

Explore

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Learning to Learn

How do we think? What motivates us? What frustrates our learning process? As an undergraduate, I was continually confronted with a serious problem involving these questions. How is it possible for something happening in the world of material objects to coincide with what is happening in the world of ideas? Although this problem has several facets, the one now in question is not an abstract philosophical one but rather the natural biological one. How does the brain process information to be learned? How does it retrieve and create information to be used for a complete range of activities extending from functional tasks to creative processes?

I will show how a possible solution to this problem evolved over a period of thirteen years in karate training and in the classroom. Where possible, I shall point out analogies in the two processes, emphasizing the strong and weak points of both disciplines. I will then illustrate how some simple ideas may not only solve the original problem, but indeed may also aid students of these disciplines in attaining their true goals.

The far reaching ramifications of *Learning to Learn* should be kept in mind throughout the analysis. Such an educational method would be at once individual and universal. The student would become aware of his own learning process, allowing him to focus and apply himself to varied fields of interest. Instead of confining "learning" to a formal fifteen to twenty year period, such a process could be developed to last a lifetime! This last point provides its own motivation for entering into such a program.

For the following discussion I'd like to describe two brain processes. One brain process I call digital, so labeled because it involves the ability to proceed step-by-step in an orderly fashion, as in one, two, three A simple reflex may be called digital in that it is a sequential response to a given stimulus.

The other process we will call analogic. This process is so labeled because it involves the ability to perceive analogies or patterns between various external and/or internal perceptions. Another important concept is that of synchronization which we define as the intermeshing of appropriate digital and analogic processes. The awareness of these processes will help us understand our own thinking and learning.

The analogic process sometimes involves extremely subtle perceptions. An example arises in an attempt to solve a large complicated jigsaw puzzle. You try and try to put patterns and pieces together, and every time you conceive of a possible overall pattern, only more confusion arises. Aha! You suddenly realize that there are *two* puzzles mixed together! Now the real problem is solved. This required keeping the bare essentials of the digital process while vastly expanding the analogic process.

Karate turned out to be one interesting method of investigation of the brain processes. The physical techniques, the "tools of the trade," are simple, although many years of training are required to execute them properly. They lend themselves to analysis by using the simple laws of Newtonian physics. The cognitive activity involved is quite another story. Split second decisions, relying on very little information, yet requiring full commitment, are necessary to successfully control an opponent. Strangely enough, this act of decision-making seems to parallel that involved in creative thinking, as we'll explore later.

Unfortunately, in actual practice karate training produces results quite different from any correspondence with this theory. After many years, the student does develop a sense of the digital process in basic or individual technique training, and in controlled or pre-planned simple sparring. Then suddenly, after a few years of this training, he is thrown into "free sparring," to sink or swim, and to develop the synchronization between his digital and analogic processes. In a clumsy effort to win or defend himself, he musters up enormous energies from various emotional states and thereby clouds the issue of learning. He never admits to himself that initially he doesn't have that overall sense of the analogic process, much less a synchronization with the digital.

In fact, because the student soon learns that imitation, along with some hard experience, accomplishes short term goals, the training many times degenerates into simple teacher worship; but, after five or ten years of constant training, even the good student cannot formulate a simple one-hour workout for himself. The reason he can't teach himself is strongly linked to the fact that he isn't aware of how he learns. Most advanced

karateists still flail at new experiences, much the same as would any new student. They are not really conscious of the method they utilized to become masters in their field, and therefore cannot easily apply themselves to a new discipline.

One can make many analogies with academia. Of course good schools do teach things like problem solving, deep appreciation of the subject matter, and a sense of the unity and difference between separate academic disciplines. What the student actually learns is another matter.

Whatever the original purpose, it is obvious that the good student does not really appreciate how to teach himself. Similar to the karate student, he is pressured, and soon becomes more concerned with getting good grades and approval from his teachers than he is about learning. Who can blame him? A "good class" to most students is one which presents logically the relevant material within the course, and which presents it entertainingly enough to motivate them. These are important parts of teaching and learning, but this is only the first step. After this initial outlining and motivation, who teaches the student how to learn the material? He doesn't learn how to learn — he doesn't abstractly know or, worse yet, even *think* about the process.

After college, even the good student can't apply his education to "real" life. Or, after graduate work, many new Ph.D.'s with fine academic records find creative work in the "unknown" too much to handle. It isn't lack of intelligence or talent that prevents these people from contributing more to knowledge and society; it is a lack of knowing how to use these attributes.

The problems in existing educational institutions may well be that only the digital process is used to teach the "average" or "below average" students, and at best the better students are only sometimes motivated to express creativity. Just as in karate training, a good method has not yet been devised for guiding the student to develop a sense of the analogic process, much less an awareness of the synchronization of it with the digital. Without this capability, the student remains dependent on the teacher to learn.

These problems can be more sharply focussed when compared with the problems in karate training. Let us suppose that the same processes are relevant to both disciplines. Academic subjects are not as easily dissected as karate, but there are many parallels. Karate at advanced levels is truly a cognitive activity, although it still contains many elements of simple game theory.

According to my theory, the ideal karateist develops the ability to maintain his visual and auditory senses in a passive, analogic state, without any motor (body) interferences. He patiently remains receptive to patterns in the joint rhythms of his opponent's and his own movements. Sensing a rhythm, implies that he can connect present motion with some motion in the near future with a fair degree of accuracy. Balanced with

this, the ideal karateist develops the ability to maintain his somatic ("feeling") sense in a very active, digital state, ready to execute a given attack or block to complete the desired pattern(s). Accurate synchronization of this attack or block with the opponent's rhythm unfolds a well-timed karate technique. Interestingly enough, karate has developed three basic training methods — "basics," "forms," and "sparring" — which do seem to stress the three fundamental processes.

Similarly to sparring with an opponent in karate, when one "spars" with a problem, ideally one "synchronizes" with the subject matter, or pays attention to it. With the analogic process, one maintains an awareness of possible patterns related to the subject, as well as to possible patterns of solution. The digital process applies concentration to the particular problem focussing on analytic understanding of the details. A solution comes to consciousness most easily when there is the best synchronization between the two kinds of attention, concentration (digital) and awareness (analogic).

The discovery of a possible ideal situation enables us to focus on the original problem: basically karate and academia utilize imitation and experience as teaching methods. Confucius had some thoughts about this:

Man has three ways of acting wisely:

Firstly, on Meditation, this is the noblest;

Secondly, on Imitation, this is the easiest; and

Thirdly, on Experience, this is the bitterest.

Meditation can be understood as the process of paying attention, the synchronization of concentration and awareness. Our problem then becomes: how to teach meditation. As meditation is personal, probably the best situation that can be created is one that will give the student an experience of the correct process. Can one "extrapolate" from this ideal state of meditation to develop a teaching-learning method based on assumed biological brain functions, so as to bypass emotional learning blocks? Other systems of introspective analysis, such as Zen and Yoga from the East, go so far as to conclude that pure awareness of the correct process leads to actual dissolution of these emotional blocks.

After three years of participation as a subject in several neuropsychology experiments, I developed a method of teaching karate which attempted specifically to develop these brain processes, *without* sacrificing the learning of standard techniques and the high level of instruction. The method fills the middle ground between digital training and spontaneous, creative motor activity. The student is forced to react, with full commitment, and within time scales barely possible with ordinary reflexes, to one of several possible visual, auditory, and tactile stimuli. After some practice requiring a choice of one of three or four multiple reactions, his brain seems to boggle, but all energy gratefully takes the path of least resistance and occasionally the student

really does react "correctly." Instead of flitting back and forth between object and idea, one sensory mechanism seems to "go" analogic, and one seems to "go" digital. At this point in his training, the student is usually amazed at his own quick and decisive response.

Very soon afterwards, many students piece together an enormous amount of previously isolated karate techniques and "feelings." In the class, exercises of primarily digital or analogic nature are practiced singularly and in combination with the visual, auditory and somatic sensory systems. This is done to enable the student to link this training with other cognitive activity. Although all thought may not be inextricably linked to sensory mechanisms, it appears that certain sensory mechanisms do facilitate, or ease, the relevant brain processes. Another way of looking at this is to intuit that, if sensory mechanisms are used to receive most of our information, then similar channels are probably used by the brain to retrieve information.

The members of ISA (Institute for the Study of Attention) have developed some methods for teaching a spectrum of academic subjects parallel to the methods now used in karate to fill in the middle ground between rote learning and creative thinking. We ask the student to approach a given problem from several directions

simultaneously. For example, one may outline the relevant material while presenting interesting paradoxes and dilemmas. The student may be confronted with two logical solutions to a problem, or with several analyses of the subject, which lead to different or contradictory conclusions. In order to decide which is correct or best, the student is usually compelled to break all preconceived approaches and become aware of the nature of the problem. After finally coming to a conclusion, the student then goes back and picks apart the bad solution to find the erroneous reasoning. All the fundamental processes are in interplay. The student has begun to appreciate what it means to learn!

Dr. Lester Ingber is an associate research physicist at UCSD, and, with others in the Institute for Study of Attention, has put together five courses for University Extension this spring. Each is based on the ideas expressed in this article. The Institute, a non-profit corporation, plans to open a high school in the fall of this year.

Learning to Learn

Five courses that will pay particular attention to the way people learn, as well as the subject at hand. The assumption behind each of these courses is that there are specific brain processes involved in learning and memory, performance of everyday tasks and in spontaneous creative activity. If we pay attention to these processes, we can improve them; in short, we can learn to learn better.

Hopefully, the approach in each of these will lead to self-motivation, a deeper understanding of course material, a greater independence for the student and a greater potential for learning in other fields.

LEARNING TO THINK IN A FOREIGN LANGUAGE – SPANISH X 401(3)

Using Spanish as a working model, the course is intended to help students attain greater foreign language fluency by reducing inhibiting psychological barriers. Methods of learning idioms and vocabulary, and interpretive review of the concepts underlying the more difficult features of grammar will be presented so that the student can interrelate words, structure and underlying meaning to attain the language sense necessary for fluency. Two basic types of learning processes (digital and analogic) will be explained so that the student can learn to apply them in combination. Specific learning techniques, including the use of self-produced visual, auditory and sematic sensations, will be explored. **PREREQUISITE:** Spanish 1, equivalent experience, or consent of instructor. **FEE:** \$45.

EDP No. M7009 Mr. Rearwin. Tue. & Thur. 7-8:30 p.m. 18 meetings. 4/4-6/1, Rm. 4050A, Undergraduate Science Bldg., Revelle Campus, UCSD, La Jolla.

David Rearwin, M.A.
 Doctoral Candidate in Spanish and Portuguese,
 Stanford University, Stanford

POETIC INTERPRETATION X 402(3)

The course will consist of learning to apply digital and analogic methods of thinking to the discipline of poetic interpretation. Using specific poems in English literature, meter, rhyme, imagery and other poetic devices will be exploited to make the student more aware of his own thinking processes. There will be a distinction drawn between the first analogic reading and the final analogic interpretation making the student sensitive to the digital process undertaken in the meantime. The course will include readings in neuropsychology, learning theory and selected poetry of Shakespeare, Donne, Blake, and George Meredith. **FEE:** \$45.

EDP No. M7005 Mrs. Fisk. Mon. 7-10 p.m. 9 meetings. 4/3-6/5, Rm. 1108, Humanities-Library Bldg., Revelle Campus, UCSD, La Jolla.

Mary B. Fisk, B.A.
 Del Mar

PATTERNS IN ALGEBRA AND TRIGONOMETRY X 403(4)

Equations, algebraic and trigonometric functions, and some analytic geometry are covered ending with an introduction to the concepts of calculus. Digital and analogic approaches to problem solving are explored to promote under-

standing of underlying concepts and perception of relationships. **NOTE:** This course fulfills the mathematics requirement for the Standard Elementary Credential. **PREREQUISITE:** Two years of high school math, equivalent experience, or consent of instructor. **FEE:** \$60.

EDP No. M7008 Mrs. Condon. Tue. & Thur. 8-10 p.m. 18 meetings. 4/4-6/1, Rm. 1116, Humanities and Social Sciences Bldg., Muir Campus, UCSD, La Jolla.
 Christina Condon, B.A.
 La Jolla

APPLICATION OF KARATE TO THE STUDIES OF ATTENTION AND PHYSICS X 404(3)

The standard training methods of Kihon (Basics), Kata (Forms), and Kumite (Sparring) are developed and utilized to teach the student elements of both digital control and analogic perception involved in rhythm and timing. Direct sensory identification is made with basic principles of physics. The visual, auditory, and somatic sensory systems are exploited separately, and in combination, in this learning experience. **FEE:** \$45.

EDP No. M7006 Mr. Ingber. Mon., Wed., Fri., 6:30-7:15 a.m., Sat. 9-9:45 a.m. 36 meetings. 4/3-6/5, Gym, UCSD, La Jolla.

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DEVELOPING INTUITION FOR THE SOLUTION OF PROBLEMS IN PHYSICS X 405(3)

Selected lessons from the Feynman Lectures in Physics will be discussed and the student will be made aware of the digital and analogic techniques necessary to solve the problems associated with each lesson. **PREREQUISITE:** High School Physics, equivalent experience, or consent of instructor. **FEE:** \$45.

EDP No. M7007 Mr. Ingber. Tue. & Thur. 6:30-8 p.m. 18 meetings. 4/4-6/1, Rm. 1106, Humanities and Social Sciences Bldg., Muir Campus, UCSD, La Jolla.

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Offered in cooperation with Institute for Study of Attention – a non-profit scientific and educational public corporation. These courses are approved by the Interdisciplinary Sequences and Contemporary Issues Department, Muir College, UCSD.