to the value of the work that they are required to do.

A common experience of students is that their mind "goes blank" during an examination. They experience an inability to remember information that they have practised the night before. They do not understand why it is that work, which the night before was readily remembered, should now be a faint or unattainable memory.

The above examples are in fact due to the normal functioning of the human memory in response to the type of learning strategy that students use in their attempts to be successful.

The CMP program makes explicit the memory and learning traps for students and offers a model of how to control learning and remembering more easily.

Trap 1. The limitations of recognition memory

"But I already *know* that. It's *boring!* Why should I have to *practise?*"

Recognition memory is an automatic capacity of the brain. It can arise simply from the learning that occurs from any experience we may have. For recognition memory to function it is necessary that we have a re-experience. We are presented with a sense of *knowing* that we have had that experience before.

When students re-read a passage in a book they experience recognition memory at work. They also experience a *recall memory priming effect* in that any readily associated ideas are automatically presented to them. This again gives them a *false* sense of "knowing" which leads them to mistakenly believe that: *no further practice of their "knowledge" is necessary*. This they later find is not necessarily true and usually this is discovered during a test. *What then should students do?*

- They should: *not* rely on *recognition* memory. A memory stored at this level requires the re-experience of the original or similar situation to permit us to remember that event.
- Be aware that during a lesson teachers are often only able to teach to a level of recognition memory. While students may be taught to a level of recognition memory they will actually be tested for their ability to *recall* what they have learned.
- They should understand that *practice and mediation* will be essential and it will need to be done as *homework*. Only practice and mediation will prevent them from experiencing “memory blackouts” during tests.

Trap 2. Reading and copying as a learning strategy

Reading through the required text for homework and taking notes as you go may seem like a useful strategy for learning and indeed it is a very good starting point.

However, reading as a skill and the copying of notes from a text all involve recognition memory and as such do not permit the stimulation of the essential recall memory process.

Taking control of the recall memory process will guarantee good test performances.

Finding a better way to study is a necessity for all students and understanding *why* it is a better way is fundamental.

We can apply the ideas discussed under the Look Say Cover Write Check approach.

- Read the passage as carefully and as quickly as you can and make a note of any important point. Make only brief notes and avoid simply copying the notes you make. Instead, try to put things in your own words. Then,
- *Cover*, i.e., hide from view, the passage just read and the notes you have taken and *recall* as much of the *meaning* of the passage as you can and write down as many ideas from your notes as you can recall. You will find that after the first reading and note taking that your *recall* will be very limited. This is *natural*. Then,
- *Repeat this whole process at least another two times!* You will discover that your reading speed increases on each repetition. Your *understanding* of what is being read and what is important will also *change*, significantly. When you attempt to recall the important points these will be readily recalled. You can then go to sleep knowing you have practised your recall memory and that you will *not* experience a mental blank next day during a test.

Trap 3. Accelerated forgetting

This is the rate of forgetting associated with recognition level storage and also with the effects of conceptual conflict. Refer to the section on the Old Way / New Way method.

Trap 4. Rote learning means learning without understanding

Rote learning simply means practising without regard to the meaning of what is being learned. An example is the learning of tables by young students or the learning by heart of passages of poetry or music. Rote learning is limited and is subject to both accelerated and normal rates of forgetting.

The forgetting of habits depends upon changed stimulus conditions whereas the forgetting of skills is conditional on the continued use of the skill. However, what we *understand* is not subject to forgetting. *These differences are very significant.*

CONCLUDING REMARKS

Remediation is usually considered to be an interpersonal teacher-directed activity. It generally involves evaluating a person’s performance, determining needs, presenting additional information and/or correcting performance. Consolidation of this new information is then attempted through practice that is sometimes extensive. The effectiveness of this widely used approach, based as it is on teaching and re-teaching techniques, has been seriously questioned since the early sixties.

Where there is no conflict between what someone knows and what is being taught then the use of effective initial teaching strategies will usually be successful.

Often, however, a perceived difference or conflict, either conscious or unconscious, exists between what the learner already knows and what is being taught. Under these conditions even the use of effective teaching strategies can lead to significant learning difficulties being experienced by the learner. The major symptoms of such conflict and the resulting learning difficulties are confusion, frustration, avoidance of the task and/or slow rates of acquisition followed then by the difficulty individuals have with independently recalling the newly taught procedures and ideas.

The Conceptual Mediation Program offers the learner practical procedures which permit direct personal control and facilitation of the natural process of change. With this new approach change is achievable through individuals recognising and understanding the need for change and confidently knowing how to achieve it.

Both Old Way/New Way and Conceptual Mediation require the individual to consciously acknowledge that there is a conflict; to learn the difference between the old and the new ways; to perform both the old and the new way and to practise the difference between them. This results in the redirection of the accelerated forgetting effect so that the old way is forgotten instead of the new.

In this innovative model of learning *accelerated forgetting* is seen as both the *default rate* of forgetting associated with learning from experience and it is also initiated whenever there is a conflict between what is already known and what is being taught, that is as a result of *proactive inhibition*. This accelerated rate of forgetting is in contrast to what is referred to as the normal rate of forgetting which is associated with learning through practice of new concepts or skills which are not in conflict with prior experience.

Accelerated forgetting caused by proactive inhibition is seen as the major phenomenon associated with the experience of learning difficulties whether this is in the field of training or of education in general.

NB: This has been a brief introduction to the methodology. There remain many issues that would involve extensive elaboration.

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