ARITHMETIC

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Mathematics and the Mind

Arithmetic is something which a lot of people think has something to do with mathematics. If you walk into the little red schoolhouse and say “Mathematics,” somebody will jump up and say “Arithmetic.”

Let’s take a baby learning how to talk: First, he knows the names of items, then he knows the names of actions, and at length he comes into the field of abstractions.

It is the same way, more or less, in mathematics. Arithmetic is the business of naming objects; this is its mathematics: 1=1; 1+1=2. You notice you are doing this with items. Clock plus clock equals two clocks. It is one of the basic laws of arithmetic that you must not add apples and oranges. That is one of the basic laws of it, and that should demonstrate to you that it is about equivalent to the level of speech of Daddy, Mama, bottle, and so on.

It is methods of taking a large number of items and adding them up and handling them in various ways, but one doesn’t go beyond the point of handling these items in arithmetic.

Now we get up into something fancier; we get up all the way along the line to algebra. Algebra contains a little bit of action. It is mostly arithmetic, but it contains some action. Things here can represent more than one thing. An x can be several items or any number of items. In other words, you are trying to get up to a point where you can substitute or, if you please, symbolize, which is just what you do in language. You get a little higher level of abstraction, then. You are not in an abstract field yet, but the baby gets to a point where he can say “bottles,” and right on up there with algebra, “parents.” This means “Daddy plus Mama—parents,” or 1+x=y. There isn’t much difference in this echelon.

The next one up along the line expresses more action and a little more abstraction, and that is calculus. Calculus gives you small bits of a problem so that you can establish rates of change, amongst other things. But what you want there is action. You are getting a little more time into the problem and you are getting a little more movement into the problem. “If a rain barrel empties itself through a leak in twelve hours and the rain barrel contains so much water, what is the velocity of the leak?” You can figure these things out.

By the way, this is a clumsy mathematics. A lot of people pretend they have an enormous amount of use for it, but if you went around an engineering shop and asked someone “How long has it been since you have done a formula in calculus?” the fellow would say, “Well, I don’t know. Not since I left school, I guess.” Or take a textbook on aerodynamics: it is full of all the symbols and variables and equations of calculus. The aerodynamic engineer really clutches these textbooks to his bosom, but he doesn’t build any propellers with them. He knows better! When he gets up to that point, he whittles out the propeller and takes it over to the wind tunnel and gets it spun. And when he has figured out how much thrust it has and how much tip turbulence it has and everything else, he sends it over to the metal shop and says, “Make it.” Over at the metal shop they just take his model and take cross sections of it and they form a metal cast exactly off the testing cast but maybe twice or three times as big, and they take that to the wind tunnel and find out if it is right. They have to change it there too because it has changed in size. And the textbooks just lie there full of calculus that looks awfully pretty!

There was a very brilliant mathematician who put a lot of equations on feedback reaction circuits into his book on cybernetics, and these equations look very pretty. Somebody asked him over at the General Electric lab why he put those chapters and chapters of mathematics in the beginning of his book on cybernetics, and he said, “Well, people kept complaining about

there not being any mathematics connected with cybernetics and I couldn't prove it to them otherwise, so I put in those formulas." At least this is the story which is told. So the reader of cybernetics is confronted with all this complex calculus.

However, as you get up to that level, you are still in the band of arithmetic. A mathematician is never really hot until he has stepped out of this band and he gets into abstractions.

The next one up from calculus is theory of equations That has something to do with arithmetic and algebra, but not as much. It has a little something to do with most anything. It is the theory of how you make out mathematics and it is a pretty sloppy subject. It is outdated now, by the way. It is still taught, but very badly outdated.

Going up from there, you get into symbolic logic. Now you have more complex symbols representing more complex and more abstract entities. One equation in symbolic logic can very easily cover about four pages, and when you get it all through you could have thought of it yourself in the first place without putting it all down, but it sure looks pretty.

Symbolic logic will do some interesting things with sets of problems. You could set up a situation whereby you could get all possible answers to a problem. For instance, you could set up Dianetic processing in symbolic logic and then extrapolate, by just figuring the formula, all possible processes. I did this for about half an hour one day and I found three new processes; I hadn't even filled out the first equation all the way, so there are lots of them. It is just treating each variable with as many variables as it is capable of handling.

But we go up from there and we get into a mathematics which is about twenty-five or twenty-six years old now called topology. J This is the art of being as thoroughly and pragmatically German as possible on an abstract line which nobody can trace or catch you on!

Seriously speaking, topology is a test mathematics. You can take topology, evidently, and test the validity of certain solutions without doing the solutions again. It has a lot of interesting uses. But with this you are into a field of abstraction. In other words, you can think about abstract things in mathematical symbols. You are almost up to the level of language.

And then we go to the last and highest mathematics of which I happen to have any knowledge, and that is the English language. That is a mathematics; it is a mathematics of logic.

Let's take the word hat. How many hats are there in the word hat? If you say "He wore a hat" you have really got action, and you have abstraction ("Why did he wear a hat?"). There are all sorts of things standing around this. "He wore a hat" is actually mathematics but because it doesn't have anything to do with arithmetic—it is only a statement of the physical universe—people say, "That can't be mathematics." Yes, it is, because all mathematics consists of is arranging items, actions and abstractions in the physical universe for more rapid computation. That is all a mathematics is. Mathematics is neither true nor false, it is just handy.

The classic mathematician used to say, "Mathematics was true long before man arrived; it will be true long after man has disappeared." He has had to change that tune.

Quantum mechanics and stuff in that level came along, and the way you get an equation to balance in quantum mechanics should make your hair stand on end. That is the mathematics they use to make an atom bomb and it has the degree of accuracy of a second-grader doing a formula in calculus.

The way you do quantum mechanics is very simple. You take the speed of light and you add 0.897 to it, then you divide that whole thing by x+y, by which you are representing the quantity of energy you wish to be contained, and you multiply all of that by 865 and you get, then, the potential range of explosion.

You ask, “What are these things, 0.897 and 865?” and the fellow who is doing the work says, “Well, I don’t know, but the thing doesn’t work unless you put those in.” This is the way they build atom bombs—no kidding. This is wonderful stuff. They just throw in an arbitrary number in order to make the equation balance. This is the mathematics they are using, actually, to find out how many pennyweights of plutonium to put in one pile before it unstabilizes and explodes. “Let’s make a new pile to make more plutonium. How much plutonium will it turn out? Is it safe or isn’t it? Well, let’s see, we throw 365 and 916 and divide that by the x +ys and the rest of it, and we will divide all that by 89 constants.”

“Why 89 constants?”

“Well, it just seems that it would work out better that way. And we divide all that by 89 constants, and we might as well take a chance on it. Yeah, I don’t think it’s quite critical.”

Of course, what they are betting on is whether or not this new pile— which is going to turn out a hundred times as much plutonium as the last pile or something of the sort—is going to blow up the first day it is turned on. And they can’t figure it precisely. (All of this is tremendously inaccurate, because I am telling you a joke, really.) After they get this all figured out, they have to ask “Did we get low-order fission this time? In other words, have we suddenly made it so that lead will blow up or can we still encase these things in lead?” All of this is in the beautiful field of “let’s guess.”

But don’t let anybody try to come around and pull a high-hatl on you and tell you about mathematics. The mind is a servo-unit to every mathematical equation written. The equation has no use or validity unless it contains, as an understood part of its elements, a human mind. That is painfully obvious. You write an equation in the sand. What wrote it? A human mind. Somebody comes along and he reads that equation. What picks it up? A human mind. But never at any time does the human mind so mechanically write it and so mechanically pick it up that it doesn’t perform action with it. The only time a mathematics can go into action is when interpreted by a human mind. The highest level of mathematical activity is done by the computers of the mind and all of these mathematics, so-called, are second-, third- and tenth-rate assistants to logic, mind and so on.

A mathematics permits the mind to be free of carrying large numbers of symbols. In other words, the mathematics provides a shorthand by which the computations and thoughts which have gone before can finally be added up to a final conclusion. And actually a human mind, if it doesn’t have stuff to write on, can actually sit down and learn to keep its own tabular system—learn to keep its own equations—at a remarkable rate.

I knew a Japanese once who used to write numbers right side up and upside down and do sums in his head and add and subtract with his toes practically, all simultaneously. He could keep enormous numbers in his head. He could take a big column of figures—four- and five-figure numbers —and add them all up down at the bottom and give you the number. Two or three hours later he could give you the number again and in addition to this he could read off all the figures again. This man, in other words, had picked up his sensitivity to a point where he was a walking calculating machine.

People talk about the big computers that figure out the positions of the sun, moon and stars and strategy for the navy and all that sort of thing, and they talk about how superior these things are. But what feeds them? What pulls the answer back out and uses it and what built them in the first place? The human mind.

The nullification of man by mathematics is an operation similar to what navigators used to do. The navigator would say, “I amount to something on this ship because I can take this mystic instrument, stand up here on this mystic deck and shoot at these mystic stars and get mystic positions, and you’re safe. But don’t inquire into this great cult that I am running or I’ll kick you off the bridge.” That used to be navigation and to a large degree that is mathematics.

It is sort of a wonderful thing that you, making up your mind as to whether to eat a banana split or a strawberry sundae, are doing a fuller computation than most computers do. You have to add up all the data you have and all the conclusions you have on banana splits and strawberry sundaes, then you have to add it up to the moment and then this checks back against what you think maybe is the nutrition content of the body and all this, and you just compare it. Then you say, "Well, you decide."

The advent of Dianetics was not an advent of some observation of human behavior. It became possible to think about human behavior only when it became possible to see what thinking was about. It was only possible to find out a little bit more about thinking by inventing something, in about 1937, called infinityh valued logic. Mind you, when I say "inventing," I don't mean bringing something new and putting it in the mind. I mean finding something that the mind has already been doing and using it: infinityvalued logic—nonabsolute gradient scales. This may sound awfully complex, yet you use it all the time.

The only reason I am telling you about this is I want to make you aware of the fact that there is a logic process behind Dianetics which you could very well employ in trying to figure things out, and it is a very simple one. Of course, I could dress this thing up and invent a whole new line of symbols: I could have equal marks which you wrote at the left-hand corner of the page on the bias, and I could take the Sanskrit alphabet and give you a new set of symbols and let you study for three years. And at the end of that time, having gone through geometry, trigonometry and other fields of complex and esoteric mathematics, you would be able to come out at the end of it and do just exactly what I am going to tell you how to do now. So we will just dispense with all of this other thinking and simply concentrate on what we are doing: infinity-valued logic.

There is a picture of it in the back of Science of Suruiual, though nothing more about it is written there. It is very simple.

Once upon a time people would say, "Why did I starve last week? God meant for me to starve." "Why did I eat this week? God meant for me to eat this week." "How come I shot that deer just when I shot that deer? God sent me the deer." This was their overall reason. Sure, you could say that was the reason, but they didn't fill in any of the center line, so they had one-valued logic, which was God's will.

They got along on this for a long time; there are a lot of races still getting along on it. Politicians get along on it beautifully: "That's the Democratic Party's will."

Now, the next big advance in logic could be said to be Aristotelian logic, which a lot of people really love to run on today. If you want to make anything very acceptable, for God's sake, put it out on the basis of right and wrong: If you do so-and-so, it is wrong; if you do such-and-such, it is right. This is two-valued logic.

Two-valued logic, however, depends on viewpoint. The Republicans say, "Everything done by the Democrats is wrong." The Democrats say, "Everything done by the Republicans is wrong." In other words, it is black and white—yes/no. Cars are fast; women are no good; to drink is evil—any number of these yes/no affairs. There is a lot of this left around; there is some of it kicking around in communism. They say, "Capitalism is evil!" The capitalist, on his part, pulls almost the same stunt when he says "Communism is evil!" There are a lot of things that people use in both of them and neither one of them is right. The truth of the matter is that they have both worked out a little bit wrong and certainly neither of them can be used as an absolute philosophy.

If you used communistic philosophy absolutely with no capitalistic philosophy in it at all, your country would take about twenty-four hours to go into a complete nose dive. There would be no exchange, and you would pay no attention to the various economics.

But people did not see that there were any of these little nuances—that something might not be all bad, that something might not be all good. They were very didactic in those days and they said, "It's bad," and "It's good." That is Aristotelian logic. Korzybski almost blew his stack most of his life over this kind of thinking.

Now, the next one is engineering logic. Engineering logic is yes, no and maybe. Engineers have been getting along just fine with this logic, and as a matter of fact, they are still getting along with it. This is the logic they use, mostly.

There is a whole mathematics built around this logic, by the way: Boolean algebra. It works on the principle of yes greater than no, no greater than yes—which implies that there is always a maybe. In Boolean algebra you can figure out any kind of a problem you want to just by figuring it on the basis of "Is yes greater than no or is no greater than yes?" You say, "No greater than yes, no greater than yes, no greater than yes; therefore all of these noes are greater than yes, so the problem answer is no."

That is the way the engineer is doing his work now, actually. He figures things out on the basis of "It will work, maybe it will work, it won't work. It is good, maybe it is good, it is bad." But he moved into a field where he could throw in a divine doubt, and logic made some progress when this type of logic came into the field.

Then there have been some fields around like multivalued logic. But we have infinity-valued logic. Let's just go the whole route. Nobody can get above that one.

We have a method of thinking about things which is a very easy one, and it has an infinity value.

Combined Spectra of Logic and of Survival

One side is right, going out to infinity, and the other side is wrong, going out to infinity, and in the center is neither right nor wrong, which is an unimaginably fine line. You wouldn't have anything hanging up dead center, really. An answer is figured out by, How many values right? How many of these gradient lines is it right? How many gradient lines is it wrong? How much is it more wrong than it is right? How much is it more right than it is wrong?

Now, let's look at the tone scale. Zero is death. That looks like an absolute, doesn't it? Death is not an absolute. In the first place, the organism isn't dead, because it becomes parts, usually, of other living organisms, one way or the other. There isn't any sharp demarcation. There is a point, evidently, where the theta and the MEST separate, but it probably isn't a terribly sharp point and I don't think it always separates all the way.

But what is infinite survival? That is clear on up to infinity. How high can one survive? How high can one go with survival? We don't know. But we do know that as a person makes mistakes and as he is slapped back at by the physical universe, he comes lower and lower on this tone scale. In other words, he gets closer and closer to death. Every mistake could be considered to be a little bit of death and every right answer could be considered to be a little bit of infinite survival. So he is on a gradient scale.

What is fear? You can't have an absolute term like fear. Lots of fear is terror. But you still have on this scale a volume; there is magnitude in terms of volume. In other words, how afraid is he? It is not enough to just say the person is afraid. One must also ask, "What is the degree of fear?"

Now, on Aristotelian logic—psychiatric logic—people were alive or dead, people were sane or insane. And these were absolutes. For instance, a court would call somebody in and ask, "Is this person sane?" and the psychiatrists would all stand around and say, "Well, according to our studies of this and to our studied opinion, we find he is insane."

By the way, the courts have a wonderful law they run on. It says, “Insanity is the inability to differentiate right from wrong.” That is just gorgeous! What is right and what is wrong? The last thing in the world that could tell you what is right and wrong is a code book of law. The last person in the world to tell you right and wrong is really a judge. It is always relative to something, so he would say something is right or wrong according to this statute as interpreted by this servomechanism—his mind. The thing could be on paper actually, theoretically, absolutely right or absolutely wrong; but when you add a servomechanism to it that interprets it, which is the mind, that takes it either way on the gradient scale. But there is no such thing as even a theoretical right or wrong.

Absolutes are unobtainable just as infinity is unobtainable. There is no absolute depth of insanity and there would be no absolute height of sanity. How insane can you get? How sane can you get? I can tell you as wrong as you can get; it is in Science of Survival. How wrong can you get? Dead! As far as your life here on this earth at this time is concerned, that is how wrong you can get. That is all you need to worry about. Now, how right can you get? The unimaginable limit on rightness would be clear up into the zenith of infinite survival. Theoretically you could be so right that the whole universe, all organisms within it and all the theta universe would survive infinitely from there on. If one organism really had something that was that right—an absolute of right—it would have an infinity of rightness which would be an infinity of rightness for everybody. It becomes an impossibility.

If you really created an infinity of rightness—a person being so right that he makes everything else right—then there would be an infinity of rightness and everything would live forever. Because what is right? Prosurvival. If we judge an action according to our viewpoint of what is right, it is what helps us survive. What is wrong? That which limits our survival or adds to our nonsurvival.

So, as a person goes toward right he goes toward survival. If he has more right answers than he has wrong answers he will survive. And if he has more wrong answers than he has right answers he will die (or become a politician !) .

This is a gradient scale at work. You more or less get this understood as underlying Dianetics; you look at someone and say, “A little bit dead. This person is not quite as sane as another person,” and so on. You are seeing this gradient scale at work; the mind responds to this immediately because it is inherently part of the way the mind thinks about things.

So you come up to somebody and say, “You know, he is pretty insane.” You don’t recognize that this statement would not be immediately well received out in the society.

“What do you mean pretty insane? What do you mean a little insane? A person is nuts or he’s not nuts! I mean, that’s obvious!” Only you know very well this is not the case. A person is somewhere on a gradient scale of sanity. He is on a gradient scale all the way on up the line.

Now, on one side you have survive and on the other side you have succumb. The way the mind evidently thinks about something is like this: “An action. How right is it to do this action? Two units right. Is there anything wrong about this action? There is an element of wrong in it: three units wrong. Is it right or wrong, this action? It’s one unit wrong. Don’t do it!” That is the way the mind adds it up.

Let’s take buying a five-thousand-dollar car. Look at the number of factors which would go into the solution of whether to buy a new car. How many factors would there be? The mind operates on a flock of subcomputers which could be said by analogy to look something like this graph. This flock of subcomputers keeps feeding these data already evaluated and plotted to the central board.

First data: “Do I want one? Oh, boy! Yes! Can I afford one?” These two factors, as they have been put down, will balance in the middle. There is indecision about it: want one/can’t afford one. Indecision. So now you start to figure out, “Could I get some more money? That’s a good

solution. That's two right." It operates to some degree like a Chinese counting board. You keep adding up the data back and forth, and you finally add up the final solution—and it happens very rapidly—that it is three units wrong to get a five-thousand-dollar car. So you decide to buy a Ford, and you find out that costs four thousand dollars these days!

Now, when a preclear gets rid of an engram—he gets this engram well out, he gets the kinesthesia out, he gets everything out of this engram and it is nicely, beautifully erased, the phrases are gone and everything—he has been moved up a little bit in the direction of being healthier and saner. His potential survival has increased; his potential of being wrong has decreased.

In the English language, there are words like right and wrong, alive and dead, accurate and inaccurate. These absolutes are foisted off on us; they are just shoved in our laps by grammarians. And I have never met a grammarian yet who was a good mathematician, so I can say they were wrong. The actual truth of the matter is that the words should be righter, wronger, aliver, deader, accurater and perfecter. In order to be completely accurate with your language you would have to have these degrees.

Now, that should give you some sort of an idea of what you are up against mathematically. There is such a thing as nonarithmetical mathematics.

You are working with this very terrific simplicity, and if this simplicity were stretched out to its ultimate on infinity-valued logic and everything you could do with infinity-valued logic were included, you would really have a mathematics. Why would you have a mathematics? The mind is doing it for you, and that is the way it should be. One of the most interesting things about thought is that it will approximate or formulate almost any.kind of mathematics there is. As a matter of fact, all the mathematics we have, have been evolved through and with thought.

You are working on gradient scales, and it should help you in studying this subject to know quite a bit about this.