

# PHILOSOPHY AND FUN OF ALGEBRA

## CHAPTER 7: HOW TO CHOOSE OUR HYPOTHESIS

The faculties by means of which we get our positive data are called the senses (sight, hearing, etc.).

The faculty by means of which we get our hypothetical data is called the Imagination.

Some persons are prone to warn young people against what they call an excessive exercise of the imagination. Of course, to say that “excessive” anything is too much is a mere truism, but nobody knows yet what is the proper amount of use for the imagination. What we do know is that there is a good deal of excessive mis-use of the imagination, by which I mean that there is a frightful amount of using it contrary to the laws of its normal action. A kind of use of it, such as, when we find a child doing it with its eyes, we say, “Do not learn the habit of squinting”; or if it does the analogous thing with its legs, we say, “Go and run about, or do some gymnastics; do not stand there lolloping crooked against the wall.”

Squinting and lolloping crooked are things that it is best to avoid doing much of with any part of one’s self.

Moreover, it is bad to spend too many hours over either a microscope or a telescope, or in gazing fixedly at some one-distance range. The eyes need change of focus. So does the imagination.

There has been in modern Europe a shocking riot in mis-use of the imagination. The remedy is to learn to use it. But the same kind of people who would like to bandage a child’s eyes lest it should learn to squint, like to bandage the imagination lest it should wear itself out by squinting.

In a school which professes to be conducted on hygienic principles, we have nothing to do with that sort of pessimistic quackery. We use the imagination as freely as the hands and eyes.

But when we come to the end of our arithmetic we do not content ourselves with guesses; we proceed to algebra—that is to say, to dealing logically with the fact of our own ignorance. One of the data that we do know is that all great nerve-centres affect each other. Mis-use of any one tends more or less to produce distorted action in the others. And, quite apart from that consideration, any energetic and continued action of one tends more or less to suppress the action of the others, for the time being, by



drawing the blood from the organs which are the seat of them; and then, when normal circulation is restored, to produce for a time an unusual sensitiveness in the others. There is nothing abnormal or wrong in this, provided that we recognise the fact, and, as I said, are careful to deal logically with the fact of our own ignorance whenever anything happens either to our eyes or to our imagination which we do not at the moment quite understand.

If you ever arrive at using your imagination strongly and rightly in the construction of any sort of algebra, you may find that it affects to some extent your sense-organs. It certainly will affect them more or less whether you know it or not. What I mean is that it may affect them in a way that forces you to be aware of the fact. If ever this should happen, take it quite naturally; and as long as you are too young to understand how it happens, just say to yourself, "This is  $x$ , one of the things that I do not know, and perhaps shall know some day if I go on quietly acting in accordance with strict logic, and remembering my own ignorance."

The ancient Hebrews used their imaginations very freely, and sometimes really very logically. And sometimes the free use of the imagination produced sensations in the eyes and ears as if of seeing and hearing. They considered this quite natural, as it really was. Many great mathematicians in modern Europe have had these sensations.

The Hebrews called these sensations by a Hebrew word which is translated by the English word "angel," from the Greek "angelos," a messenger. The Hebrews were quite right. The sensations are messengers from the Great Unknown. They bring no information about outside facts. No angel tells you how many petals there are in a buttercup; if you want to know that, you are supposed to ask the buttercup itself. No angel tells you the price of sugar; you ought to ask your grocer. No angel tells you how to invest your money; you ought to ask your banker or your lawyer. There are people foolish enough to ask angels about investments, or about which horse will win a race; which is just as foolish as asking your banker in town how many blossoms there are on the rose tree in your country garden. It is not his business, and if he made a guess it would most likely turn out a wrong one. All that sort of thing is quackery and superstition. But the angels do bring us very reliable information from a vast region of valuable truth about which most of us know very little as yet. They guide us how to frame our next provisional working hypothesis, how to choose the particular hypothesis which at our present stage of knowledge and development will be most illuminating for us. Some of the angels come during sleep; we call them dreams. Dreams sometimes suggest the best working hypothesis to experiment on next. More often they warn us against thinking upon some hypothetical basis which for the present will not suit us.



And here comes in the value of such formulæ as the Ten Commandments. They are the laws of the normal working of the brain machinery. The angel (or imaginary messenger) suggests to you the one among possible working hypotheses on which your brain will most readily work. Now the formularies of which I spoke give you the laws of healthy brain action. Therefore, if the angel suggests something contrary to the registered formulas, he is suggesting the hypothesis which you ought carefully to avoid thinking out or using at that time. It is of all paths towards disease the one which will lead you, in your present condition, most rapidly towards disease. But if the imaginary angel suggests nothing contrary to the formularies, then the image or idea which he suggests is likely to be one on which your mind for the time being can work safely, and the one along which it can work most easily and profitably. When your imagination is acting strongly in providing you with working hypotheses, there are a few little precautions which you ought to observe. Do not at such times take either very rapid or very much prolonged physical exercise.

Be rather particular not to eat anything either indigestible or highly flavoured. Even if you were in the habit of taking any kind of alcoholic stimulant (which, while you are young, I hope you will not do), avoid it during the process of framing hypotheses. Be extra careful, at such times, to keep up any routine exercises of slack muscles and slow breathing which you find suit you. Take a little extra care, at such times, not to catch cold. You are rather less liable than usual to take cold at such times; but, on the other hand, you are less conscious than usual of ordinary physical sensations, and may be very cold without knowing it. A chill may settle locally, and produce permanent mischief. Above all, be very careful, while the imaginative fit is on, to avoid letting the subject as to which your imagination is stirred become the object of either fun, vanity, or gossip. The vision which you see may quite harmlessly and legitimately become a source of fun to yourself and your friends at some future time, but take care never to gossip or joke about it until it has passed from the condition of imaginative vision to that of working hypothesis. But the most important precaution of all is incessant reverence for the Great Unknown, the sacred  $x$ : or, in other words, a constant awareness of your own ignorance. Remember always that Genius means conscientious, careful work on suggestions of the imagination taken as provisional hypotheses.

To take suggestions of the Imagination as fact is Insanity. When you hear of a man that he has unquestionable genius but is a little mad, that means that he sometimes takes the products of his imagination as working hypotheses, but sometimes mistakes them for facts.

All the above precautions may be summed up in one sentence: Remember that the more active the imagination is, the less the physical and moral instincts are on the



alert; therefore, conscious precaution should supplement instinct at such times, until self-protection has become so fixed by habit as to become in its turn automatic and instinctive.

If you observe these precautions you need not fear using your imagination freely. When you hear of some brilliant imaginative writer who has come to grief physically, mentally, or morally, after a short and brilliant career, you will find it advantageous to try to find out which of the precautions he has been neglecting.

In future letters I hope to point out to your notice some famous cases of disaster due to such neglect.

