Chapter 2: Internal Systems

Function of bio psychological processes and systems

Steps

Referring to **Figure 2.1** we can observe once more the function of bio psychological processes and systems as they occur within human thinking and problem-solving processes - yet another homologous system. The sequence of functions in the stream of consciousness that accompanies mental processing **of a "problem" is represented by the same steps living organisms follow:**

a. **Searching** for available knowledge and information.
b. **Analyzing**, breaking down, and digesting the data.
c. **Manipulating** that information through imagination into new synthesis, into a hypothesis or idea.
d. **Internally projecting** the use of the idea.
e. **Evaluating** the solutions for their "fitness," that is, their potential effect and value and the probable feedback that will be received.

Once this internal system has processed a problem to our satisfaction, we put it into the primary growth system and try it out in the external world. Although we do not know the details of all the internal processes of the cell, we can speculate that this creative internalization confers to the activities of Man a unique advantage - being able to submit a wide variety of growth alternatives to an internalized simulation of evolutionary natural selection process before actually applying it in the real world.

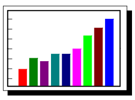
Parallel steps

Although we have so far considered the process by which the ectogenetic system of Man came about and how it operates, **some of the parallel steps in the growing organization of information may indeed have created a reconstructed system** even more fundamental than the ectogenes or culture. Because the primary mechanism of biologic endogenetic information accumulation has always occurred by creating mutated nucleotide codes and testing their fitness through natural selection, it is reasonable to imagine that both the external replication of the system through Man's tools and ideas, and the internal structure of the human system operate in an identical way. Man's brain may be, in fact, a miniature evolutionary laboratory.

Take closer look

Brain work

To take a closer look at this concept, imagine that the **brain is a colony consisting of 12 billion cells or so.** *If an "idea" is formed in the mind, it can actually represent the rearrangement, addition, or subtraction of codes among neurons. The neuron does not duplicate itself in the usual way, however. Its propagation and self -verification come about when it is subjected to the environment made up of the other brain cells. The nuclear data making up the coded pattern of* *these cells are the facts, opinions, and perceptions of the external environment, a condensed replica of that believed world. It may very well be that, like the transfer of* ***DNA*** *in such operations as temperate phase transduction, the idea attempts to grow in the "culture" by transmitting its code to other cells*. In this process it encounters normal environment pressures. If it fits, it is allowed to grow and affect many parts of the brain. Thus, by successfully propagating in the replica culture, it has been "pretested;" it can change, mutate, and even die within the cerebral system without incurring any gross biologic waste. The brain and the process of thinking may be, in effect, a miniature, accelerated, and magnificently more efficient evolutionary instrument - in quite real organic and biologic terms.



Internal problem solving

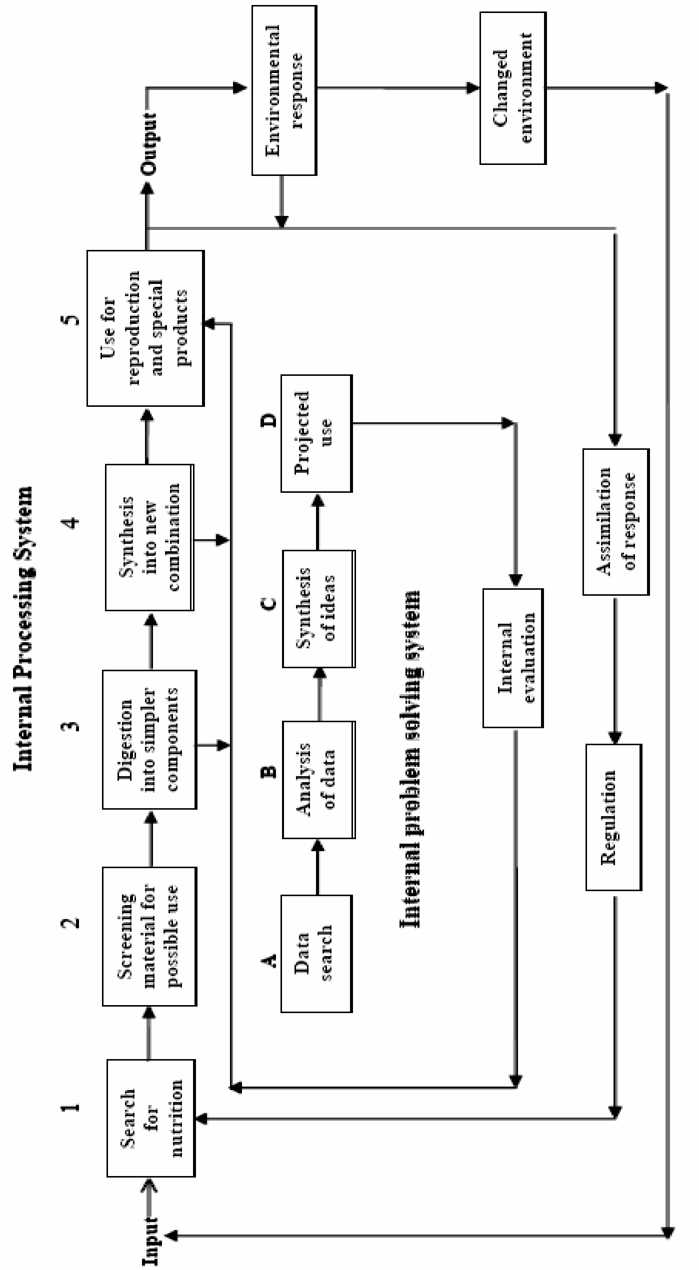


Figure 2.1: Internal problem-solving system

Automatic and autonomic

As an automatic and autonomic “laboratory" of testing reality, the enigma of the unconscious state of dreaming can also be explored within the conceptual framework of transformation. Although we may temporarily sever the connection of our link with external reality in sleep, the process of mutation and selection continues. Deprived of external effect and feedback, however, the brain may react unconsciously in the same way that consciousness operates in sensory-deprivation experiments. After a period of no perception and feedback, even while fully awake, a person will begin to fantasize and hallucinate. The unconscious, while it is attempting to perform normal "problem-solving" or what can be seen as evolutionary activity, may be greatly affected by loss of connection with the outside world.

In practical sense

In a practical sense, *by applying individual experience each of us can observe the evolution, mutation, and selection processes as they go on in our own minds at any time.* The process which Ainsworth-land calls imagination generates mutations with “novelty and diversity”; the function of natural selection or “judgment” is observed as the pressure of facts buffets an idea, allowing it to grow or die inside the mind.

Thinking

2.1 Thinking

Thinking most generally, **any covert cognitive or mental manipulation of ideas, images, symbols, words, propositions, memories, concepts, precepts, beliefs or intentions.** In short, it is a term used so that it encompasses all of the mental activities associated with concept-formation, problem-solving, intellectual functioning, creativity, complex learning memory, symbolic processing, image; etc. These terms in psychology cast such a broad net and few encompass such a rich array of connotations and entailments.

Components

Certain components nonetheless lie at the core of all usages: (a) Thinking **is reserved for symbolic processes;** the term is not used for behaviours explicable by more modest processes such as that of rats learning a simple maze. (b) Thinking **is treated as a covert or implicit process** that is not directly observable. The existence of a thought process is inferred either from reports of the one who was doing the thinking or by observing behavioural acts that suggest that thinking was going on, e.g., a complex problem solved correctly. (c) Thinking **is generally assumed to involve the manipulation** of some, in theory identifiable, elements. Exactly what these "elements of thought” are anybody's (and sometimes it seems, everybody's) guess. Various theorists have proposed muscular components **(Watson)**, words or language components **(Whorf)**, ideas **(Locke)**, images **(Titchener)**, propositions **(Anderson)**, operations and concepts **(Piaget)**, scripts **(Schank)** and so forth. Note that some of these hypothesized entities are quite elemental and others are quite holistic. No matter, all are serious proposals and all have at least some evidence to support their use in the process of thinking.

Because of the breadth and looseness of the term, **qualifiers are often used to delimit the form of thinking under discussion.** Some of these specialized terms follow; others are found under the alphabetic listing of the qualifying term.

Characterizing Thinking

2.1.1 Characterizing Thinking

The term "thinking" will be **taken as referring to a set of processes whereby people assemble,** use and revise internal symbolic models. These models may be intended to represent reality (as in science) or conceivable reality (as in fiction) or even be quite abstract with no particular interpretation intended (as in music or pure mathematics). Here, we will be mainly concerned with the first case, which is typical in problem -solving. Thinking directed toward problem-solving may be regarded as exploring a symbolic model of the task to determine a course of action that should be the best (or at least be satisfactory). **A symbolic model often enables the thinker to go far beyond the perceptually available information** and to anticipate the outcomes of alternative actions without costly overt trial and error.

Characterizing Problems

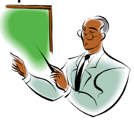
2.1.2 Characterizing Problems

Given the strong emphasis on problem-solving in this context and in the general literature on thinking, the question arises **"what is a problem?"** The definition offered by the Gestalt psychologist **Karl Dunker** is still serviceable. He wrote that "a problem arises when a living organism has a goal but does not know how this goal is to be reached".

This is a useful initial formulation that signals a number of points. ***First,*** *that a "task" set by an experimenter is not necessarily a problem for a given individual. Whether it is a problem or not, depends on the subject's knowledge and on his ability to locate relevant knowledge, should he have it?* ***Second,*** *a problem may vanish or be dissolved if the person changes his goals.* ***A third point*** *is that a problem does not effectively exist until the person detects some discrepancy between his goals and the situation he finds himself in.*

Most psychological studies of problem-solving (especially, as we shall see, those within the information processing framework) have dealt with well defined problems. If we accept **Rittman's** useful proposal that problems in general can be viewed as **having 3 components (viz. a starting state, a goal state and a set of processes that may be used to reach the goal from the starting state)** then a problem is well defined if all 3 components are completely specified. Problems

Defined problem



in mathematics, in logic and in various board games tend to be well defined. **Although well defined, such problems can be very difficult** and the psychologist is faced with the task of explaining how we humans, with our various limitations, manage to solve geometry, chess and similar scale problems in reasonable time. Of course, it will be still more difficult to explain how we tackle those ill-defined problems that are more typical of real life than the well-defined variety.

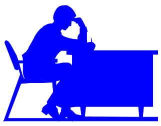
Undefined problem

Undefined problems leave one or more components of the problem statement vague and unspecified. Problems can vary in degree of defineness an animal.

Handling well-defined problems

It seems a reasonable strategy for psychologists to start with people's ways of **handling apparently well-defined problems** and then move on to consider ill-defined tasks. Perhaps people tackle ill-defined tasks by seeking a well-defined version of the problem, which they then work within until the problem is solved or a new definition is tried. If this is so, then studies with well-defined problems will be relevant to part of the process of solving ill-defined problems. Indeed, processes of defining, or interpreting, the problem are also important in well-defined tasks and some attention has recently been given to task interpretation processes that must play a role in both well- and ill-defined tasks.

Thinking as a Skill



1. A matter of intelligence

2. Can be improved by training

2.2 Thinking as a Skill

You have two choices; **as De Bono Says:**

1. **Thinking is a matter of intelligence.** Intelligence is determined by the genes with which you were born. You can no more change your thinking than you can truly change the color of your eyes.
2. **Thinking is a skill that can be improved by training, by practice and through learning how to do it better.** Thinking is no different from any other skill and we can get better at the skill of thinking if we have the will to do so.

These two opposing views can be combined rather simply.

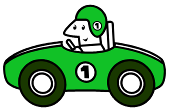
intelligence like a horsepower of a car

Intelligence is like the horsepower of a car. It is possible that the “intelligence” potential of the mind is determined, at least in part, by our genes. Even so there is evidence that the use of the mind can change the enzyme characteristics just as the use of muscles can change their characteristics.

The performance of a car does not depend on the horsepower of the car but upon the skill with which the car is driven by the driver. So if intelligence is the horsepower of the car, then “thinking” is the skill with which that horsepower is used.

intelligence a potential gift

Intelligence is a potential gift. Thinking is an operating skill. Thinking is the operating skill through which intelligence acts upon experience.



If we pursue the car analogy a little further then we come to two important conclusions:

1. If you have a **powerful car then you need to improve your driving skills.** If you do not improve your driving skills then you will not be able to make full use of the available power. You may also be a danger to others.
2. If you have **a less powerful car then you need to develop a high degree of driving skill** in order to make up for the lack of power.

So those who do not consider themselves to be highly intelligent can improve their performance by improving their thinking skill.

2.3 Critical Thinking

Critical Thinking

There are **a few schools** that do have "critical thinking" **on the curriculum.** Critical thinking is a valuable part of thinking but totally inadequate on its own. It is like the left front wheel on a car: wonderful in itself but inadequate by itself.

Critical thinking perpetuates the old-fashioned view of thinking established by the Greek Gang of Three **(Socrates, Plato and Aristotle)**. This view is that analysis, judgment and argument are enough. It is enough to "find the truth" and all else will follow. If you remove the "untruth" then that is enough.

Kritikos means judge

"Critical" comes from the **Greek word "kritikos"**, which **means judge.** While judgment thinking has its place and its value it lacks generative, productive, creative and design aspects of thinking that are so vital. Six brilliantly trained critical thinkers sitting around a table cannot get going until someone actually puts forward a constructive proposal. This can then be criticized by all.

Many of the present problems around the world persist because traditional education has mistakenly believed that analysis, judgment and argument are enough.

Our success in science and technology comes not from critical thinking but from the "possibility" system. The possibility system moves ahead of our information to create hypotheses and visions. These give us a framework through which to look at things and also something to work towards. Critical thinking does have a part to play because if you know your hypothesis is going to be criticized then you seek to make it stronger. But critical destruction of one hypothesis has never produced a better one. It is creativity that produces the better hypothesis.

Culturally, we desperately **need to break loose of the notion that critical thinking is sufficient.** While we believe this we shall never pay sufficient attention to the creative, constructive and design aspects of thinking.

2.4 Lateral Thinking

Lateral Thinking

The purpose of **lateral thinking is to counteract both the errors and the limitations of the special memory-surface.** The errors may lead to incorrect use of information. The limitations may prevent the best use of information that is already available. Natural thinking has all the errors of the special memory-surface. Logical thinking is used to avoid the errors of natural thinking, but it is limited in that it cannot generate new ideas that make the best use of information already available. **Mathematical thinking avoids the errors of natural thinking by setting up an information processing system that is distinct from the memory-surface.** The limitation of mathematical thinking is that it is only a second stage system which is used to make the most of what has been chosen by the memory-surface in the first stage. None of these three types of thinking can get completely beyond the limitations of the memory-surface, though two of them can reduce the actual errors to a considerable extent.

Mathematical thinking

A problem is simply the difference between what one has and what one wants. Since a problem has a starting-point and an end point, then the change from one to the other by means of thinking is a direct indication of the usefulness of that thinking.

Types of Problems

Types of problem

There are three basic types of problems:

1. Problems that **require the processing of available information** or the collection of more information.
2. The problem of no problem; **where the acceptance of an adequate state of affairs precludes consideration** of a change to a better state.
3. Problems that are **solved by re-structuring of the information** that has already been processed into a pattern.

Require processing of available

Problem of no problems

Solved by re-structuring of information

The **first type of problem can be tackled with logical thinking, or mathematical thinking,** or the collecting of more information. **The other two types of problem require lateral thinking.**

Most of the time the established patterns on the special memory surface are improved only by information which comes in from outside. It is a matter of addition or gradual modification.

Lateral thinking is more concerned with making the best possible use of the information that is already available on the surface than with new information, see Figure 2.2.

Lateral Thinking

Lateral thinking is concerned with compensating for the deficiencies of the special memory-surface as an information-processing device. Lateral thinking has to do with rearranging available information so that it is snapped out of the established pattern and forms a new and better pattern. This rearrangement has the same effect as insight. The established patterns which determine the flow of thought can be changed by lateral thinking, as can the established patterns which control how things are looked at.

The memory-surface itself, natural thinking, logical thinking and mathematical thinking are all selective processes. The memory surface selects what it will pay attention to. Natural thinking selects a pathway according to emphasis. Logical thinking blocks pathways according to the mismatch reaction. Mathematical thinking uses the rules of the game to select possible changes. The only generative process involved is the chance arrangement of information in the environment.

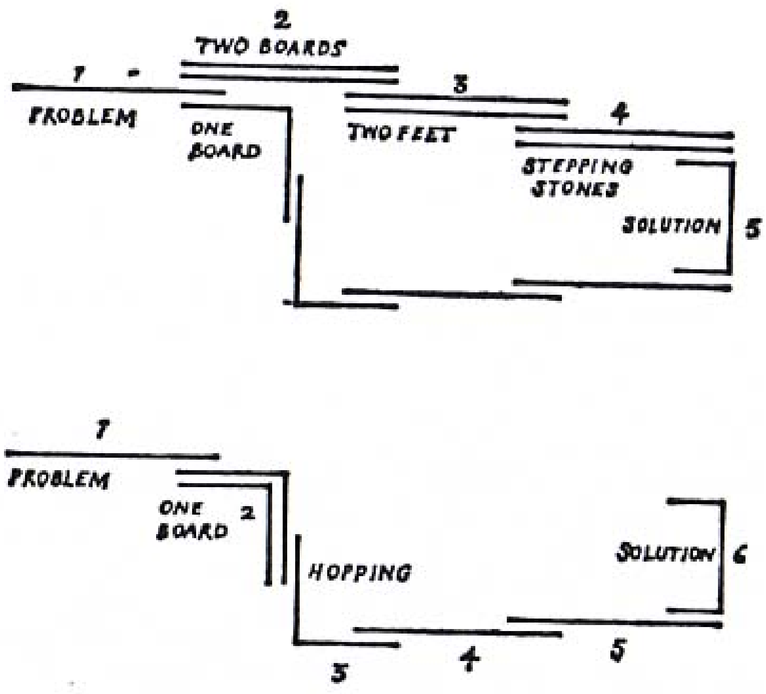
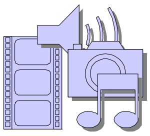


Figure 2.2: Lateral thinking

A baby crying is a generative situation. The baby just makes a noise and then things happen. From all the things that happen, the baby accepts the ones that are useful to it. Lateral thinking is a generative process. Instead of waiting for the environment to change established patterns, these are deliberately disrupted in various ways so that the information can come together in new ways. If any of these new ways are useful, then they can be selected out by any of the selecting processes.



In the early days of photography, **the photographer used to go to a great deal of trouble to arrange the background, the lighting, the pose, the smile, and then when everything was just right he took the photograph.** Nowadays the photographer just takes dozens of pictures from different angles with different expressions and different lightings. Then he develops all the pictures and picks out the ones that look best. In the first case the selection is done before the photograph is taken, in the second case it is done after the photographs have been taken. The first method will only produce what is known beforehand and planned. But the second method may produce something new that was totally unexpected and could never have been planned.

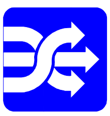
With the other types of thinking you know what you are looking for. With lateral thinking you may not know what you are looking for until after you have found it. Lateral thinking is like the second method of taking photographs, and the other sorts of thinking are like the first method. For convenience these other sorts can be included under the heading of vertical thinking which is the sequential development of a particular pattern - like digging the same hole deeper. With vertical thinking one moves only if there is a direction in which to move. With lateral thinking, one moves in order to generate a direction.

The generative effect of lateral thinking is exerted in two ways. The **first way is to counteract, restrain or delay the fierce selective processes of the memory-surface itself.** It is also necessary to counteract the selective processes that have been artificially developed, such as logical thinking with its heightened sensitivity to a mismatch. **The second way is to bring about deliberate arrangements and juxtapositions of information that might never otherwise have occurred.** The aim of both these processes is to allow information to arrange itself in new and better patterns, as happens in insight.

The nature of lateral thinking may be illustrated by outlining a few specific points of difference from vertical thinking.

Alternatives

Alternatives



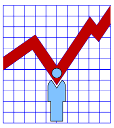
The special memory-surface is a self-maximizing system. The tendency of such a system is to select the most obvious approach provided this is adequate. In an experiment, **a group of children were each given two small wooden boards.** There was a hole in the end of each board, and the children were also given a piece of string. The task was to cross the room as if it were a river by somehow using the boards so that no part of the body touched the ground. Because there were two boards and they had two feet the children soon hit on the idea of using the boards as stepping stones. They stood on one board and moved the other ahead and then stepped on that and moved the first board ahead. This was an effective way of getting across the room.

A second group of children were only given one of the boards and the piece of string. After a while a few of them tied the string to the hole in the board. Then they stood on the board and holding it up against their feet with the string they hopped across the room. This was a much better way of getting across the room than the stepping stone method. But the children with two boards were completely unable to find this solution since they were blocked by the adequacy of the other solution.

An approach may choose itself because it is obvious, or it may be the only one left after other approaches have been blocked with a no label.

With vertical thinking, an approach is selected in either one of these two ways. With lateral thinking, as many alternatives as possible are generated. One disregards the no reaction since so often it is applied prematurely. One may recognize the obvious approach but never the less go on generating other ones as well.

Non-sequential

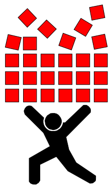


Non-Sequential

There may be no reason for saying something until after it has been said. Once it has been said a context develops to support it, and yet it would never have been produced by a context. It may not be possible to plan a new style in art, but once it has come about it creates its own validity. It is usual to proceed forward step by step until one has got somewhere. But it is also possible to **get there first by any means and then look back and find the best route**. A problem may be worked forward from the beginning but it may also be worked backwards from the end.

Instead of proceeding steadily along a pathway one jumps to a different point, or several different points in turn, and then waits for them to link together to give a coherent pattern. It is in the nature of the self-maximizing system of the memory-surface to create a coherent pattern out of such separate points. If the Pattern is effective then it cannot possibly matter whether it came about in a sequential fashion or not. A frame of reference is a context provided by the current arrangement of information. It is the direction of development implied by this arrangement. One cannot break out of this frame of reference by working from within it. It may be necessary to jump out, and if the jump is successful then the frame of reference is itself altered.

Quota



Quota

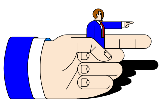
It is quite easy to **set up a fixed quota of alternative approaches** that must be found for any problem. No one approach is followed until the quota has been filled. This procedure will not itself generate new approaches but it will keep attention at the starting point instead of letting it be led away by the first promising approach to the extent that other approaches are never looked for.

Rotation of Attention

Rotation of Attention

If one divides the situation into parts then it is possible to **have a deliberate technique which requires that each part in rotation** becomes the centre of attention. Once again this is a delaying technique to prevent attention being monopolized by the most dominant feature.

Reversal



Reversal

This involves **taking something and turning it upside down**. Where one direction is defined then the opposite direction is also defined by implication.

In a winding country lane a motorist came up behind a slow moving flock of sheep which filled the lane from side to side. The lane was bounded by high walls with no gap and the motorist was resigned to a long wait. Then the shepherd signaled the motorist to stop, and proceeded to turn the flock round and drive it back past the stationary motorist. It was a matter of getting the sheep past the car rather than the car past the sheep.

Cross-fertilization

Cross-fertilization

This is a matter **of providing a formal opportunity for different minds to interact** so that differences in thinking about a subject act as outside influences to change the established patterns in each mind. What is established in one mind may be novel in another. Ideas spark off other ideas.

Conclusions

Conclusions

These are a few of the formal techniques that can be used in lateral thinking. The techniques provide **special opportunities for lateral thinking processes to occur on the memory-surface.** Just as a scientific experiment is a designed opportunity for information to become manifest, so the formal techniques are opportunities for information to become arranged in new patterns. The patterns will be different, some of them may be better.

Lateral thinking is a generative type of thinking. Once a new arrangement of information has come about then it can he examined by the usual selective processes. Lateral thinking as a process can never justify the outcome, which has to stand by itself. Lateral thinking in no way detracts from the efficiency of vertical thinking. On the contrary, as a generative process it can only add to the over-all effectiveness of any selective process.

It sometimes happens that **lateral thinking can provide an insight rearrangement of information that by itself solves the problem.** At other times lateral thinking provides an approach for vertical thinking to develop.

Late twentieth-century neuropsychological theory suggests that **the human forebrain can best be considered as a limbic system and a frontal neocortex.** The limbic system is the seat of the emotions; it deals with the non-rational. In contrast, the neocortex is the thinking brain, but is itself divided into lateral hemispheres with rather different functions, see Table 2.1. In short, the left hemisphere is Apollonian: verbal, mathematical, logical, deductive, and oriented towards the external environment ('outward bound'), whereas the right hemisphere is Dionysian: holistic, intuitive, spatial, pattern-recognizing, and concerned with inner spaces ('Inward bound').

Table 2.1: Left-and right-brain functions

Left hemisphere	Right hemisphere
• verbal language • detail • linear • manipulative • orthodox • behavioral (do) • rational (scientific) • analytical (tree) • departmentalizes • form (spherical ball) • concrete (a shoe is a shoe) • tangible (seeing is believing) • time (next thing to do)	• eidetic (image) language • pattern recognition • geometric, three-dimensional • reactive • creative • experiential (feel) • emotional (artistic) • synthetical (forest) • emphasizes relationships • color (blue ball) • associative (a shoe: let's walk) • intuitive (that's possible) • space (enjoy where you're at)

Brain and Thinking

2.5 Brain and Thinking

A scientific field of study that helps us to distinguish the functions of the brain from those performed by the mind is hemisphere specialization. Launched in the early 1960s at the **California Institute of Technology** by psychologist **Roger Sparry** and his associates, the field has advanced enormously with vigorous neurophysiological and split brain studies that use computer correlated psychophysiological measuring techniques. Today, all major research works in visual communication media related topics for example, acknowledge the findings in the field of hemisphere specialization, particularly those related to the recognition and aesthetic effects of moving images. In visual learning the discussion of left and right brain recognition of moving images is very important because the composition of visual images is directly related to brain specialization.

Left and Right Brain Decodification of Visuals

2.6 Left and Right Brain Decodification of Visuals

The brain has two hemispheres connected with fibbers in the corpus callosum. *If the corpus callosum did not exist, or if it was surgically severed, visual and auditory information input from the left eye and ear would reach only the left hemisphere, and vice versa,* as the optic and acoustic chiasma that allows the criss-crossing of the information reaching the brain would no longer exist.

Extensive correlated studies that started with brain surgeries mostly on epileptic patients **and the latest neuroanatomical and neurophysiologic ones** that use deoxyglucose to identify which part of the brain is more active have confirmed that recognition of images is a function of the right brain.

Underlining the tasks of the right brain, ***Ornstein*** *stated that: If the left hemisphere is specialized for analysis, the right hemisphere seems specialized for holistic mentation*. Its language ability is quite limited. This hemisphere is primarily responsible for our orientation in space, artistic endeavour, crafts, body image, and recognition of faces. It processes information more diffusely than does the left hemisphere and its responsibilities demand a ready integration of many inputs at once. If the left hemisphere can be termed predominantly analytic and sequential in its operation, then the right hemisphere is more holistic and relational and more simultaneous in its mode of operation.

Image recognition is a function of the right hemisphere of the brain that controls the left side of the body. Pictures are typically images of objects of the real world. Consequently, picture recognition is a function of the right hemisphere of the brain. Recognizing a television picture that combines visuals, sounds, and motion is a holistic process, a task performed by the right brain.

The Rational Left and the Holistic Right Hemispheres of the Human Brain

2.7 The Rational Left and the Holistic Right Hemispheres of the Human Brain

The number of scientific studies on the left and right brain specialization is immense, and the range of the fields of study of brain specialization-related investigation is large. **An impressive list of such findings illustrating the two modes of operation of the brain was provided by Nevitt.**

The left brain is occidental, whereas the right brain is oriental. The logical brain recognizes objects and events sequentially and logically. Watching the news delivered by a newscaster without distracting visuals in the background is an occidental function of the left brain that controls the right visual field. However, watching a scene described by a newscaster off camera is an oriental activity of the right brain that controls the left visual field.

The left brain specializes in visual speech and recognizes all activities involving language, logic, and words, whereas the right hemisphere is predominantly musical and acoustic and recognizes more readily melodies and musical tunes. Because of this dichotomy of the brain's functions, speeches on television tend to be monotonous and boring, whereas musical concerts, even when filmed by one camera on a long shot, are interesting to listen to and easier to watch.

Charts, maps, numerical figures, tables, statistics, lists of names, numbered items, and mathematical computations are more readily recognized by the left hemisphere of the brain, found to be specialized in logical, mathematical, intellectual, sequential, and analytic functions.

Complex visual elements and multilevel action scenes placed on the viewer's left side of the screen are recognized by the holistic, simultaneous, intuitive or creative, and synthetic right hemisphere of the brain.

Constructors of television programs that consist primarily of scenes requiring a linear and detailed controlled approach such as instructional or educational programs, cooking shows, and language instruction, should consider placement of such activities on the right side of the screen to be recognized by the left side of the viewers' brain. However, those producing television programs consisting for the most part of scenes with artistic, symbolic, simultaneous, emotional, and intuitive content (such as experimental television programs, music videos, art shows, and religious programs) should consider placement of the main activities on the left side of the screen for better recognition by the right hemispheres of viewers' brains.

All quantitative activities encompassing the action of a television program such as the recognition of complex motor sequences and significant order, reading, writing, numbering, and analyzing should be placed on the right side of the screen to be more readily recognized by viewers' left hemispheres.

On the other hand, all qualitative activities that characterize the action in a television program such as recognition of complex figures, abstract patterns, or scenes requiring simultaneous comprehension, synthesis, and configurations, have a better chance of being recognized if placed on the viewers' left side of the screen.

Perception and Attention

2.8 Perception and Attention

Understanding the value of knowledge and the context in which it is used is an important step in learning about human cognition. Nowhere are the roles of knowledge and context clearer than in human perception.

The process by which meaning is assigned to stimuli **is referred to as perception.** *Perception is critical to all aspects of cognition and is itself directly influenced by the person's knowledge and the context of events created by his or her knowledge.* Closely related to perception is attention, the allocation of a person's cognitive abilities. As your read this page, you also may be listening to the radio. What you perceive at any given moment depends on how your attention is divided among various tasks. If most of it is devoted to a weather forecast on the radio, you may not correctly perceive the meaning of some of what you are reading. On the other hand, if you are immersed in this subject, you may not hear your name when the radio announcer calls it and says that you have five minutes to phone to collect a $1,000 prize.

Perception

2.9 Perception

Let's think for a moment about what is required for perception the assignment of meaning to incoming stimuli to occur**, First,** some aspect of the environment-some stimulus has to be picked up by the person (e.g., has to be seen). **Next,** that stimulus has to be transformed and held, somehow. A body of knowledge has to be available and brought to bear on the stimulus (e.g., cat, cut, and cot are the three-letter words beginning with c and ending with t). **Finally,** sonic decision has to be made-a meaning must be assigned (It's an "a").

The very common phenomenon of identifying the letter "a" seems far more complex when we consider what may happen during the process of perception. One important observation is the fact that perception takes time-identifying the "M" figure (or any other stimulus, for that matter) is not instantaneous. Recall that the stimulus must be picked up and transformed, memory must be called up, the stimulus must be compared to what is in memory, and a decision must be made. The fact that perception requires time leads to a problem of sorts. Because environments may change rapidly (as when watching a film or driving a car), a stimulus could stop being available before a meaning was assigned. (Imagine seeing the word: *DOOR projected by a slide projector for, say, one tenth of a second.) Unless there is some way in which we can "hold" that stimulus for a while, our perceptual processes would have to stop in midstream.* The experience of watching a movie, for example, would be terribly frustrating if stimulus after stimulus disappeared before we could interpret their meaning. Our experience, however, tells us that such breakdowns in our perceptual processes occur infrequently. This is because our cognitive systems are equipped to register sensory information.

Sensory Registers

2.10 Sensory Registers

One of the capabilities of our cognitive system is that it can temporarily retain environmental information after it has disappeared. Apparently, each of our senses has this ability, a sensory register, but research has focused almost entirely on vision and hearing. Here we discuss the visual and auditory sensory registers.