Basic nature of lateral thinking 4

In Chapter Two the nature of lateral thinking was indicated by contrasting it with vertical thinking. In this chapter the basic nature of lateral thinking is indicated in its own right.

Lateral thinking is concerned with changing patterns

By pattern is meant the arrangement of information on the memory surface that is mind. A pattern is a repeatable sequence of neural activity. There is no need to define it any more rigidly. In practice a pattern is any repeatable concept, idea, thought, image. A pattern may also refer to a repeatable sequence in time of such concepts or ideas. A pattern may also refer to an arrangement of other patterns which together make up an approach to a problem, a point of view, a way of looking at things. There is no limit to the size of a pattern. The only requirements are that a pattern should be repeatable, recognizable, usable.

Lateral thinking is concerned with changing patterns. Instead of taking a pattern and then developing it as is done in vertical thinking, lateral thinking tries to restructure the pattern by putting things together in a different way. Because the sequence of arrival of information in a self-maximizing system has so powerful an influence on the way it is arranged some sort of restructuring of patterns is necessary in order to make the best use of the information imprisoned within them.

In a self-maximizing system with a memory the arrangement of information must always be less than the best possible arrangement.

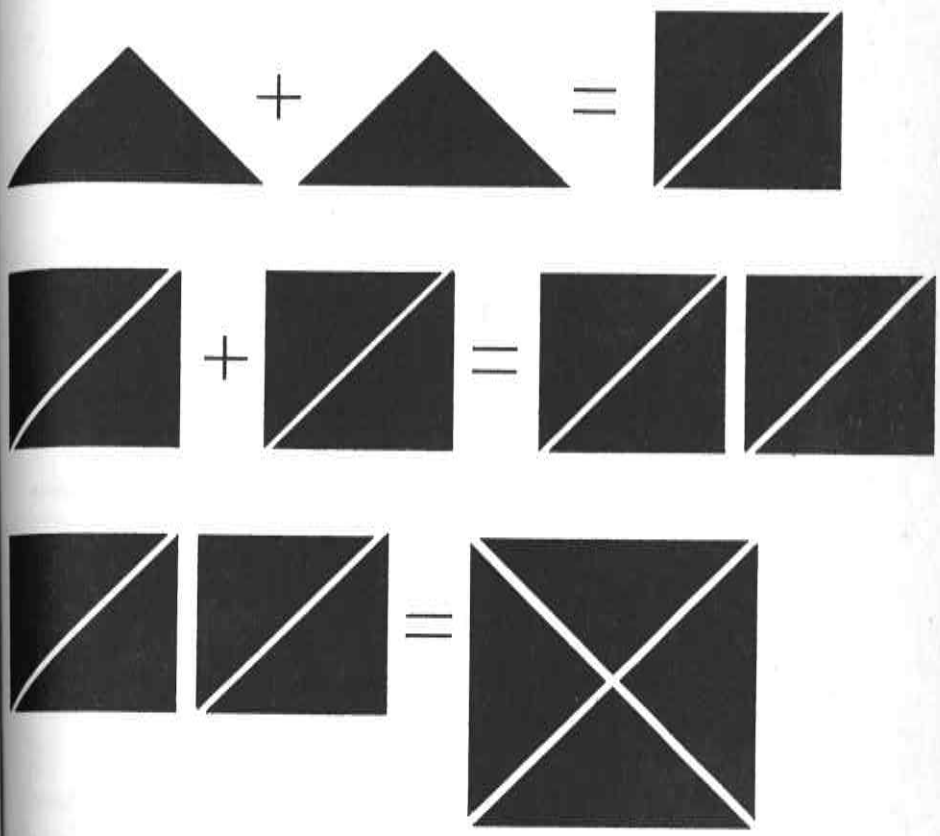
The rearrangement of information into another pattern is insight restructuring. The purpose of the rearrangement is to find a better and more effective pattern.

A particular way of looking at things may have developed gradually. An idea that was very useful at one time may no longer be so useful today and yet the current idea has developed directly from that old and outmoded idea. A pattern may develop in a particular way because it was derived from the combination of two other patterns but had all the information been available at one time the pattern would have been quite different. A pattern may persist because it is useful and adequate and yet a restructuring of the pattern could give rise to something very much better.

In the diagram opposite two pieces come together to give a pattern. This pattern then combines with another similar pattern in a straightforward manner. Without the addition of any new pieces the pattern can suddenly be restructured to give a much better pattern. Had all four pieces been presented at once this final pattern is the one that would have resulted but owing to the *sequence of arrival* of the pieces it was the other pattern that developed.

Lateral thinking is both an attitude and a method of using information

The lateral thinking attitude regards any particular way of looking at things as useful but not unique or absolute. That is to say one acknowledges the usefulness of a pattern but instead of regarding it as inevitable one regards it as only one way of putting things together. This attitude challenges the assumption that what is a convenient pattern at the moment is the only possible pattern. This attitude tempers the arrogance of rigidity and dogma. The lateral thinking attitude involves firstly a refusal to accept rigid patterns and secondly an attempt to put things together in different ways. With lateral thinking one is always trying to generate alternatives, to restructure patterns. It is not a matter of declaring the current pattern wrong or inadequate.



Lateral thinking is never a judgment. One may be quite satisfied with the current pattern and yet try to generate alternative patterns. As far as lateral thinking is concerned the only thing that can be wrong with a pattern is the arrogant rigidity with which it is held.

In addition to being an attitude, lateral thinking is also a particular way of using information in order to bring about pattern restructuring. There are specific techniques which can be used deliberately and these will be discussed later. Underlying them all are certain general principles. In lateral thinking information is used not for its own sake but for its effect. This way of using information involves looking forward not backward: one is not interested in the reasons which lead up to and justify the use of a piece of information but in the effects that might follow such a use. In vertical thinking one assembles information into some structure, bridge or pathway. The information becomes part of the line of development. In lateral thinking information is used to alter the structure but not to become part of it.

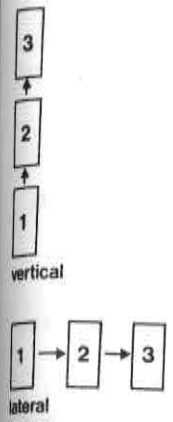
One might use a pin to hold two pieces of paper together or one might use a pin to jab into someone and make him jump. Lateral thinking is not stabilizing but provocative. It has to be in order to bring about repatterning. Because it is not possible to restructure a pattern by following the line of development of that pattern lateral thinking may be deliberately perverse. For the same reason lateral thinking may use irrelevant information or it may involve suspending judgment and allowing an idea to develop instead of shutting it off by pronouncing it wrong.

Lateral thinking is directly related to the information handling behaviour of mind

The need for lateral thinking arises from the limitations

of a self-maximizing memory system. Such a system functions to create patterns and then to perpetuate them. The system contains no adequate mechanism for changing patterns and bringing them up to date. Lateral thinking is an attempt to bring about this restructuring or insight function.

Not only does the need for lateral thinking arise from the information handling of mind but the effectiveness of lateral thinking also depends on this behaviour. Lateral thinking uses information provocatively. Lateral thinking breaks down old patterns in order to liberate information. Lateral thinking stimulates new pattern formation by juxtaposing unlikely information. All these manoeuvres will only produce a useful effect in a self-maximizing memory system which snaps the information together again into a new pattern. Without this behaviour of the system lateral thinking would be purely disruptive and useless.



The most basic principle of lateral thinking is that any particular way of looking at things is only one from among many other possible ways. Lateral thinking is concerned with exploring these other ways by restructuring and rearranging the information that is available. The very word 'lateral' suggests the movement sideways to generate alternative patterns instead of moving straight ahead with the development of one particular pattern. This is indicated in the diagrams opposite.

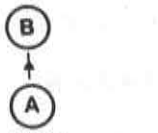
It may seem that the search for alternative ways of looking at something is a natural search. Many people feel that this is something that they always do. To some extent it is but the lateral search for alternatives goes far beyond the natural search.

In the natural search for alternatives one is looking for the best possible approach, in the lateral search for alternatives one is trying to produce as many alternatives as possible. One is not looking for the *best* approach but for as many *different* approaches as possible.

In the natural search for alternatives one stops when one comes to a promising approach. In the lateral search for alternatives one acknowledges the promising approach and may return to it later but one goes on generating other alternatives.

In the natural search for alternatives one considers only reasonable alternatives. In the lateral search for alternatives these do not have to be reasonable.

The natural search for alternatives is more often an intention than a fact. The lateral search for alternatives is deliberate.



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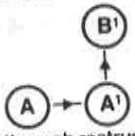
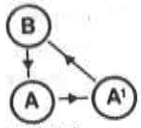


through restructuring



indirect

The main difference is the purpose behind the search for alternatives. The natural inclination is to search for alternatives in order to find the best one. In lateral thinking however the purpose of the search is to loosen up rigid patterns and to provoke new patterns. Several things may happen with this search for alternatives.
One may generate a number of alternatives and then return to the original most obvious one.
A generated alternative might prove a useful starting point.
A generated alternative might actually solve the problems without further effort.
A generated alternative might serve to rearrange things so that the problem is solved indirectly.

Even if the search for alternatives proves to be a waste of time in a particular case it helps develop the habit of looking for alternatives instead of blindly accepting the most obvious approach.

The search for alternatives in no way prevents one from using the most obvious approach. The search merely delays the use of the most probable approach. The search merely adds a list of alternatives to the most probable approach but detracts nothing from it. In fact the search adds to the value of the most probable approach. Instead of this approach being chosen because it seems the only one, it is chosen because it is obviously the best from among many other possibilities.

Quota

In order to change the search for alternatives from being a good intention to a practical routine one can set a quota. A quota is a fixed number of alternative ways of looking at a situation. The advantage of having a predetermined quota is that one goes on generating alternatives until one has filled the quota and this means that if a particularly promising alternative occurs early

in the search one acknowledges it and moves on instead of being captured by it. A further advantage of the quota is that one has to make an effort to find or generate alternatives instead of simply awaiting the natural alternatives. One makes an effort to fill the quota even if the alternatives generated seem artificial or even ridiculous. Suitable quotas might be three, four or five alternatives.

Having a quota does not of course stop one generating even more alternatives but it does ensure that one generates at least the minimum.

Practice

Geometric figures

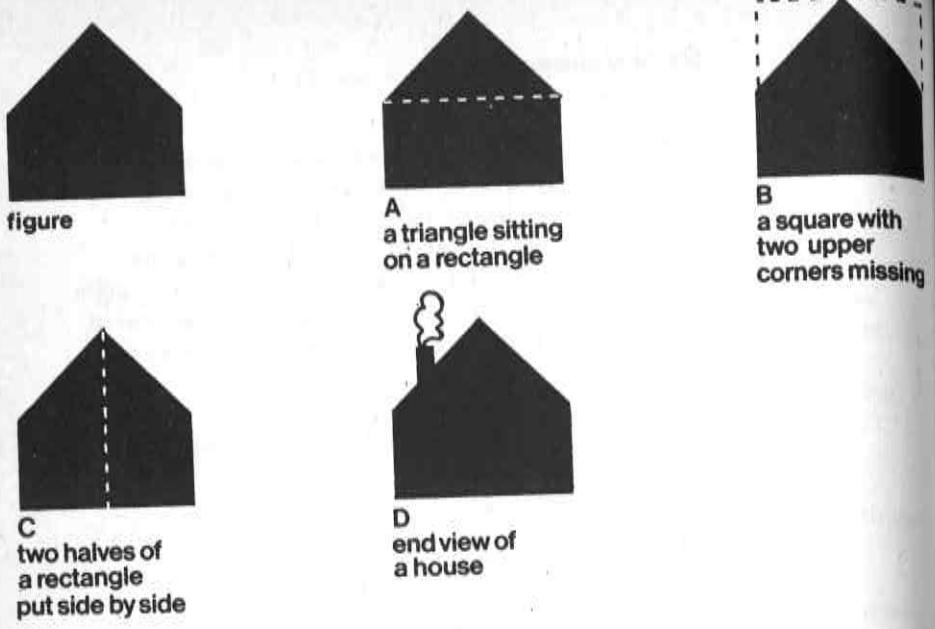
The advantage of visual figures is that the material is presented in an unequivocal form. A student may look at the material and make of it what he will but the material remains the same. This is in contrast to verbal material where tone, emphasis, individual shades of meaning all give the material an individual flavour which is not available to everyone.

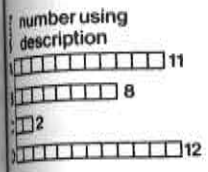
The advantage of geometrical figures is that they are standard patterns described by simple words. This means that one can snap from one description to another without any difficulty in describing how one is looking at the figure.

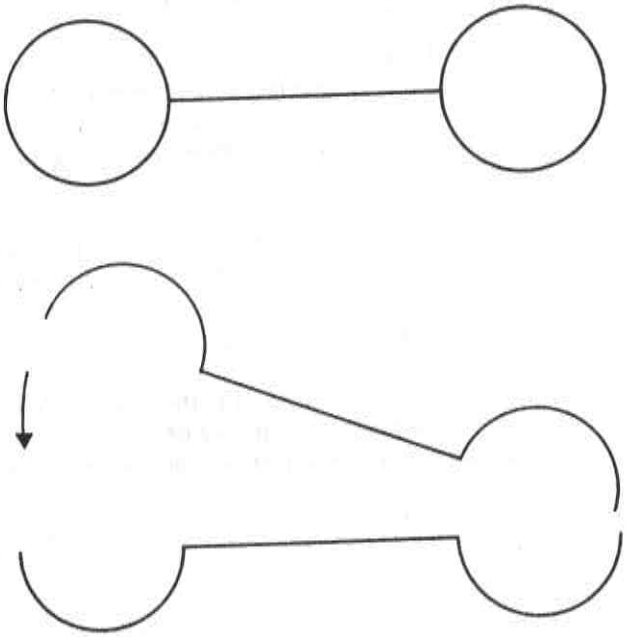
The teacher starts off with the geometric figures in order to indicate what the generation of alternatives is all about. When the idea is clear he can move on to less artificial situations.

In practice the teacher handles the situation as follows:

1 The figure is shown on the board to the whole class or else given out to each student on a separate piece of paper.







2 The students are asked to generate different ways of describing the figure.

3 The teacher can then collect the written alternatives or not, depending on the size of the classroom and the available time.

4a (papers not collected)
The teacher asks for a volunteer description of the figure. If one is not forthcoming he points at someone and asks that person to describe the figure. Having got the first description the teacher asks for other variations. The other possible variations are listed.

4b (papers collected)
The teacher may pick out one or two papers without needing to go through the lot. He reads out the description. He then asks for other variations or goes through the accumulated papers and picks out any variations.
If there is sufficient time between sessions the teacher could go through the papers and draw up a histogram list of the variations offered (as shown opposite). This is then shown at a subsequent session.

5 The function of the teacher is to encourage and accept variations not to judge them. If a particular variation seems outrageous the teacher does not condemn it but asks the originator to explain it more fully. If it is obvious that the rest of the classroom cannot be persuaded to accept this outrageous variation then it is best to list it at the bottom. But it should not be rejected.

6 Whenever there is difficulty in generating variations the teacher must insert a few possibilities which he himself has prepared beforehand.

Material

1 How would you describe the figure shown opposite?

Alternatives

Two circles joined by a line.
A line with a circle at either end.

Two circles each with a short tail attached and placed so that the tails are in line and meet up.
Two pieces of guttering, one placed on top of the other.

Comment
It may be protested that 'two circles joined by a line' is really the same as a 'line with a circle at either end'. This is not so since in one case attention starts with the circle and in the other case it starts with the line. From the point of view of what happens in the mind the sequence of attention is of the utmost importance hence a different sequence of attention is a difference.

Some of the descriptions may be static ones that can be explained in terms of the figure shown. Others may be dynamic descriptions which are more easily shown by additional diagrams. This happens when the presented diagram is taken as the end point of some arrangement of other figures.

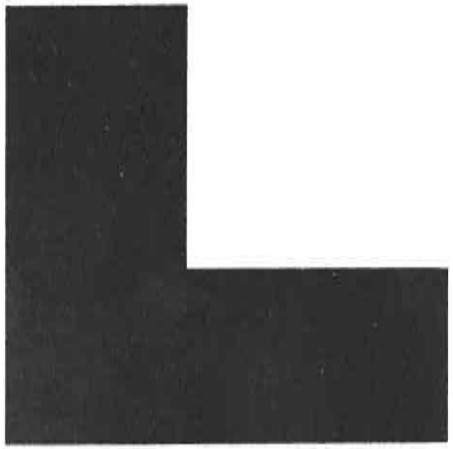
2 How would you describe the figure shown opposite?

Alternatives
An L shape.
A carpenter's angle.
A gallows upside down.
Half a picture frame.
Two rectangles placed one against the other.
A large rectangle with a smaller rectangle subtracted.

Comment
Some difficulty arises when the presented shape is compared to an actual object like 'a carpenter's angle'. The difficulty is that this sort of description opens up an unlimited range of descriptions, for instance another description might describe the shape as a building looked at from the air. The point to keep very clearly in mind is that *one is asked for an alternative description of the presented figure, one is not asking what the figure could be or what it reminds you of*. The description must be

such that someone could actually draw the figure from the description. Thus the suggestion that the figure looks like a building seen from the air is useless unless the building is specified as L shaped in which case the description is L shaped. One need not insist that the description be very exact, for instance the 'two rectangles placed against the other' ought really to contain an indication of the orientation but one must not be pedantic because it misplaces the emphasis.

Some of the descriptions may indicate a particular process. Such descriptions as 'two rectangles placed one against the other' or 'a larger rectangle with a smaller rectangle missing' actually require that one consider

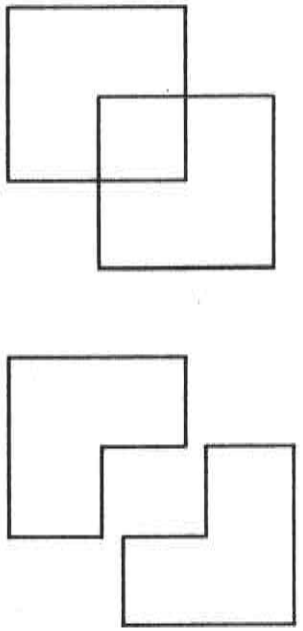


some other figure and then subtract or modify. Clearly this is a valid method of description. The basic types of description might be regarded as:
Building up from smaller units.
Comparing to another figure.
Modifying another figure by addition or subtraction.

As before one may have to draw additional diagrams to show what is meant. If one cannot understand oneself what the student means then he is asked to explain it himself.

3 How would you describe the figure shown opposite?
Alternatives
Two overlapping squares.
Three squares.
Two L shapes embracing a square gap.
A rectangle divided into half with the two pieces pushed out of line.
Comment
The 'two overlapping squares' seems so obvious a description that any other seems perverse. This illustrates how strong is the domination by obvious patterns. Once again it may be felt that 'two squares overlapping' is the same as 'three squares' since the latter is implied by the former. This is a tendency that must be resisted because often even a minor change in the way a thing is looked at can make a huge difference. One must resist the temptation to say that one description means the same thing as another and hence that it is just quibbling.

There may be elaborate descriptions which seek to be so comprehensive that they cover all possibilities: 'Two squares that overlap at one corner so that the area of overlap is a square of side about half that of the original squares'. Such comprehensive descriptions almost reproduce the diagram and hence must include



all sorts of other descriptions. Nevertheless these other descriptions must be accepted in their own right. Logically a description may be redundant in that it is implied by another but perceptually the same description may make use of new patterns. For instance the idea of *three* squares is useful even though it is implicit in the overlap description.

4 How is the pattern opposite made up?

Alternatives

A small square surrounded by big squares.

A big square with small squares at the corners.

A column of large squares pushed sideways to give a staircase pattern.

Basic unit made out of one large and one small square.

Extend the edges of a small square and draw other small squares on these extended edges.

A line is divided into thirds and perpendiculars are drawn at each third.

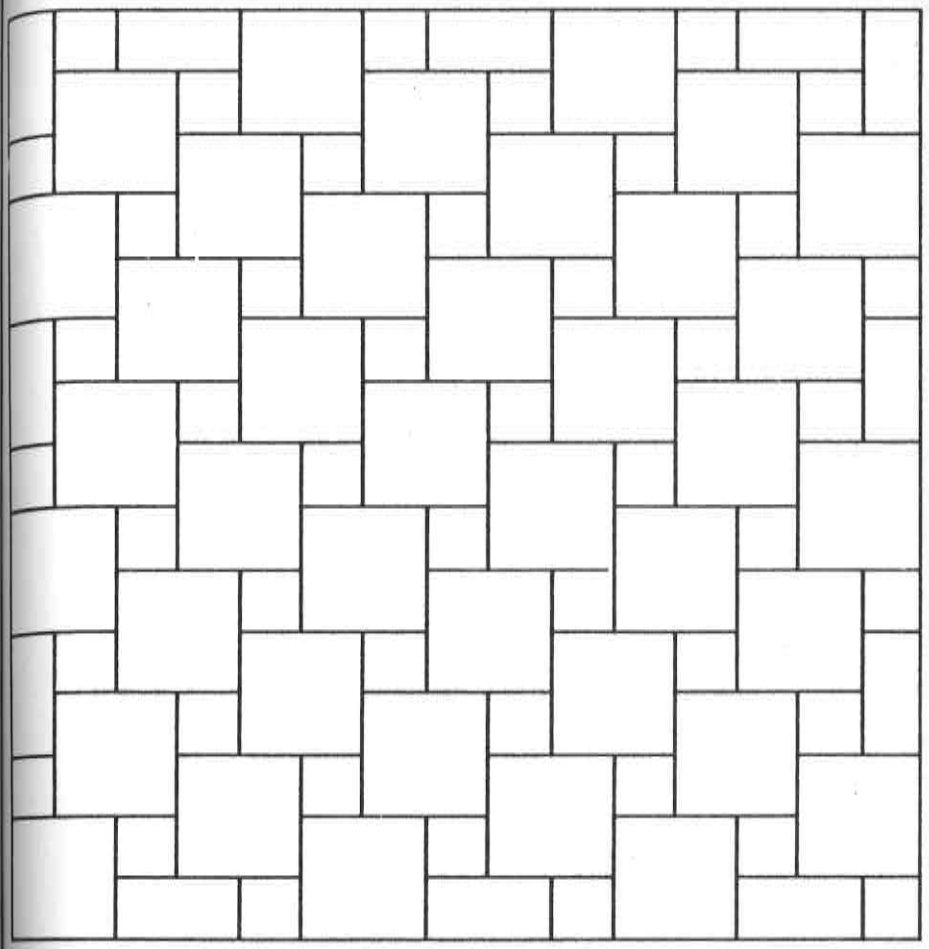
In a grid pattern some of the small squares are designated in a certain way and outlined and then the lines are removed and the spaces filled with big squares.

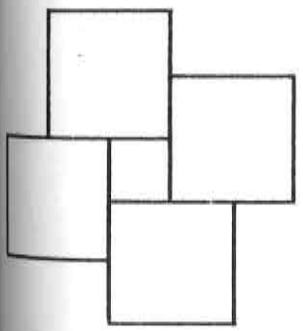
Big squares are placed against each other so that the side of each one half overlaps the side of every adjacent square.

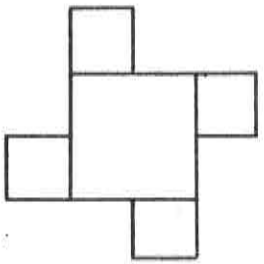
Two overlapped patterns of lines, one at right angles to the other.

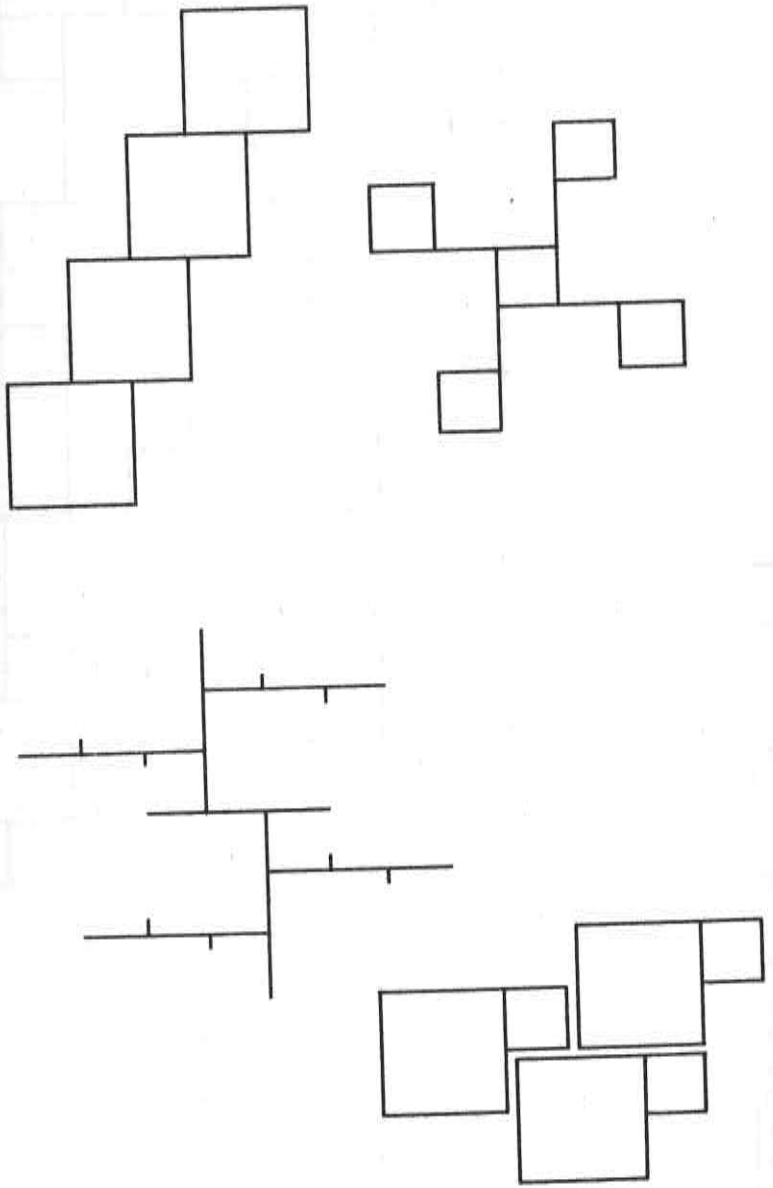
Comment

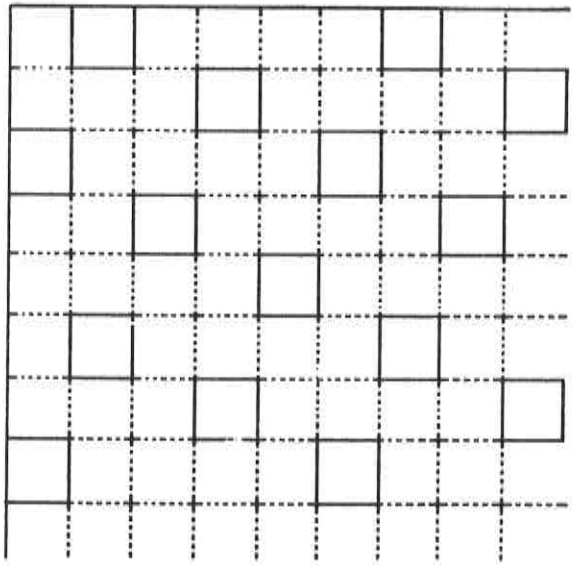
There are very many possible variations other than those listed above. The descriptions offered must be workable. The description should clearly indicate how the pattern is being looked at. What is of importance is the variety of ways the pattern can be treated: in terms of large squares only, in terms of small squares only, in terms of both large and small squares, in terms of lines, in terms of spaces, in terms of a grid pattern.











● Activity

The examples used so far call for different descriptions of a presented pattern. One can move on from different ways of looking at things to different ways of doing things. This is rather more difficult since with description it is only a matter of selecting what is already there but to do something one has to put in what is not there.

5 How would you divide a square into four equal pieces? (For this example it is better that each student tries to draw as many different versions as he can instead of just watching the board and offering a new approach. At the end the papers may be collected if the teacher wants to analyse the results or else left with the students for them to tick off the various versions.)

Alternatives

Slices.

Four smaller squares.

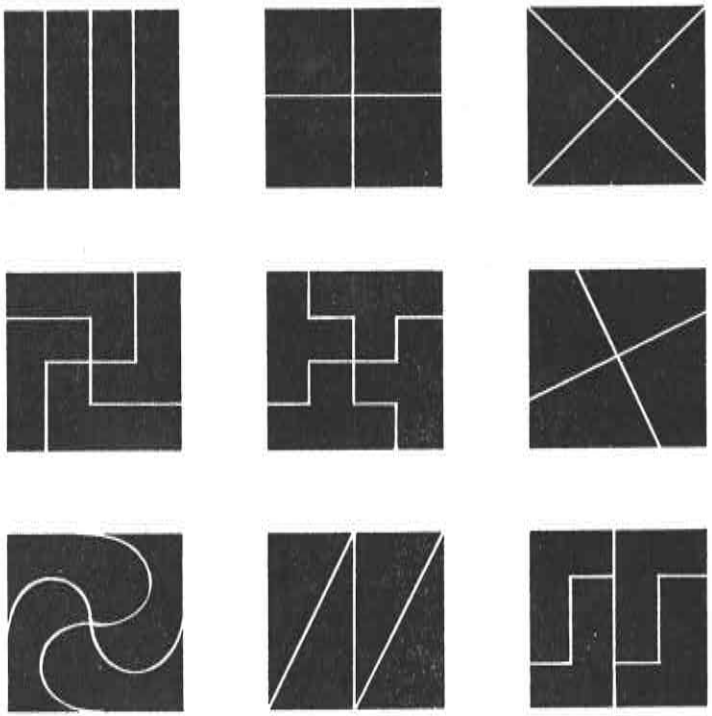
Diagonals.

Divide the square into sixteen small squares and then put these together to give swastika or L shapes as shown.

Other shapes as shown.

Comment

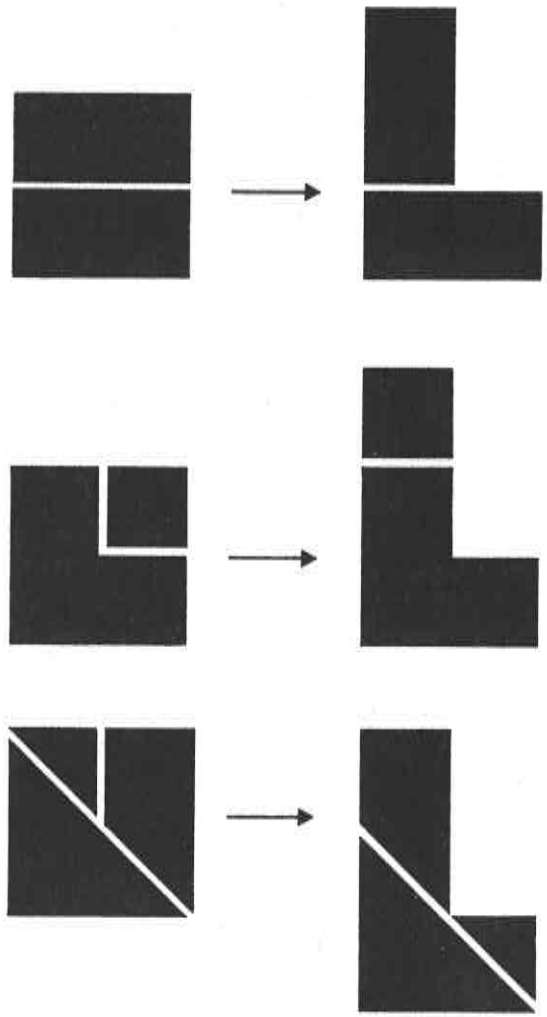
Many students at first stick to the slices, diagonals and four small squares. One then introduces the idea of dividing the square into sixteen small squares and putting these together in different ways. The next principle is that any line which passes from a point on the edge of the square to an equivalent point on the opposite edge and has the same shape above the centre point as below it divides the square into half. By repeating the line at right angles one can divide the square into quarters. Obviously there is an infinite number of shapes which this line can have. It may be that some students will offer variations on this principle without realizing the principle. Rather than listing each



variation one puts them together under the one principle. A variation on this principle involves dividing the square into half and then dividing each half into half again. For each half any division which passes through the centre of that half and is of equivalent shape on each side of the centre point will do. This introduces a whole new range of shapes.
Since this is not an exercise in geometry or design the intention is not to explore the total possible ways of carrying out the division. What one tries to do is to show that there are other ways even when one is convinced that there cannot be. Thus the teacher waits until no further ways are offered and then introduces the variations suggested above one at a time. (It may of course happen that all the variations listed above are introduced by the students themselves.)

6 How would you divide up a square of cardboard to give an L shape with the same area as the square. You can use not more than two cuts. (Actual squares of cardboard can be used or drawings should suffice.)
Alternatives
The two rectangular slices (see figure opposite.)
The cutting out of the small square.
The diagonal cut.
Comment
The requirement 'use not more than two cuts' introduces the element of constraint. The constraint is not meant to be restrictive, on the contrary it encourages the effort to find difficult alternatives instead of being easily satisfied.

Since one is used to dealing with vertical and horizontal lines and with right angles the diagonal method is not easy to find. Perhaps the best way to find it is to 'cut across the square diagonally and then see where that gets one'. In effect one is beginning to use provocative manoeuvres rather than simple analytical ones.



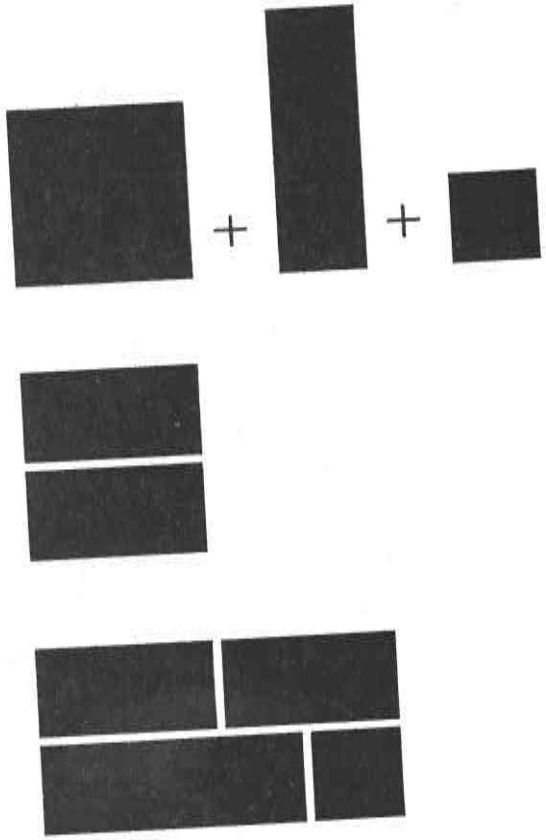
Challenging assumptions 8

The previous chapter was concerned with alternative ways of putting things together. It was a matter of finding out alternative ways of putting A, B, C and D together to give different patterns. This section is concerned with A, B, C and D for their own sakes. Each of them is itself an accepted, standard pattern.

A cliché is a stereotyped phrase, a stereotyped way of looking at something or describing something. But clichés refer not only to arrangements of ideas but to ideas themselves. It is usually assumed that the basic ideas are sound and then one starts fitting them together to give different patterns. But the basic ideas are themselves patterns that can be restructured. It is the purpose of lateral thinking to challenge any assumption for it is the purpose of lateral thinking to try and restructure any pattern. General agreement about an assumption is no guarantee that it is correct. *It is historical continuity that maintains most assumptions– not a repeated assessment of their validity.*

The figure overleaf shows three shapes. Suppose you had to arrange them to give a single shape that would be easy to describe? There is difficulty in finding such an arrangement. But if instead of trying to fit the given shapes together one reexamined each shape then one might find it possible to split the larger square into two. After that it would be easy to arrange all the shapes into an overall simple shape. This analogy is only meant to illustrate how sometimes a problem cannot be solved by trying different arrangements of the given pieces but only by reexamination of the pieces themselves.

If the above problem was actually set as a problem and the solution given as indicated there would immediately be an outcry that this was 'cheating'. There would be protests that it was assumed that the given shapes could not themselves be altered. Such a cry of cheating always



reveals the use of certain assumed boundaries or limits.

In problem solving one always assumes certain boundaries. Such boundaries make it much easier to solve the problem by reducing the area within which the problem solving has to take place. If someone were to give you an address in London it might be hard to find. If someone told you it was north of the Thames it would be slightly easier to find. If someone told you that it was within walking distance of Piccadilly Circus it would be that much easier to find. So it is with problem solving that one sets one's own limits within which to explore. If someone else comes along and solves the problem by stepping outside the limits there is an immediate cry of 'cheating'. And yet the limits are usually self-imposed. Moreover they are imposed on no stronger grounds than that of convenience. If such boundaries or limits are wrongly set then it may be as impossible to solve the problem as it would be to find an address south of the river Thames by looking north of the river.

Since it would be quite impossible to reexamine everything in sight one has to take most things for granted in any situation – whether or not it is a problem situation. Late one Saturday morning I was walking down a shopping street when I saw a flower seller holding out a large bunch of carnations for which he was only charging two shillings (ten newpence). It seemed a good bargain and I assumed that it was the end of the morning and he was getting rid of his leftover flowers. I paid him whereupon he detached a small bunch of about four carnations from the large bunch and handed them to me. The little bunch was a genuine bunch wrapped with a little bit of wire. It was only my greed that had assumed that the bunch offered had referred to the whole bunch he held in his hand.

A new housing estate had just been completed. At the ceremonial opening it was noticed that everything appeared to be a little bit low. The ceilings were low, the doors were low, the windows were low. No one could understand what had happened. Finally it was discovered that someone had sabotaged the measuring sticks used by the workmen by cutting an inch off the end of each one. Naturally everyone using the sticks had assumed that they at least were correct since they were used to show the correctness of everything else.

There is made in Switzerland a pear brandy in which a whole pear is to be seen within the bottle. How did the pear get into the bottle? The usual guess is that the bottle neck has been closed after the pear has been put into the bottle. Others guess that the bottom of the bottle was added after the pear was inside. It is always assumed that since the pear is a fully grown pear that it must have been placed in the bottle as a fully grown pear. In fact if a branch bearing a tiny bud was inserted through the neck of the bottle then the pear would actually grow within the bottle and there would be no question of how it got inside.

In challenging assumptions one challenges the necessity of boundaries and limits and one challenges the validity of individual concepts. As in lateral thinking in general there is no question of attacking the assumptions as wrong. Nor is there any question of offering better alternatives. It is simply a matter of trying to restructure patterns. And by definition assumptions are patterns which usually escape the restructuring process.

Practice session

1 Demonstration problems

Problem

A landscape gardener is given instructions to plant four special trees so that each one is exactly the same distance from each of the others. How would you arrange the trees?

The usual procedure is to try and arrange four dots on a piece of paper so that each dot is equidistant from every other dot. This turns out to be impossible. The problem seems impossible to solve.

The assumption is that the trees are all planted on a level piece of ground. If one challenges this assumption one finds that the trees can indeed be planted in the manner specified. But one tree is planted at the top of a hill and the other three are planted on the sides of the hill. This makes them all equidistant from one another (in fact they are at the angles of a tetrahedron). One can also solve the problem by placing one tree at the bottom of a hole and the others around the edge of the hole.

Problem

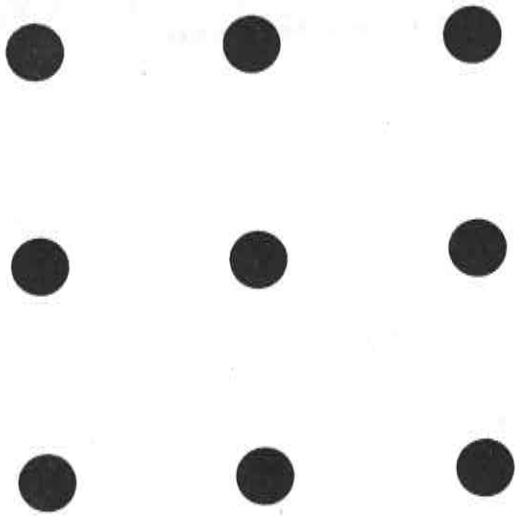
This is an old problem but it makes the point very nicely. Nine dots are arranged as shown overleaf. The problem is to link up these nine dots using only four straight lines which must follow on without raising the pencil from the paper.

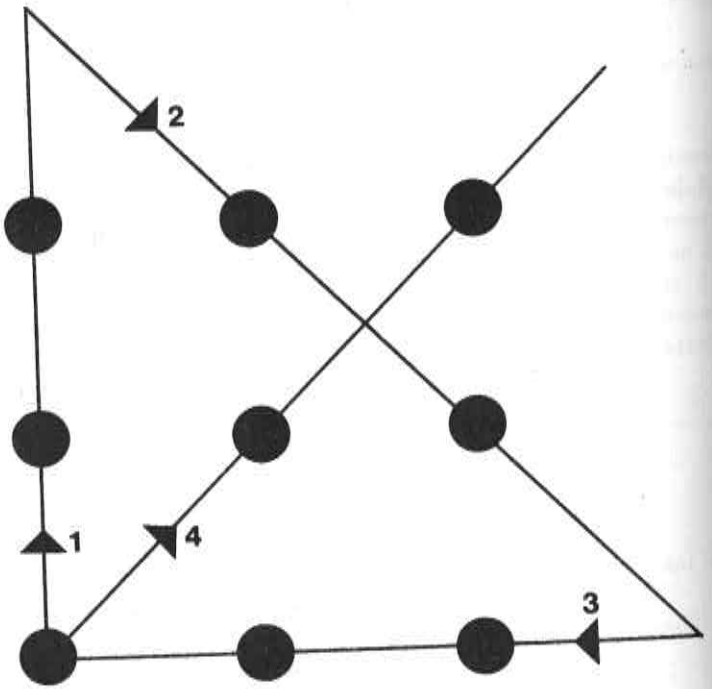
At first it seems easy and various attempts are made to link up the dots. Then it is found that one always needs more than four. The problem seems impossible.

The assumption here is that the straight lines must link up the dots and must not extend beyond the boundaries set by the outer line of dots. If one breaks through this assumption and does go beyond the boundary then the problem is easily solved as shown.

Problem

A man worked in a tall office building. Each morning he got in the lift on the ground floor, pressed the lift button to the tenth floor, got out of the lift and walked up to the fifteenth floor. At night he would get into the lift on the fifteenth floor and get out again on the ground floor. What was the man up to?





Various explanations are offered. They include:
The man wanted exercise.
He wanted to talk to someone on the way up from the tenth to the fifteenth floor.
He wanted to admire the view as he walked up.
He wanted people to think he worked on the tenth floor (it might have been more prestigious) etc.
In fact the man acted in this peculiar way because he had no choice. He was a dwarf and could not reach higher than the tenth floor button.

The natural assumption is that the man is perfectly normal and it is his behaviour that is abnormal.

One can generate other problems of this sort. One can also collect examples of behaviour which seem bizarre until one knows the real reason behind it. The purpose of these problems is just to show that the acceptance of assumptions may make it difficult or impossible to solve a problem.

2 The block problems

Problem

Take four blocks (these may be matchboxes, books, cereal or detergent packets). The problem is to arrange them in certain specified ways. These ways are specified by how the blocks come to touch each other in the arrangement. For two blocks to be regarded as touching any part of any flat surface must be in contact – a corner or an edge does not count.

The specified arrangements are as follows:

1 Arrange the blocks so that each block is touching two others.

2 Arrange the blocks so that one block is touching one other, one block is touching two others, and another block is touching three others.

3 Arrange the blocks so that each block is touching three others.

4 Arrange the blocks so that each block is touching one other.

Solutions

1 There are several ways of doing this. One way is shown opposite. This is a 'circular' arrangement in which each block has two touching neighbours – one in front and one behind.

2 There is often some difficulty with this one because it is *assumed* that the problem has to be solved in the sequence in which it was posed i.e. one block to touch one other, one block to touch two others, one block to touch three others. If however, a start is made at the other end by making one block touch three others then this arrangement can be progressively modified to give the arrangement shown.

3 Some people have a lot of difficulty with this problem because they *assume* that all the blocks have to lie in the same plane (i.e. spread out on the surface being used). As soon as one breaks free of this assumption and starts to place the blocks on top of one another one can reach the required arrangement.

4 There is a surprising amount of difficulty in solving this problem. The usual mistake is to arrange the blocks in a long row. In such a row the end blocks are indeed touching only one other but the middle blocks have two neighbours. A few people actually declare that the problem can not be solved. The correct arrangement is very simple.

Comment

Most people solve the block arranging problems by playing around with the blocks and seeing what turns up. Nothing much would happen if one did this without bothering to have the blocks touching one another. So for convenience one assumes that the blocks all have to touch one another in some fashion (i.e. there has to be a single arrangement). It is this artificial limit, this assumption, that makes it so difficult to solve the last problem which is so easy in itself.