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ABSTRACT

The development and use of intuitive thinking, at all levels of education, have been of concern to scholars in recent years. This paper discusses the findings and theories of various scholars about intuitive thinking and learning, including the work of Jean Piaget, Jerome Bruner, Richard Jones, and Robert Ornstein. The paper also explores the use of language and communication in relation to intuitive thinking in various cultures, as well as insight and creative thinking as aspects of intuitive thinking. The author concludes that, for problem solving, individual students may need both logical-thinking experiences and creative experiences and that individual student cognition is required for learning to be realized. (JM)

A Study of Intuitive Thinking

by

Susan E. A. M. Goethe

In recent years, scholars have expressed concern with the development and use of intuitive thinking at all levels of education. This paper represents our attempt to study and better understand intuitive thinking. We reviewed some of the sources previously read, then set out on a course of discovery with many others, including Jean Piaget, Jerome Bruner, Richard Jones, Robert McKim, and Robert Ornstein.

In 1959 the Woods Hole Conference on Education was held on Cape Code for ten days. Prominent scientists, scholars, and educators met to discuss education in the elementary and secondary schools. The meetings were specifically concerned with up-dating curriculum content and methods in these schools. Jerome Bruner, then a member of the Harvard University teaching staff and Head of the Department of Psychology, chaired this conference. (Dr. Bruner is at present Watts Professor Experimental Psychology at Oxford University). Barbel Inhelder represented Jean Piaget and his colleagues in Geneva. In 1960 Jerome Bruner and George Miller founded the Center for Cognitive Studies at Harvard University. In America, the current developments in elementary and secondary education owe their appearance to the influence of those attending the Woods Hole Conference and to their colleagues.

In 1960, Jerome Bruner's book The Process of Education was published by the Harvard University Press. This book has been read and reread by teachers and school administrators and has had a widespread influence for what has been called the "new educational psychology." It represents advanced research in the psychology of cognition under the sub-title headings "The Importance of Structure", "Readiness for Learning", and "Intuitive and Analytical Thinking."

Jerome Bruner and other scholars have been greatly influenced in their thinking by the developmental psychology of Jean Piaget.

A discussion of Piaget's developmental psychology is based on the explanations offered principally by Jerome Bruner and John Flavell. Piaget uses classification of stages of development as a way of understanding the developmental process. He sees important differences as well as similarities, between children and adults. Developmental theory must deal with these. According to the Geneva School, there are three stages in child development. The pre-school stage, through age 5 or 6, is the period for first language development and manipulation of symbols. In this stage, the child's symbolic world is not clearly separated from his feelings and the external world. (Stars, like himself, go to bed). In this period he lacks the concept of reversibility, so called by the Geneva School. When the shape of an object, such as a ball of plasticene is changed, the first-stage child cannot grasp the idea that it can be brought back to its original state.

A central concept in cognitive development for Piaget is conservation. He defines this as the ability of an individual to be aware of invariant aspects or properties of objects in the face of transformation. For example, the same amount of water exists when poured from a tall cylinder into a flat container. Piaget and his colleagues, consider the concept of conservation as a central pre-requisite for the acquisition and subsequent development of logical thought. He describes developmental invariance sequence as mass, weight, and volume. A cognitive structure can be applied to task X, but not to task Y. A year later task Y is solved. Cognitive operations used to solve task X are now applied to solve task Y. Thus the child acquiring the concept of conservation of mass, acquires cognitive operations, which he will eventually use in acquisition of conservation of weight and finally of volume.

At each developmental stage, the child has his own way of viewing the world and explaining it to himself. The second stage of development - the child is now in school - is the stage of concrete operations. Now he does not have to use trial and error in solving problems; he can

carry out this procedure in his head. If marbles are divided into sub-groups, he can understand the original collection can be added back together again. He can adjust weights on a balance scale. The structure of the balance scale is a serial order of weights in the child's mind. Such internal structures or internalized symbolic systems represent the world as the child now sees it. This second stage is from age 6 to 10. This age of concrete operations deals with immediate present reality. The child cannot deal with possibilities not directly before him or not already experienced. This does not mean children operating concretely cannot anticipate things not present, but that they cannot go systematically beyond the information given them to a description of what else might occur.

In the second or concrete stage of operations, the child can grasp intuitively and concretely many basic ideas of mathematics, science, and social sciences, but only in terms of concrete operations. Fifth grade children can play mathematical games with rules modeled on advanced mathematics but will flounder if the teacher attempts to give them a formal mathematical description of what they have been doing.

The third stage of development is called the "formal operation stage" by the Geneva School and occurs between the ages 10 to 14. Now the child can operate hypothetical propositions. He can think of possible variables and even deduce potential relationships that can later be verified by observation or experiment. He can now give expression to the concrete ideas that previously guided his problem-solving, but which he formerly could not describe and did not understand. His intellectual operations now have the same logical operations of the scientist or the abstract thinker.

Piaget calls his technique the clinical method. The Geneva School uses the daily, seemingly commonplace behavior of children of all ages as prime data. The observers go through rigid training comparable to that of clinicians. Differences among children within the same stage and similarities among children in different stages are possible. Critics say the significance of Piaget

rests in conceptualizing the development of intelligence within the context of the human condition adapting to a complex environment. Viewing intelligence in this way, removes it from the narrow psychometric view pervasive among American and British psychologists. The Woods Hole Conference was influenced by Piaget's concepts, according to opinions expressed, and seemed generally to agree that any subject can be taught to a child effectively and honestly, if the subject can be structured or represented to the child in terms of his way of viewing the world and explaining it to himself, according to the stage of his development.

In the chapter on "Intuitive and Analytic Thinking", in the book The Process of Education, Bruner has emphasized some familiar and some unfamiliar ideas. Much of school learning and student examining is upon explicit formulations, either verbal or mathematical. The value of intuitive thinking is stressed, however, by scholars in the fields of mathematics, physics, and biology. In mathematics, intuition is used with two different meanings: for reference to the sudden achievement of a problem on which one has worked a long time and for which he yet has to provide a formal proof, and in reference to a good intuitive mathematician as one who can make immediate good guesses as answers to questions others bring him. Many highly regarded teachers in mathematics and science consider the development of intuitive thinking an important objective. Many physicists have indicated there is too little attention to the development of intuitive understanding. Bruner says questions about intuitive thinking seem to center on two large issues: what is it? and what affects it? He approaches these by commenting first on analytical thinking. This type thinking proceeds a step at a time. Steps are explicit and can be reported adequately. Full awareness of the information and operations involved is present. It may use deductive reasoning, mathematics, or logic, and an explicit attack. Or it may involve step-by-step process of induction and experiment, using principles of research design and statistical analysis.

In contrast to analytical thinking, intuitive thinking does not usually advance in careful

well-defined steps. It seems to involve an implicit impression of the total problem. The thinker arrives at an answer with little awareness of how he reached it. He usually cannot explain how he obtained his answer and he may even be unaware of what aspects of the problem situation he was responding to. Through intuitive thinking the individual may often arrive at solutions to problems which he might not achieve at all with anlaytical thought, and if so, certainly more slowly. The intuitive thinker may even invent or discover problems that the analyst would not. But it may be the analyst who gives these problems the proper formalism.

Bruner states that the formalism of school learning has somehow devalued intuition. He says that it is a very strong conviction of scholars who have been designing curricula in recent years in science and mathematics that much work is needed to discover how we may develop intuitive gifts from the earliest grades onward. A precise definition of intuition in terms of observable behavior is not available. But research on the topic cannot be delayed until an unambiguous definition of intuitive thinking is possible. We can begin by identifying certain problem-solving episodes as more intuitive than others. The rightness or wrongness of intuition is finally decided not by intuition itself, but by the usual methods of proof. Some intuitive leaps are "good", some "bad", depending on how they turn out. Experience and familiarity with a subject help some, but not all.

What variables seem to affect intuitive thinking? If the teacher thinks intuitively, is the student more likely to do so? Does the providing of varied experience in a particular field increase effectiveness of intuitive thinking in that field? By emphasizing the structure or connectedness of knowledge can we increase facility in intuitive thinking? It seems likely that effective intuitive thinking is strengthened by the student's own self-confidence and courage. Such thinking requires the willingness to make honest mistakes. Grades in school emphasize the acquition of factual knowledge, the correct answer. If different bases for grading were used, intuitive thinking might be encouraged. Many kinds of problems can best be approached by a combination of intuitive and other procedures. The mathematicians and physicists may reflect

their confidence in the power and rigor of their disciplines when they use the word "intuition." The historian must lean on intuition for he must select what is relevant. He limits himself to finding or learning predictively fruitful facts which when combined enable him to make intelligent guesses about what else went on. Both the poet and the literary critic practice intuition in their craft. The case for intuition in the arts and social studies is just as strong. Scientists lavish praise on those of their colleagues who earn the label "intuitive."

In such a culture as ours where there is so much pressure toward uniformity of taste through mass media communication, it becomes more important to nurture confident intuition in the realm of literature and the arts. But the pedagagic problems in fostering such a gift are severe. How to distinguish an intuitive mistake or an interesting wrong leap from a stupid or ignorant mistake? Along with any program for developing cultivation and measurement of the occurrence of intuitive thinking, there must be practical consideration of classroom problems and our own limitations in this sensitive area.

The discussions of what children can learn in school as well as what they should learn in school continued. In the summer of 1962, a two-week's conference was held at MIT's Endicott House, to consider reforms in the humanistic and social studies in the elementary and secondary schools. Many eminent scholars were present. In 1972 appeared the third printing of the book Fantasy and Feeling in Education, written by psychologist, Richard M. Jones, who was present at this conference. This writer feels that Bruner and his colleagues have attempted to found the new educational processes on an exclusively cognitive base. Jones indicates that Bruner's theory advances by half steps, and that the coordination of cognitive moves with emotional and imaginative moves will mean advancing by whole steps. One of Bruner's major contributions to the new educational psychology, according to Jones, has been that teachers are coming to include within professional purviews, the cultivation of cross-curricular cognitive skills. But Jones feels that the teachers must be equally responsible in respect to emotional and imaginative skills. They will

have to compose lessons which capitalize on the intrinsic relevance in the subject matter to cognitive, emotional, and imaginal skills in any sequence they consider appropriate, leaving the pupils to engineer the integration of these in the privacy of their own broodings.

According to Bruner in the introduction to Perception and Personality, perceptual theory offers the possibility of a unifying set of concepts for all psychologists eventually. Bruner does not propose that all forms of behavior be reduced to a few principles of perception. There is no intent to make the principle of closure as ubiguitous as the conditioned reponse. But the clinician is becoming aware of potentials of the laboratory and the experimentalist to relize that human subjects have personalities and aspirations and anxieties; that they live in a social setting; and that these facts influence their behavior in critical ways. This symposium of papers edited by Jerome Bruner and David Krech includes papers presented at the Denver Meetings of the American Psychological Association in 1968.

The paper by Hans Wallach on the relation of perception and cognition, states that a number of perceptual functions besides the strictly sensory processes have to take effect to bring about visual percepts as we experience them. Memory traces affect perception. Spatial patterns, noises, speech sounds, and temporally extended patterns are involved in visual perception. George S. Klein and Herbert Schlesinger of the Menninger Foundation reported that the person himself has been ignored as a determinant of his own perceptional behavior. Personality theory is imbedded in the data of motor behavior, and cognition, or learning. They object to conclusions based on rigid and frequently elaborate controls of stimulus conditions and response possibilities. The concept "that any perceptual phenomena, even visual acuity, can reflect successive levels of integration within the person" is gaining support even among laboratory psychologists. In their size estimate experiments, Klein and Schlesinger found that some people typically overestimate; others consistently underestimate; still others are quite accurate. Klein and Schlesinger stress the enduring character of perceptual organization, but admit they have ignored changes in

perception occurring under special stresses or special motivation.

Jane W. Torrey of the University of California investigated the operation in behavior of Gestalt principles hitherto applied in interpretation of perception and learning. If a task, including all the knesthetic, visual, and tactual perceptions that go with performing it, can be thought of as analogous to a visual pattern, then a well-patterned task, one which has a definite ending with steps leading logically to it, should have a tendency to complete itself. Closure would occur if the task is interrrupted and the resultant tension in thestructure calls for completion of the task. But if the task is interrupted and there is no resulting tension-then closure would not occur. Torrey interprets tension as the existence of a cognitive structure which differs from a need because of its cognitive content. Gestalt experiments in the literature - that is tasks with cognitive content, rather than formless tasks - seem to result in closure.

In The Study of Thinking, Bruner points out that in the past, science embarked on a voyage to discover tha truths that existed in Nature. But that contemporary science and common sense inquiry do not discover ways in which events are grouped in the world; they invent ways of grouping. The test of the categories is the predictive benefits that they may introduce. Do such categories as tomatores, lions, snobs, atoms, and Mammalia exist? Yes, as inventions, not as discoveries. Perceptual on one hand; conceptual on the other. In the perceptual case, the relevant attributes are more immediately given; in the conceptual case, search may be involved. Some people utilize immediate attributes and others are more "conceptual" or "abstract". The basic processes of categorization are the same. Judgment, memory, problem-solving, inventive thinking and esthetics - not to mention areas of perception and concept formation. Man sorts out and responds to life with categories drawn from his culture- languages, religion, science, and way of life. In some languages, there are no noun or verb categories, no time indicators. Anthropological linguists make it clear that languages differ not only in sound but in concepts coded. Language is an inventory of ideas, interest, and occupations and cannot be separated from the

study of culture. Poets, schizophrenics, and scholars - all cultivate deviant cognition.

Two books appeared in 1973, Beyond the Information Given and On Knowing: Essays for the Left Hand. In the first, Jerry Anglin included twenty seven articles written by Bruner. These were grouped under several headings, but each division sheds light on cognitive learning. Bruner has two themes in his view of education: first, the acquisition of knowledge is an active process. The student or other individual is not a passive recipient of knowledge. He selects and transforms information. The student should be encouraged to work things out for himself. Second, a person constructs knowledge by relating incoming information to a previously acquired psychological theme of reference. This is what gives meaning and organization to regularities in experience and enables the person to go "beyond the information given." A basic assumption is that this internal model changes with the course of growth. Spiral curriculum involves converting knowledge into the form, sequence, and manner of representation that can relate to the learner's understanding.

Bruner says that for fifteen years he has been a right-handed psychologist in the study of cognitive processes; that he has studied perceptions, memory, learning, thinking; that he has worked with the laboratory rat and with human beings. He has come to the conclusion that the conventional role of the psychologist leaves one approach unexplored. It is the way of the happy hunches and "lucky" guesses. It is an approach whose medium is the metaphor played out by the left hand. Hunches and intuition generate a grammar of their own. It is the poet that stirs this connective activity. Reaching for knowledge with the right hand is science; but great hypotheses of science are gifts carried in the left hand. But the left hand is not all. The art of sensing and knowing involves learning the methods of compacting vast ranges of experience into economic symbols --- that is, concepts, metaphor, myth, formulae. Society equips its members with the means for compacting vast ranges of experience - notably a language and an ordering point of view.

In art school in order to draw freshly, to impart new life to a right hand grown stiff with technique, the student is told to draw with the left hand-- then apply the techniques of the right

hand to the suggestive fresh concept. The poet introduces new connections of ideas, a fresh point of view. Bruner states that: the creative process is silent. It is antic and serious and silent. It consists in ordering elements in such a way that one sees relationships not evident before. The poet, the mathematician, the scientist must each achieve detachment; and at one stroke, they, the creative ones, are disengaged from what exists conventionally and are engaged deeply in what they construct to replace it. The creative act is effective surprise, the production of novelty. It reveals to us unsuspected kinship between facts, long known, wrongly believed to be strangers to one another.

Weldon, the English philosopher, describes problem-solving thus: We solve a problem or make a discovery when we impose a puzzle form on a difficulty to convert it into a problem that can be solved in such a way that it gets us where we want to be. In other words, we recast the difficulty into a form that we know how to work with--then we work it. Practice in inquiry is what is needed, but in what form? Bruner states: "Of only one thing am I convinced: I have never seen anybody improve in the art and technique of inquiry by any means other than engaging in inquiry. The reform movements we see in American education today, the cultivation of individual excellence as an ideal, moves from the inside out."

Robert H. McKim of Stanford University, throws some light on visual perception and idea sketching, and the fundamental relationship between idea sketching and imagination. In his book Experience in Visual Thinking, published in 1972, Mc Kim observes that the two most successful approaches to the education of thinking are the "discovery method" and "the strategy method." The student is not required to memorize concepts but is stimulated to discover them for himself. He learns to think independently because he is challenged to do so. On the strategy method, the student is not only challenged to think, he is taught how to apply a number of thinking strategies. The first step, says Mc Kim, toward visual thinking, is to stop unteaching it. Most people pursue the three R's because there is no other alternative. Opportunity for visual expression usually ends

in the elementary grades for all but a few. Reading, writing, and arithmetic are practiced as skills that detach the child from sensory experience. There is a common education notion that man thinks in words alone and that without words, no thinking takes place. Given a one-sided education in the three R's, people have a large, unrealized potential for visual thinking.

Nearly everyone, says Mc Kim, can learn to see more fully, to imagine more productively, and to express their visual ideas by drawing. The three obstacles to this are: the notion that with 20/20 vision or corrected vision, all see equally well; the apprehension that, "I don't have any imagination;" the belief that drawing requires rare, artistic talent. After identifying these obstacles, the next step is to identify a challenge. Try to apply visual thinking strategies toward the solution of problems that interest you. Learning to think Visually is a lifetime pursuit. You have mastered it when you can use it to solve problems.

The importance of relaxed attention to creative thinking is well known. After intensive conscious preparation, the creative thinker commonly lets the problem "incubate" subconsciously: "I will regularly work on a problem until late in the evening and until I am tired. The moment my head touches the pillow, I fall asleep with the problem unsolved." After a period of relaxed incubation, which can take place in the shower or on a walk as well as by sleep, attention is not uncommonly riveted by the "aha" of discovery. It takes "ho-hum" relaxing and "aha" a sudden flash of insight - it must be immediately noted or it is lost. We have all had the experience of being unable to recall a name and then when we stop trying to remember, the name comes bobbing up into consciousness--of its own accord. Memory, like creative thinking, works best in a state of dynamic relaxation.

Mc Kim gives many examples of graphic writing as an aid to insight. In graphic writing we can express graphic ideation by circles, squares, triangles, arrows, rungs of ladders, and so on to express relations of ideas. An architect can first set up traffic patterns in an on-going house plan by using circles with connecting pathways. Flow charts are used by administrators in

considering organization plans. A linked-node diagram can be used to form a socio-gram. A bar chart can encode specific dimensions. Film writer and director Frederico Fellini, who was first a cartoonist, says, "Any ideas I have immediately become concrete in sketches. Sometimes the very ideas are born when I'm drawing." President Hoover's doodles do not represent a thing, but express a reverie, a feeling, or an aesthetic interest in structure. It is therefore abstract in the same sense that non-representational art is abstract. Designer Tony Chan drew a bubble diagram to view a design problem as a whole. Having abstracted basic relationships in the problem, he is now prepared to generate concrete solutions. Organic chemists use snap-together models to deal with extremely complex molecular structures and find such models are invaluable tools for thinking, and an essential alternative to two-dimensional diagramming. Doodle while you think. Henry Ford's personal notebooks revealed drawings which were not intended to communicate to others and they don't. There were also drawings depicting concrete ideas. Not only sketching of external appearance aid the visual thinker in determining and manipulating relationships, but cross-sectioning, peeling away, exploding, and transparentizing (a word coined by Robert Mc Kim) -- enables the visual thinker to explore in-depth concepts.

Some of the writers studied, have made references to the conscious, unconscious, subconscious, and preconscious. Two books titled, The Nature of Human Consciousness and the Psychology of Consciousness, have presented various interpretations of these features of mentality, and in these we have found further recognition of closure or intuition and possible means to realize such. Robert E. Ornstein is the editor of The Nature of Human Consciousness (1973), a book of readings, in which forty-one eminent scholars have presented papers on human consciousness, which include two modes of consciousness: the intellectual and the intuitive or holistic. In The Psychology of Consciousness (1972), written by Dr. Ornstein, attempts have been made to reconcile two basic streams of knowledge -- the rational, or analytic, and the intuitive or esoteric. This psychologist says these two modes are complementary and together form the basis of human consciousness. One mode, the

articulate or verbal-intellectual, involves reason, language, analysis, and sequence. The other mode is tacit, sensuous, and spatial and operates in a holistic relational manner.

The Nature of Human Consciousness, collects evidence on two modes of consciousness from psychiatry, psychology, neurosurgery, anthropology and other sources. In the paper "Bimodal Consciousness", Arthur Deikman states that the individual experiences psychological and physiological variations day by day, minute by minute; variations that can be slight or extreme. These can occur in body boundaries, in muscle tension, in sensory vividness, in electroencephalograms, in imagery, in logic, and in self-awareness. States of consciousness have not been thought of as integrations of these many physiological and psychological variables. Deikman proposes in his paper to view physiological and psychological variations as manifestations of two modes coordinated to a particular function. These two modes are an "action" mode and a "receptive" mode. The action mode is a state organized to manipulate the environment. It is a state of striving, oriented toward achieving a wide range of personal goals. In contrast, the receptive mode is organized around intake of the environment rather than manipulation. It is aimed at maximizing the intake of the environment. Within each mode, the components are inter-related to form a system, so that a shift in one component can affect any of the others. For example, a decrease in muscle tension can decrease anxiety. The components do not cause each other but they are not independent of each other.

Language is the very essence of the action mode. Through it we discriminate, analyze, divide up the world into pieces or objects to be grasped and acted upon. We manipulate our environment through language-direct strategies. The culture may set the general base line. In western civilization, orientation is toward the individual's voluntary control over phases of his life by the pursuit of material and social goals. These call for manipulation of environment and the self. The receptive mode seems to be one in which certain activities are facilitated by the emphasis on relinquishing conscious striving and intellectual control. Subjects in laboratories who learn to control

functions of the autonomic nervous system, such as alpha wave production or finger temperature, learn that they must "let it happen" rather than "make it happen."

Accounts of the process of intuitive or creative synthesis show several distinct stages: first, a stage of directed intellectual attack on the problem leading to a feeling of impasse; then the stage of "giving up", in which the person stops struggling with the problem and turns his attention to other things. During this unfocused rest period, the problem manifests itself as as "Aha" or "Eureka!" experience--the answer is suddenly there of itself; the final stage sees a return of directed intellectual activity as "the answer" is worked over to assess its validity or fit with the object world. Consideration of developmental psychology, provides the possibility that the individual excercises considerable selection over what features of the world are giving priority of attention and structuralization in language. The view thus obtained of the world, according to many theoretical physicists, is relative, rather than absolute, and incorrect in certain applications. But the receptive mode may provide a way of "knowing" certain aspects of reality not accessible to the action mode. Deikman uses the terms action and receptive modes as other scholars use the terms intellectual and tacit or sensuous mode.

Michael S. Gazzaniga in the essay "The Split Brain of Man" shifts the emphasis to the neurophysiological level. He presents the biological basis of two modes of consciousness. (Do not confuse the reference to left and right hemispheres with Bruner's essays for the left hand and his reference to a "right handed psychologist"; for the left hemisphere of the brain controls the right side of the body; and visa versa, right hemisphere of brain controls left side of the body.) Gazzaniga treats the two hemispheres as major and minor, the major being the left hemisphere where the function is verbal analytic. The right hemisphere subiends different functions from the left and its very mode of information-processing is different. The right hemisphere of the brain is primarily responsible for music, art, crafts, orientation in space, even perhaps for dreams along with phenomena termed mystical. Our technological culture has devalued these activities and

the right portion of the brain has been termed minor. This writer states that from a variety of neurological observations, it would appear that up to the age of four or so, the right hemisphere is about as proficient as the left, in handling language. Why does the right hemisphere at a later stage of development - then possess a rather poor capacity for language? The implication is that during maturation, the processes and systems active in making this capacity manifest are somehow inhibited and dismantled in the right hemisphere and allowed to reside only in the dominant left hemisphere.

Roberto Assagioli wrote the article titled "Psychosynthesis: A Technique for the Use of Instruction". According to this article, many intellectuals are afraid when an intuition intrudes into their thought process and they repress it, either consciously or unconsciously. This writer considers intuition a specific psychological function. It is a cognitive function as an organ to apprehend reality. It is a synthetic function in that it apprehends the totality of a given situation or psychological reality. It does not work from the part to the whole, as the analytical mind does, but conceptualizes a totality directly. Repression of intuition is produced by non-recognition, devaluation, neglect, and lack of its connection with other psychological functions. Anyone who feels has emotions and does not require a demonstration of their existence. Anyone who is intuitive spontaneously uses intuition. Cognition by way of thinking or feeling differs from cognition by intuition. This last is immediate and direct.

To activate intuition it is necessary to carry out a psychological cleaning of the field of consciousness, to eliminate sensations from the outer world or from the body. This involves action of the will. Next, one must wait quietly in a state of relaxation in which the will remains in the background, to prevent pure passivity. This identification with the looked-for experience of reality or truth, which we call intuition, is fleeting and very easily forgotten; although at the time it enters consciousness, it is vivid and the subject does not believe he will or can forget it. A general field of application is valuation; sound valuation is often the outcome of an intuitive

perception. This valuation can be checked through critical analysis. Another field of application is science, where it can be used to reach truth in a synthetic way--such as a principle, a law, or a general method of procedure. A truly successful therapist uses intuition, as do educators. Children and adolescents often have very active intuition. But however valuable, intuition may be, it should be used concomitantly with other psychological functions.

In the essay titled, "Implication of Physiological Feedback Training", Ralph Ezios discusses this in medical use and in education. College students have been enthusiastic and have willingly participated in research on feedback training. This psychologist says that within the brief time he spent working on skin temperature of his hands (ten minutes) he could warm or cool his hands deliberately by responding to a "click" that meant go in the opposite direction. The experimenter could alternately cool and warm his hands even when the clicks came as rapidly as one a second. Possible feedback training can influence students to discriminate internal processes that potentially affect their physical health and psychological well-being. Educational Psychologists might want to determine if certain controllable physiological states lead to maximum receptivity in learning. Results with animals have demonstrated some complex processes can be brought under control, such as blood flow in one ear lobe, blood flow in stomach lining, and kidney functioning. Heart rate can be controlled by humans, and blood pressure can be lowered. There is clearly promise, but the dynamics of types of control acquired are poorly understood. If and when inexpensive portable feedback devices are commercially available, medical practitioners and educators will certainly make use of them. In behavioral psychotherapy -- phobias, headaches, and anxiety are thought of as faulty learning. In education, the use of self-regulation training may set the stage for individual excellence.

In the book, Psychology of Consciousness, Robert Ornstein states that Sigmund Freud proposed the division between the "conscious" and the "unconscious" mind. The workings of the conscious mind he hold to be accessible to langugge and to rational discourse and alteration . The unconscious,

is less accessible to reason or to verbal analysis. Some aspects of unconscious communication are gestures, facial and body movements, and tone of voice. Different occupations and disciplines involve a concentration in one of the major modes of consciousness. Science and law are heavily involved in linearity, and verbal logic. Crafts, the "mystical" disciplines, and music, are more present-centered, aconceptual, intuitive. A complete human consciousness involves the polarity and integration of the two modes. Western education is dominated by the verbal-analytic modes. The scientific, logical mode depends on a steady input and accumulation of information. The other, the intuitive, attempts the development of another "organ of perception."

Teaching stories were part of the culture of ancient times. This literature works on both modes. These stories were at one time conveyed by oral tradition. It is rare in our culture today to sit down and listen to stories. Reflect on this. Reading aloud takes longer and allows the events more importance. Listening takes the burden off our eyes and returns balance to our ears. It allows us to picture the events as they occur in space. Finally, listening involves the sound of language. It can communicate to the tonally sensitive areas of the brain through the inflections and higher harmonics of the voice.

Sports provides other examples of intense concentration and dynamic relaxation. In the October, 1975 issue of Psychology Today, is an article titled "The Zen Approach to Sports: Sports, It's a Western Yoga," written by Adam Smith (real name, T. George Harris). He quotes John Brodie, ex-Stanford star and a seventeen-year quarterback for the 49'ers, and most valuable NFL player in 1970, as follows: "Sometimes in the heat of the game a player's perception and coordination improve dramatically. At times I experience a kind of clarity...this seems to slow way down as if everyone were moving in slow motion... and yet I know the defensive line is coming at me just as fast as ever, and yet the whole thing seems like a movie or a dance in slow motion. It is beautiful." Brodie tells how he has four chances on every play to communicate a pattern to Gene Washington, his wide receiver. First, the play itself, Brodie comes up to the line; the defense shifts, and he

has a second chance, an audible, shouted signal. Somebody moves in the enemy backfield and he has a third chance, a quick hand signal. And fourth, "sometimes I let the ball fly before Gene has made his final move, without a pass route exactly; it's sort of intuition and communciation... you don't know what the cornerbacks and safety men will do; that's part of the fun; you don't know where those guys ar going to be a second before something happens; you have to be ready for the sudden glimmer!"

Adam Smith comments - What is the click that tells you the shot is good before you know it's good? Maybe that isn't so mysterious. Maybe it's right-brained information that usually get suppressed by the left brain, but sometimes it gets through before it stops to be translated into words. And that total concentration - some psychologists say that we crave it almost instinctively, damping down, and focusing, and then opening up with a new state of concentration. That is why people take on activities that demand total attention- mountain climbing and tobogganning and skiing and car racing -- where penalities are so great that even the language - using mind shuts up for a minute, because it understands for at least a few minutes, it better get out of the way.

If we have learned one thing from science, says Robert Ornstein, it is that the atypical case, the unusual incident; the one fact that dousn't fit in with the rest, is the one which - if we look seriously at it - teaches us about all the others. It is the one substance in Madam Curie's workshop that glows in the dark which teaches us about the basic structure of all others that do not. It is the one petri disk in Fleming's laboratory in which the bacteria die unexpectedly that leads to the discovery of antibiotics. It is the one problem in physics (the addition-to-velocities problem) that cannot be solved in the usual way that leads to the Einstein revolutionary theory of relativity, and teaches us a deeper understanding of the problems we have not been able to solve in the old way.

Unlike logical thinking, intuitive thinking is not limited to any age. Very young children find their way in their world in an apparent roughly intuitive manner. Insight and creative thinking

seem to be aspects of intuitive thinking. New understanding of relationships and sudden comprehension are characteristics. Favorable conditions are a state of relaxation and out-of-awareness concentration. Some reach this by sleep, others by doodling, and others by turning to a less demanding activity and deliberately emptying the conscious mind of all problems. Intuitive thinking can climax in verbalization aloud, or by immediately making note of the fleeting resolution of the problem.

Teacher instruction, tapes, films, and textbooks, provide an accumulation of information. This leads to problem-solving. Individuals may need both logical thinking experiences and creative experiences. Further consideration of intuitive perception may give the learner more prominence. Clozure is a reference to the completion of tasks or to the solution of problems which have cognitive content. In the act of clozure, logical thinking and, or, intuitive thinking takes place. Thus individual student cognition is required for learning to be realized.

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