SWAIN SCHOOL LECTURES

Swain School Lectures

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ABOUT MINDS

A ton of coal is exchanged at one place for two barrels of flour; at another place for one. An ounce of gold, which to-day buys thirty ounces of silver, was once bartered for sixteen ounces. All the antecedents that determine the ratio of exchange in an actual instance are never ascertained. In many actual instances, however, there have been disclosed features common to them. But the aspects, common or individual, are operative mainly as they determine the states of mind of the two parties to a transaction. In other words, psychical elements are involved; and the business man succeeds or fails in part by reason of his greater or less knowledge of psychical facts and principles.

These facts and principles are not those ultimate facts and principles which are discerned by a few gifted and devoted students; for those profounder truths are as little likely as the doctrines of the Calculus of Variations to become the possession of many minds.

There are psychical phenomena, it is plain, the knowledge of which is of universal and immediate applicability; and no one can go far in any walk of life without finding himself baffled by his ignorance of some point of psychology, though he may never have bestowed that name on the sort of knowledge he needs.

The teacher with his pupils; the orator before his audience; the actor facing his house; artists, statesmen, philosophers,—who is exempt from the necessity of knowing psychical facts, facts about the ideas, wishes, purposes, designs of his fellowmen?

Palmistry, physiognomy, phrenology, astrology are names for sets of signs that have been believed to be indicative of psychical facts. Sculpture, painting, architecture, music, and poetry are certain processes for modifying psychical movements in a determinate way.

A chemist weighs, measures, counts, calculates, and concludes that one gramme of that water contains one milligramme of chlorine. He is not always aware that he has learned considerable psychology on the way to this conclusion. No matter what the result, the beginnings are sights, smells, tastes, "feels"—in a word, sensations that have become modified by countless repetitions. His training has consisted in discriminating amid a cluster of

psychical elements something which he calls real, while rejecting the other elements as unreal. The chemist would miss his own aim if he should try to be at the same time a psychologist. He would have to attend to these rejected elements, and live over again a life which he must forget to succeed as a chemist. It is not for all persons, not even for all teachers, to be psychologists. With most people a little psychology, as Matthew Arnold said of mathematics, goes a great way. And yet a little psychology is likely to be very useful; to the majority of people more useful than a good deal. This little, if it be of a peculiar kind, is a good thing to have when one is occupying his mind with dreams, apparitions, ghosts, materializations, mind-cures, thought-transferences,—matters, i. e., about which men still dispute, not where among reals they are to be placed, but whether they are to be placed among real things at all.

Besides *Tellus* and *Ceres* the Roman peasant invoked twelve other gods who were associated with as many processes of husbandry: *Vervactor* with the first plowing of the fallow field; *Reparator* with the second plowing; *Imporcitor* with the third and final plowing, by which the furrows were drawn and the hills heaped up; *Insitor* with the sowing; *Obarator* with the drawing of the plow over

the ground after the sowing; *Occator* with the working of the field over with the harrow; *Saritor* with the uprooting of weeds with the hoe; *Subruncinator* with the pulling up of weeds with the hand; *Messor* with reaping; *Convector* with the bringing in of the grain; *Conditor* with stowing it away; *Promitor* with the distribution of corn from bin and barn.

This is but a fragment of the evidence that Usener and others have collected to the effect that the primitive Roman never plowed or sowed or reaped, never sheared his sheep or cut his own hair, never did any good or, for that matter, bad deed, without thinking on a god whose name was allied to a word that denoted the very act in which he was engaged; Plower, Sower, Harrower, Weeder, Shearer, and even Manurer.

What are these gods? Where do they come from? If you and I believed that these were real beings, the problem would be like that of accounting for the origin of the moon, the oak-family or the human race. But we do not believe that such beings ever existed in reality. How then did it come to pass that anyone ever entertained such beliefs? This is a very different problem; not to account for the origin of the gods, but for the origin of the belief in the gods, such gods, that is, as these that have just been named. If we do not

believe that these gods really existed and were known in some way, what could have been the experiences out of which the ideas of such beings originated? Let us try to imagine, at least in vague outlines, a possible solution. Hunters and fishers, even nomads, did not take kindly to the cultivation of the soil when their condition urged them to do it or starve. The feebler were forced to the arduous toil by the stronger; women and captives and slaves were driven to each occupation again and again, generation after generation, till at length a people of husbandmen were trained. But how hard was the task of learning these unwonted crafts! The memories of the tillers of the soil were one long array of masters, drivers and lords who either compelled them to the task, or instructed them how to perform it, or perhaps even assisted them to complete their labor and requited their efforts with some share of the product. Associations of the constant presence of an enforcer, director, helper or rewarder with each subdivision of the peasant's employment from year to year would result, when the training had produced an ingrained habit, in the revival, at the proper season, of the image, the memory, of the forms which had summoned the thrall to his task; and this remembrance now would prompt him to the fulfilment of his duty, while

his lips might implore the mercy or the kindness of the being who appeared to him in spirit with an actuality which was more real to him than reality itself is to many of our disillusioned philosophers. Blended memories of his own experiences, we may call these, the ideas of past impressions, associations which were to fade away when man should become adapted to his surroundings, and new tests of reality should be applied. "Still the old instinct brings back the old names"; and "O Plower, help me now," "Do thou, O Sower, scatter the seed," "May the good Weeder aid me," had a meaning to the haunted minds of early men.

So may we explain these occasion-gods, as they might be called.. You may accept the solution or reject it; I am not concerned now to defend or confirm it by arguments. My purpose has been served if I have made plain that there once prevailed a series of agricultural usages implying certain accompanying beliefs; that we may imagine them to have been preceded by certain experiences and that in those experiences were the origins of those beliefs. We have been attacking a psychological problem and have essayed its solution in accordance with psychological principles. We have assumed that certain actions implied certain thoughts and feelings; that these psy-

chical states grew out of definite experiences; that these experiences were determined by the environment; that it is possible for us to imagine what that environment was.

Let us examine these assumptions and consider how we are to classify them, that is, determine what assumptions they most resemble of those with which we are already familiar. There are assumptions and assumptions; and to ascertain which will be accepted and which will be rejected is itself a psychical problem. Thus does psychology meet us at every turn!

We have assumed that certain actions are attended by feelings and thoughts. I appear to myself to be permanently debarred from testing this assumption directly. I hate and love, hope and fear, believe and disbelieve, reason and dream,—I do not know directly whether you do or not. What I seem to myself to be immediately aware of (even this immediacy often turns out to be a mistake) are sounds, colors, touches, and so forth. Stones and plants and beasts and men I behold; but minds are nowhere. If I could dissect a man, alive or dead, I should find no more of hopes and fears, beliefs and disbelievings than I should in any dog or log or clod. And here emerges another problem of psychology: How do I come to ascribe feel-

ings and endeavors to some of the objects about me and to deny them of others? I am not asking now as an epistemologist might ask whether a belief that a toad has feelings and a flint no feelings is warranted by the evidence or not; I am only asking for some account of the origin of beliefs, not whether they are true or false. The pursuit of this inquiry would lead you to the discovery of many psychologies very different from any conception of the doctrine which you think prevails or ought to prevail. You will find psychologists who treat of the mind of God or of gods, of the feelings of demons and angels, of the souls of worlds and stars, of the thoughts of mountains and seas, of the doctrine that animals are automata, of the ideas entertained by disembodied spirits, of the strange ideas imputed to stranger shapes which were thought to have inhabited the earth; but it is with none of these that the psychology I mean is occupied. This confines its attention to psychical phenomena that occur in connection with men and animals. Its range is even more restricted; for it does not include all the psychical phenomena that are alleged to be manifested in conjunction even with these, but only such as admit of being subjected to certain specifiable tests which will leave the least room for misinter-

pretation. You will find, however, that this psychology has not a tenth as many cultivators as the doctrine which most people in our country understand by the name psychology, if they understand anything by it at all. Their psychology busies itself with precisely those things which the other has excluded on the ground of its incompetence to determine any mode of investigation; namely, with telepathy, thought-transference, possession, and the like.

In pursuing the inquiry I have indicated, that is, in trying to find out how you come to ascribe feelings and endeavors to some of the objects about you and to deny them of others, you will learn that, even with the restriction of the scope of the psychologist's inquiry to the emotions and ideas of men and other animals, there has been much discussion whether these thoughts and sentiments were associated with the whole organism of an individual or limited to some part of his system. Thus at different times the blood, the marrow of the bones, the heart, the nerves have figured as the organ of psychical activity. Now, what is called the nervous system has, after long investigation and many confusions, been disentangled from the rest of the organism and show to be more intimately concerned with mental manifestations than any other part of our frame. This

doctrine of the correlation of nerve tissue and mental action is now taught dogmatically in our schools, and the evidences for or against it are treated with as much indifference as is usually accorded to the proof of doctrines that are held to have been established beyond doubt. But nerves are not mind, any more than stones are. It still appears that there is only one mind of which I have any direct and immediate knowledge. The movements of living beings around me I may ascribe to muscular changes. These muscular changes may be shown to be due to the excitation of the nerves. This excitation of the nerves may be produced by some chemical, mechanical, electrical, or other physical agency, or by something else which I do not find in the phenomena at all, but the presence of which I assume there. There may be as many minds as there are men, but each man has access to only one mind. What do you think would be the present knowledge of the structure of hearts, if the only heart that each one could know were his own, and it were a physical impossibility for him ever to see the heart of another?

But this assumption that mind goes with nerve structure requires a few more words. It is not always assumed to go with all nerve structure, not with that of the dead, for

instance,—not with all the nerve substance of the living,—not with any of it at all moments of life. Sometimes, then, where there is nerve tissue, there is mind, but is there mind where there is no nerve tissue? Some have said: "Without nerve tissue no mind," and have even gone so far as to deny the existence of God on the ground that nowhere in the universe is an adequate nervous system discoverable. At all events, they say, the scientific psychologist is limited for his ultimate data to his own mind and the nerves of others. These conflicting opinions reveal the depths of our ignorance. The relation among these different views may be exhibited very simply by means of diagrams or symbols. *n* stands for what has nerves, and *m* for what has mind.

n *m*	*m*	*n*	*n*
n *m*	*n* *m*	*n*	*n*
n *m*	*n* *m*	*n* *m*	*n* *m*
n *m*	*n* *m*	*n* *m*	*n* *m*
	m	*n* *m*	*n* *m*
	m	*n*	*m*
			m
			m
n = *m*	*n* (*m*	*n*) *m*	*n*) (*m*

Our second assumption in accounting for the (supposed) fact, that the mind of primitive

man was haunted by a swarm of occasion-gods, was that any psychical state grew out of certain experiences, implied certain previous mental states without which it would not have been. If our psychologist infers that a man knows Arabic, he assumes that the man has had certain experiences, has associated with Arabs or has consulted Arabic books; and he would refuse to entertain any other hypothesis in regard to the origin of this man's knowledge of Arabic until his assumptions concerning the previous experiences of the man were proved to be false. This, I say, is the assumption of our psychologist, not of those other psychologists who, I asserted, were much more numerous. This brings us to the consideration of the third assumption which this least numerous school of psychologists feels bound to make, that these experiences were determined by the animal's (man or beast) surroundings at some spot or spots on the earth's surface. In this regard the position of the least numerous school of psychologists as against all others is: If, as you assert, psychical states are otherwise originated, the only way to establish your contention is to exhaust all the possibilities of our mode of explanation.

Our psychologist then is limited to the consideration of psychical states, their interre-

lations and their relations to the animal organism and its environment, so far at least as these problems are essayable by methods of research that have approved themselves as having brought about agreement heretofore on disputed matters. His position, you see, is an isolated one. He stands contrasted not only with the hosts of telepathists, Christian scientists, spiritualists, obsessionists, possessionists, and the like, called by themselves and others psychologists; but he is also at variance with another class of whom an account is given in the lecture on metaphysics. He is, however, closely akin to him who has been called an experimental, or a physiological, or a laboratory, or a mathematical psychologist. For the mathematicians, the physicists, the chemists, the physiologists, and their kind have begun to ask themselves if they may not perhaps help the psychologist in the answering of his questions, though it must be admitted that their help was not always thankfully welcomed, even on those rare occasions when it has been considerately proffered. It has sometimes been fancied by these earnest scientists to the great amazement of the psychologist that the sensation blue, for example, is going to be identified with some movement or other property of the atoms of ether or nerve. It may be possible to

enumerate the physical conditions of the sensation of blue; the physiological antecedents may be made out: the accompanying neural state may be determined; the psychical elements that preceded it and made it feasible may be learned; it may be proved to be really compound, simple though it appears; its constituents may be recognized; its ultimate disappearance may be foreseen and the mental state to follow predicted; yet the sensation of blue is something absolutely and inexplicably distinct and different from all these. What I have here said of blue is true of any other color, any sound, taste, smell, and so forth, which appears to us simple. No explanation can explain my blue out of existence. I emphasize this point, that the sensation blue is something peculiar, unique, *sui generis;* because I am compelled to read so much in which, partly from carelessness of expression, partly from confusion of thought, partly, one must admit, from the imperfection of language and from unavoidable brevity, the contrary is implied. When I read in Professor Pearson for instance: "The mind is absolutely confined within its nerve exchange; beyond the walls of sense impression it can logically infer nothing," he seems to me to be confounding sensations and nerves in a way that does not help me to understand psychical processes. That

a mind has any relation to a brain is one of the latest discoveries that a mind makes.

You see this desk, its distance, shape, size, color, perhaps the material of which it is made. You are aware too that you see these things. Now whether this table exists or not, or rather what the meaning of existence is, it is the claim of the metaphysician that it belongs to him to decide; and with his questions we have nothing to do. Whether you know what you claim to know, or rather what the word knowledge should be taken to mean, is a matter the decision of which the epistemologist desires should be reserved to himself; and the consideration of that point we leave to another occasion. But this conviction of yours that you see the distance, shape, and so forth, of this table is doubted and denied by many who have reflected on it. Among the first to call in question the belief which the philosophers among his contemporaries shared with the vulgar was Berkeley. "To Berkeley every virtue under heaven" is Pope's famous line; and those immortal dialogues reveal in their simple language not less the clear thought than the pure heart of the benevolent bishop.

The psychologist's question is not whether that conviction of yours is true, not whether it is (epistemo)logically based, but what are the

experiences out of which it has grown. It cannot be answered by recalling those experiences; no one remembers them. It cannot be answered by renewing those experiences; each bit of experience would suggest now implications which we cannot be sure that it would have suggested to unfurnished minds. How then can we find out anything about it? It is hard to give a generally intelligible answer. The process by which the philosopher attains to a different conception from yours of the nature of seeing is a part of that mental growth which in you has reached a stage in which he once was. His answer resembles that of the religious believer to the unconverted: You must live the life, if you would attain the vision. Do you know how the astronomers have reached their conviction that the solar system was developed from a nebulous expanse? Do you know how the geologists have arrived at the conclusion that the earth has been developing through long ages from a molten mass to its present diversified surface? How came biologists by their notion that all the varied forms of plants and animals have been slowly evolving through the lapse of years from a uniform protoplasmic jelly? Nay, that the eye itself did not precede seeing, but that the eye and seeing have been climbing the ascent of life together, each

helping the other, from the time when one was a mere pigment cell and the other a vague and dim sensation of dark and light? But all of these things were unknown to Berkeley,—Laplacian speculations about the origin of the solar system, geological theories of the earth's unfolding, the contributions of Darwin and Haeckel and Huxley to our knowledge of the development of living structures and of the tissues of the eye,—the whole evolutionary philosophy as applied to every aspect of the world had no lodgment in his mind; and yet he discerned the evolution of the process of seeing. I will not say that all his arguments were sound. I will not say that he was not influenced by considerations that would have no weight with a modern evolutionist. I will not say that even now all difficulties have been overcome to my apprehension at least and that the theory is as clear to my mind as that of the common pump. There are some things which it is not given to all of us to understand but I am sure that any of you may have as clear a notion of this subject as I have.

The contention is that along with the eye there went originally no consciousness but that of color; not even of color as we are conscious of it, with its diversities of tints and definiteness of outline; and that alone by

itself this color sensation would never have resulted in what we now behold whenever we lift our eyelids. Berkeley's insistence was that this color experience was accompanied by another experience totally unlike it, and that the color-series had become so indissolubly associated with that other series as to suggest that other immediately; somewhat as words, which are totally unlike the ideas they stand for, yet call up those ideas in spite of ourselves. The puzzle of our being able to see things at a distance had not escaped the notice of curious men; nor had there been wanting, long before Berkeley, attempts at its solution; but, as often happens with first attempts, the solution missed the very thing to be explained. Some said that the mind went out through the eye to the object; others that emanations from the object came to the eye; while others dismissed the problem as insoluble, and others again declared that there was no problem to solve, that it was "just e'en so from the beginning and that's an end on 't." Berkeley thought he had discovered that other experience which clung so tightly to color, in the combinations and organizations of sensations of touch. These touch-sensations had themselves become greatly modified from what they originally were by being frequently repeated, felt in all sorts of

successions and combinations, coalescing with one another and forming wholes whose parts were no longer distinguishable. The color-feelings blended with the touch-feelings till it became impossible for us to touch a surface without thinking of it as colored, or to have the color-sensation without thinking of the tangible surface. In short, Berkeley thought of the almost instantaneous glance by which one takes in a whole landscape, as a complex of a series of manifold inferences, all melted and merged into one. Others have discerned other elements in the process since, and the intricacy of the whole demands a volume for its exposition; as indeed on the physiological side the account of the structure and tissues of the eye demands no less. Listen to what he himself says: "In treating of these things, the use of language is apt to occasion some confusion and obscurity, and create in us wrong ideas. For language, being accommodated to the common notions and prejudices of men, it is scarce possible to deliver the naked and precise truth without great circumlocution, impropriety, and (to an unwary reader) seeming contradiction. I do therefore once for all entreat whosoever shall think it worth his while to understand what I have written concerning vision, that he should not stick in this or that

phrase or manner of expression, but cordially collect my meaning from the whole sum and tenor of my discourse, and laying aside the words as much as possible, consider the bare notions themselves, and then judge whether they are agreeable to truth and his experience or no."

We have forgotten the ardent zeal of the good bishop in commending the virtues of tar-water for the cure of all the ills of flesh. His scheme for civilizing the wilderness by establishing a college at Bermuda seems strange to us now. We smile as we read: "Tell me, are we not obliged, if we believe the Mosaic account of things, to hold the world was created not quite six thousand years ago?" Few will trouble themselves nowadays to determine whether his *New Theory of Vision* warranted all the conclusion that it seemed to the author to imply—that a material universe does not exist, and that a personal God does exist. But in our knowledge of psychical phenomena a great advance had been made, analogous to that which has recently taken place in our knowledge of the structure of the brain. This, it is asserted, is the result of the coalescence of some nine vertebral segments, thus disproving Goethe's theory of the skull, and showing, in his case, as indeed in that of Berkeley, that praise was due to him for the spirit and nature

of his discovery rather than for its exemption from an admixture of error.

"We are the stuff that dreams are made of, and our little life is rounded with a sleep," represents this universe of men and things as the dream-images of a sleeper, with all the implications of unreality, unsubstantiality, incoherence, and uncertainty that we associate with dreams. The utterance has an emotional, a religious, a moral, perhaps an immoral, effectiveness; but the psychologist seeks to assign dreams their place and to keep them from troubling the waking thought of himself and his friends. If he ventured to encroach on the jealously-guarded domains of his fraternal enemy, the metaphysician, and to hazard any statement about the sum of things, he might declare: "Sensations are the stuff that thou and all that is are made of, and thy little life upbeareth thy great world."

Epistemology

ABOUT KNOWLEDGES

EPISTEMOLOGY

ABOUT KNOWLEDGES

There are not only lichens and planets, steamships and novels, Egyptian antiquities and bacteria, but knowledges. I show how knowledges differ from non-knowledges. I exhibit their resemblances and differences, their groupings into sciences, their enchainments one to another. I exclude, too, many things that my fellows call knowledges, simply because I do not find in those things the characters I mean by the term. Knowledges are psychical states. All the sciences are psychical states. Science itself, i. e., all the sciences or their common element, is a psychical state. Botany is a psychical state; but we call a book a Botany, and we speak of botanical phenomena, meaning plants and their qualities and relation. If all mankind should perish, the book might remain, the plants might remain, let us suppose; but there would be no science, no botany. Would there then be no botany if all mankind should sink into profound sleep? Surely there would be no psychical states, and consequently no knowledge, and hence no science. A man loses consciousness in a swoon

and recovers it again. So knowledge comes and goes; and if we say a botanist knows more than he is conscious of at any instant, we merely express the possibility of this recurrence. It is with respect to the possibility of these revivals that he differs from the layman who never knew and never will know botany.

Knowledges then are psychical states and they are readily discriminated by most from the states which we name pleasures and pains, hopes and fears, loves and hates, desires, endeavors; and as they have been already collected under a general term, we need not enumerate all the particulars, but call them at once wills and emotions. An emotion of one man may be like an emotion of another; you might say, though you would not mean, that the two were experiencing the same emotion. Now how minds became alike or rather how there came to be a set of objects which resembled one another to such a degree that one name should be applicable to any one of them is one of that host of questions the answer to which was sought by Darwin and given in terms which differed widely from those which conveyed the answers of others. Whatever origins the resemblances among animals may have had, such resemblances are one of the conditions of knowledge. The primary criterion by which one ascertains that a conscious-

ness of his is a knowledge, is the discovery that other minds resemble his in that particular. Knowledge, that is to say, is a social product; without society, no knowledge. Without this comparison of mind and mind, without the conditions that made this comparison possible, there would be nothing which I should call knowledge. It is not merely this agreement in a number of minds that makes of a consciousness a knowledge, but it must be accompanied with the additional consciousness that this agreement exists. This, however, is only a negative criterion. Nothing is knowledge which does not stand this test; but much that stands this test is not knowledge. It is not enough that I agree with others and that I am aware of that agreement, there must be an absence of conflicting states of consciousness. With animals, with most men, and with every man on some occasions and on some subjects, this second test is the only one that is, I can hardly say applied, but involved; and that too with no thought of the necessity of the first test and still less of any other. From this primitive, uncritical state many never are aroused; they never awake from this dogmatic slumber. It is better perhaps not to see a test of the knowledge-quality of a consciousness in this individual conviction, nor yet in the intensity of the conviction. It is surely not applied

by primitive men, but it is applied by philosophers to vindicate as knowledges certain ineradicable beliefs of their own which either cannot be established by any other tests or have failed to stand them. Observe that it is only under the point of view of your personal conviction, regarded as a test of your knowledge, that I have permitted myself to bring together such unlike things as a belief that has never been doubted and a belief which has triumphed over all doubts and annihilated them.

Knowledges are intellectual states; let us say in one word, intellections; but all intellections are not knowledges. By what third criterion can a knowledge-intellection be distinguished from any other? By their relative clearness and distinctness, has been replied. Clearness refers to the relation of the intellection to other consciousnesses of the individual; distinctness to its internal structure. This is one criterion, but it is not a sufficient criterion; though it has been considered such not only by the generality of mankind, but by many eminent philosophers. Among the latter was Descartes, who said: "I believed myself to be able to assume as a general rule that everything that I conceived clearly and distinctly was true." An intellect like that of Descartes wins a great many bits of knowl-

edge from the void and formless infinite by the rigid adherence to this principle, because it discerns obscurities and difficulties and has the force to remove them; but the insufficiency of the principle, even in the control of a Descartes, for discriminating knowledges from what may be mistaken for them, is evident enough when we consider how many of his knowledges have failed to stand the severer tests which modern thought demands.

Observe, however, that in determining what intellection is a knowledge, and what intellection is not a knowledge, all the tests I have enumerated and all that I shall enumerate are necessary. It may be that the combined manifestation of them all is necessary. It may be that even then the discrimination is not as perfect as it will become hereafter. Some failure will admonish us of that, but repeated failures have already abundantly admonished us that no one criterion ever proposed has been sufficient.

Your personal conviction, your agreement with others, no matter how many, your consciousness of such agreement, the clearness and distinctness of your idea,—if all these do not warrant you in declaring your conviction a knowledge, where, pray, does knowledge emerge? Well, we might say that it has emerged already, and not object in every-day

talk to apply the name of knowledge to conceptions that exhibited all, or even some of the characteristics only, that I have already enumerated; but what I am trying to do is to make plain that the word knowledge, in default of a better word and to avoid a strange term, such as cognition, is coming to be used in a very precise and definite signification which requires as a fourth test that the intellection to which it is applied should have been analyzed, as far as possible, into the elements and relations of which it is composed by the process of comparing and contrasting it with other intellections, and determining wherein it is like and wherein it is unlike those others. I might linger on this process and develop in your minds, by an array of examples, the intuition of its nature as I conceive it. This process discloses the likeness of different conceptions and the differences of like conceptions. It bears us away from those associations which custom and language and tradition have woven around us. It reveals to us new worlds amid the old, and remoulds for us our inner life and the aspect of nature. It generates those classes with which logic has to deal; and it lights the way for us to behold the remaining features that an intellection must possess to be called, by us at least, a knowledge, a cognition.

Now this analysis discloses in any intellection a set of elements and relations among elements. Between any two of these elements are exhibited numerous relations. Here comes the fifth examination to which those consciousnesses, those ideas, those intellections, those beliefs, those faiths, those surmises, those suspicions, those theories, those hypotheses, in brief, all those psychical states must be submitted that are discontented with their station and aspire to rise, if it may not be to sink, to the rank of knowledges. Let us then fix our attention on one of the couples that our analysis has disclosed. Let the elements be denoted by *a* and *b*, and the relation between them by *r*. Our question now is: This intellection of the relation between *a* and *b*,—is it a knowledge? If it is not, then the whole of which it forms a part is not a knowledge; and, for this elementary intellection to be allowed to rank as a knowledge, we must in addition to the tests to which we have already subjected it, find that it survives the following tests:

Suppose that in one set of circumstances, in one group of consciousnesses, *a* and *b* occur in the relation *r*, and that when the circumstances change, *a* and *b* still occur in the same relation to each other; and that this relation persists, when the accompanying group has

undergone another change; and so on, until the environment has changed as frequently and as completely as possible; then, as far as this test is concerned, this intuition of the relation between *a* and *b* is entitled to rank as a knowledge, but only so far as this one criterion is involved. Before it can be made free of the realm, it must undergo still further tests. (Method of Agreement.)

Let there be two sets of circumstances as closely alike as we can find or make them, and suppose that into one of these we introduce *a* but not into the other, and *b* emerges in the relation *r* to *a* amid the conditions into which we had introduced *a*, but not into the other, then we have one more reason for calling this intellection a knowledge. (Method of Differences.)

Suppose, in the third place, that while everything else remains the same, the variations in *a* are accompanied by variations in *b*, that, as the phrase goes, they vary "concomitantly," then we have this additional ground for calling this relation between *a* and *b* a knowledge. (Method of Concomitant Variation.)

Anyone who has ever done any cooking and attempted to follow a recipe, will understand that a great many precautions must be taken in the employment of these tests, familiarity with which can only be acquired by

repeated trials. It is plain, too, from what we said at the outset about knowledge being a social product that these experiences must not only be repeated by one's self, but that others must go through like experiences and attain like results, before what we call knowledge can make its appearance.

It seems cruel to refuse the title of knowledge to a psychical state that has survived all these tests. The great majority of men employ, and insist on employing, the term in a much less precise signification. But there are some who are not content even yet; they will not call this isolated intellection knowledge even when it has satisfied all these requirements. They contend that there must be many similarly established intellections whose relations to each other have been tested by the processes by which each single intellection has been tested, till the whole forms a system of interrelated elements, a science.

All this merely means that epistemologists, or the cultivators of the knowledge of knowledges, like the cultivators of other sciences, have not yet come to an agreement among themselves as to the definition of knowledge, nor do they all classify knowledges in the same way. I permit myself to think that there is no one classification, but that there are and always will be a number of classifica-

tions one of which will best serve one purpose and another another; but that no classification is possible which will answer all purposes for which man wants knowledge. Even knowledge itself is by no means an universal want. There are great peoples that have no such knowledges as we have been trying to characterize. It does not seem likely to be attainable by the bulk of any civilized communities. The very idea of taking such pains is distasteful to many cultivated persons. The difficulties in the way of anyone wishing to become an epistemologist are so numerous that few would attempt it if it were not for the fact that many a man believes himself to be an epistemologist already. The presumption of those who pretend to know something about knowledges has this merit, that it stimulates the desire of others to know. But just see what are some of the unavoidable difficulties, difficulties I mean which will always exist, even when every man shall become as passionately eager for knowledge as Kant himself, difficulties which not even a Kant can surmount.

You wish to become a mineralogist. You collect minerals; you examine and compare them. You weigh them; you measure their angles; you expose them in a variety of ways to heat and light; you break and grind them

and mix them with chemicals; you visit various localities and ascertain the sources of the minerals; you compare your views with those of others. But why make a long story of it? After half a life-time spent in this way, you are merely a mineralogist. But you wish to become an epistemologist. Then it merely remains for you to occupy the rest of your life in acquiring, in a similar manner chemistry, botany, zoölogy, psychology. But is not the idea absurd that anyone should ever think of becoming an epistemologist? Why, you might say, what you call an epistemologist is what we others call a philosopher, one who takes all knowledge for his province. But the philosophers are all dead; I doubt if any philosopher, in your sense of the word, will ever walk the earth again. He has fissiparously left a brood that care little for their ancestor or for one another. The "natural philosophers" fell off long ago, and those who were left behind regarded the dissidents with scorn, and ridiculed the English for calling mere scientists philosophers. Then the psychologists broke away, and found too much to occupy themselves with in their own restricted province. Moralists, sociologists, ethnologists are also a part of the progeny; and there are left still hardly more than the epistemologist and the metaphysician to dispute about the division

of what remains of the old estate; and a hard time enough they have of it in ascertaining what belongs to each alone and what they must continue to hold in common. The present arrangement appears to be that the epistemologist limits himself to knowledges and the metaphysician is restricted to realities.

Knowledges have been divided into mediate and immediate. It is by no means settled where the line between the two is drawn. The beginnings of consciousness are not the beginnings of knowledge. The analysis of neither leads us to any elements which we can regard as more than provisionally ultimate. And surely the elements which we regard for the time being as ultimate in the one are not those which we regard as ultimate in the other. All knowledges are psychical states, but there are many psychical states which are not knowledge and which in part precede knowledge. In this aspect all knowledges are mediate, and the laws of knowledge derivative laws,—particular cases of more general psychical laws. The ultimate elements of knowledge are certain persistences and recurrences amid the throng of psychical states. The belief that the earth is ninety odd million miles from the sun is entertained by thousands of people. Their conviction is ineradicable. How it has become so is a

psychological story that might differ from person to person. To a few only is it knowledge; a few only have subjected this belief to those tests which the belief must survive to be called knowledge in anyone's mind. Even here there would be great differences. One would discern that his belief of the sun's distance depended on his knowing that the sum of the angles of a triangle is equal to two right angles; while another would encounter no mathematical or physical belief, but would resolve his knowledge (for we have assumed it to be knowledge in his case) into certain beliefs in regard to the credibility of human testimony. The belief that the angle-sum in a triangle is two right angles is inferred in different minds from different data.

The distinction then between mediate and immediate knowledge is that between any knowledge-group and the elements from which it is compounded. From the latter the former are said to be inferred; but the elements were not reached without inferences. What is this inference-relation?

In the past the logician occupied himself with a number of heterogeneous subjects. He mingled with the study of classes and their relations the study of inference-relations; and this in part because the latter were supposed to depend on the former. As I conceive it,

the doctrine of inferences belongs to the epistemologist; at any rate, the logician has material enough in class-relations to keep him busy for some years yet. An inference, as the anticipation of a storm from the aspect of the heavens or the surmise that a man has walked along the shore from marks on the sand, requires a memory of an association of two things, *a* and *b*, the presence of something like *a*, followed by the consciousness of something like *b*. This is the general scheme, but there are three modifications which indeed merge into each other, but in the developed consciousness are sufficiently distinct to have received different names: transduction, induction, and deduction. The results of these processes do not, any more than the results of other psychical processes, become knowledges until they have withstood the tests already enumerated. These three words imply meanings which I do not intend to convey. They are simply the least unsatisfactory terms I can find. When from the experience of *a* and *b* together we suspect that every *a* is accompanied by *b*, we have an induction, but some apply the term to thoroughly tested conclusions of this kind and others use it of any general relation however obtained. If we, upon the actual occurrence of an *a*, divine the presence of *b* because we believe that a *b* goes

with every *a*, we have a deduction. When, however, the presence of *a* suggests *b* simply on the ground of some remembrance of the conjunction of the two without any warrant that *a* and *b* are often found together, we have a transduction.

The comparison and the contrasting of knowledges or rather of candidates for the title of knowledges, the resolving of them into their elements and the putting of these elements together again, the making of inductions, transductions, inductions, the repeated testing of these by the methods of agreement, difference, concomitant variation, and a multitude of others, are processes which are being executed by merchants, lawyers, manufacturers, scientists, logicians, physicians, farmers, laborers with more or less exactitude and success; but all that these care for is the result of the processes; the epistemologist is interested in the processes themselves, not merely as psychical states, but as generating knowledges. He rejoices in the discovery of any new criterion by which the separation of knowledges from foreign admixtures may be effected. As epistemologist (as epistemologist, observe, he may be at the same time an epicure and a humanitarian) the utility, the beauty, the nobility, the sanctity of a long-accredited mass

of supposed knowledge, he disregards completely, when considering the question of admitting it to his museum of knowledges. It may be that the belief will always retain those attributes after its knowledge-quality has been taken away from it; he does not care. It may be that these ascriptions of praise will one after the other dwindle away from the belief, now that its knowledge-element has vanished; still he does not care. Anguish of hearts, domestic disharmonies, civil strife, world-wide confusion may be known, even by his refined tests of knowledge, to be the consequences of the new discrimination; he heeds it not at all. Indeed, there is no such ruthless tame animal living as is your epistemologist . . . in his study.

But however extensive his collection of knowledges may be, or may become, there are two knowledges which each epistemologist wishes to add to his collection. One of these concerns the classification of knowledges among realities and their relation to other realities, if any meaning can be attached to that word. For some contribution to this department, he has long awaited the report of the metaphysician, and incidentally made incursions into the realms of the latter on his own account. The other concerns the ultimate analysis of knowledge, its elements, its prin-

ciples, its constituents . . . we must multiply terms here, for we do not know this as yet, and therefore do not know exactly what we want to know. It requires much experience of answers to frame a question rightly. The old analysists asked their questions boldly, and expected to find some such answer as 7 or 8; but they got fractions, negatives, zeros, infinities, imaginary and complex quantities, with which they did not know what to do. These are seen now to contain answers to questions which lurked unnoticed in the original question. Similarly, the epistemologist's question, simple as it may seem, involves, I take it, a number of different questions. He who asks, as Kant did, "How is knowledge possible?" should have explained more fully than Kant did just what he meant by such ambiguous terms as *how* and *possible* and *knowledge*.

This ultimate question of the "knowledgist" has shared the fate of many philosophical questions; to be answered, proved unanswerable, considered as futile, scorned as meaningless. Again, when the question was first asked, the universe was for men full of distinctions,—God and Devil, Heaven and Hell, reason and sense, body and soul, organic and mineral, species and species, faculty and faculty; and moreover these distinctions were

not only thought to be indefeasible, but to be indissolubly bound up with human happiness and virtue. Whatever may have been held by divines and philosophers, I cannot see that any question in which they are interested is affected in its decision by the ultimate analysis of knowledge that may be adopted more than it is by the ultimate analysis of air. Really, it is time to discern that the freedom of the will, the immortality of the soul, the existence of God are as independent as the diameter of the earth of the analysis of knowledge into its elements. There are many good things besides knowledges within our reach.

The question is, what are the ultimate constituents of knowledges, of knowledge? Knowledges are a peculiar kind of psychical states. We have seen how they are distinguished from other psychical states. What elements have they taken up into themselves? Sensations; that is admitted on all hands. Anything else? Is space a sensation? Is time a sensation? Are species, genera, and classes sensations? Are the ideas of freedom, of immortality, sensations? This is denied on all hands. What are they then? Compounds of successive sensations, say many; and they endeavor to establish their assertion by essaying the analysis of these ideas into sensations with some measure of success, as they think.

The answer of pre-Kantian philosophers was that these objects are realities about which the mind is in some way conversant. Kant's answer was a reversal of this; and he conceived that his theory was related to the previous theories as the Copernican theory of the universe to the Ptolemaic, as the heliocentric to the geocentric hypothesis. Kant said, These are ultimate constituents of mind, without which there would be no experience, which make experience possible, which are not products of experience, but which shape and mould experience, and determine our perceptions, our reasonings, and our conduct. They are subdivided—these determinative constituents of mind are—into the forms of sense, that is, space and time, whence perceptions and the order of the universe, and such sciences as geometry and mechanics; the categories of the understanding, that is, quantity, quality and relation, whence species and genera, and the foundations of the science of logic; the ideas of reason, that is, God, Immortality and Freedom, whence the ideals of religions and ethics. These forms, categories, ideas, on the one hand, and sensations on the other, are the elements of knowledges. They are blended in every actual knowledge; they are themselves distinct, disparate, incomparable, admitting no derivation

of the one from the other. Both elements are necessary to knowledge, the sense-element, no less than that with which Kant contrasts it. Hence, as sciences, metaphysics and theology are impossible; for Kant could find no material in our present life to which the moulds of reason could be related as the moulds of sense and the moulds of the understanding had been found by Kant to be related to their contents. These forms of reason, these ideas have a function; namely, a regulative one, a moral and aesthetic value.

Kant's view of knowledge is one among many. No one of them has become itself a knowledge, has passed the tests we have enumerated, Kant's as little as any. Aristotle, Aquinas, Hegel, Spencer and thousands on thousands besides have tried to solve the problem of the origin, nature and limits of our knowledge. As the character of the problem comes to be better understood, the attempted answers appear less and less satisfactory. We are not so near omniscience as philosophers are inclined to suppose, and any attempt to exhibit the science in all its parts and as a whole, would be and remain an attempt merely. Should Kant himself come back to life, I do not think that many things would astonish him; they would all fit easily into his system, the Roentgen rays and all; but when

he should learn what the mathematicians and the psychologists have made out of that space which had seemed to him so simple! He would hear of point-spaces and line-spaces, of spaces of four dimensions, of spaces in which the proposition about the angle-sum of a triangle does not hold true; and all this from the geometers. And he would hear the psychologists discussing the origin of the consciousness of space and seeking to ascertain whether there are any universal and necessary elements in that space which for Kant was not analyzable into elements at all. Would he refrain from saying to himself, "Truly we epistemologists were as were the chemists before the days of Sir Humphrey Davy, when salt was held to be an element; and we must have many more knowledges before we have a complete knowledge of knowledges"?

Ah, but knowledge is then a knowledge of something. Of what? But for answers to that question, you must consult the metaphysician.

Metaphysics

ABOUT EXISTENCES

METAPHYSICS

ABOUT EXISTENCES

"We are botanists," say the first, "we have the science of plants." "But there are no plants," say the others. Is it possible to imagine that the botanists will ever find that others will deny the existence of the very things the botanists profess to know? We can already dispense with the madder, the vanilla, and even the vine; perhaps we shall be able to get along without vegetable life some day. Will the sons of the seventh sons of botanists be botanists still, and will all the sons of all the rest cry out, "There never were any plants"? And may some of the botanists then respond, "It is even so; there never were any plants; there never will be, at least, in any sense that you attach to the word 'being,' but in a higher, nobler, diviner sense, they are forever."

Worse than this imagined state of the future botanists is that of the metaphysicians to-day. "We are metaphysicians," they say, "we know . . . ours is the knowledge of . . . we have the science of . . . of . . . of . . . of." "Of what, pray"? asks some impatient earth-

ling. "Of God, of Heaven and Hell, of a Future State, of the Beginning and Ending of the Universe?" What will be the reply of the metaphysicians? I hesitate somewhat to report it. I may have failed to understand it. Many a metaphysician may rise up and say, "Such is not my answer." There has never been a Congress of Metaphysicians pure and simple; rather, "Journals of Pure and Applied Metaphysics." They are so different from us others. They have to use our language in talking with us; but we soon become aware that, though they may resemble us in having ideas, the ideas themselves are so unlike our own that the same language is the same only in sound. But in this respect we fare no worse with the metaphysician than with the adept in any other science. What the mathematician may mean by "tangent" is something so different from what we mean, that we might not be able to comprehend him after all his efforts to make himself understood. A "tangent" may be to him the limit of the sum of any infinite number of terms of a certain converging series; and he would explain to us what "series," "converging," "sum," and "limit" mean. So far we discern no difference between the mathematician and the metaphysician; both use equally unintelligible language. The difference emerges later. All

the statements of the mathematician are exemplified by material found within the range of a human experience; the metaphysician, by his own declaration, is endeavoring to transcend the limitations of human experience. No wonder then that I hesitate to report his answer to the earthling's question; but it would seem to be about as follows:

"We remember that men used in the brave old days to resort to our predecessors for the answers to their questions about God and Eternity; some continue to do so; but we no longer think that the people's imaginings about the Universe are to be allowed any influence on our purely scientific, objective, and disinterested investigation. To state our case strongly: If there were no Earth, no Heaven and no God, and if we were in Hell, the problems of metaphysics would remain the same; the only difference being that we might have less inclination, if more leisure, to attend to them."

Suppose, as will presently be the case, that we have all left the room, what will be here then? "Settees, chairs, tables, books," you reply. How do you know? "From experience if not of this, of similar relations. In the first place, if we come back, we find these things here." But how do you know that they were here while you were away? "It has often

happened that while some left the room, others stayed; and again when another set left the room, yet others stayed and so on in all possible combinations of the occupants of the room; and we have found on comparing our experiences that in no case did the departure of some, so far as the others who were left could observe, make any difference in these things. Hence we have concluded that the departure of all of us from the room has left books, settees and desks just as we knew them. Moreover, on our return we have often found the hands of a clock, the sands of an hourglass, the logs on the fire, in a different position from that in which we had left them indeed, yet having undergone only such changes as we had frequently observed them to undergo when we have been present. When we are remote from the room, we retain a representation of the room, which we call our knowledge of the room; and if it is questioned, we test, or verify, our knowledge by going to the spot and comparing our representation with the locality itself; or when a second resort to the place has appeared undesirable, we have had recourse to some of the numerous indirect ways which all involved the same process of testing an idea by comparing it with the reality. For these are our realities; books, chairs, settees, tables, and

such as these are the realities of which we say that we have knowledge when the ideas we form of them have been tested in the ways which the epistemologist prescribes. These were before we were born and will be when we are dead. Our sleeping and our waking affect them not. We want no other realities than these. When we say that angels exist, that God exists, we mean just what we mean when we say that this book or that tree exists. When we talk of the knowledge of the thing, the knowledge and the thing are not identical but distinct; the knowledge is a psychical state, the thing is . . . is". . . "What," asks the metaphysician . . . "is . . . is the thing, the reality, not a psychical state".

I trust that I have done no injustice to your views by the expressions that I have ascribed to you. Have not some philosophers the same? Then the metaphysician must appear to you a . . . something quite different from what you are. He amuses you. You recall the useful Irishman: "Pat, what are you standing there for in front of the mirror with your eyes shut?" "I'm trying to see how I look when I am asleep." The metaphysician appears to you to be trying to see how things look when no one is looking at them. Some fine day a sort of Roentgen ray may pass

through Pat's closed eyelids, and the laugh will be on his side then. But I am not certain that the metaphysician will be any nearer his aim by such a vision.

You are sure of your ground. There things are; open your eyes and see them; reach out your hand and touch them. What you like is plain common sense; and this is the view of common sense.

Poor, simple, misguided, mistaken folk. Enter, not the metaphysician, but the man of science; which you value now-a-days even above common sense. What does he say? "You may think of the room you have quitted in terms of your consciousness when there; and you may get along well enough with your associates in doing so; but I cannot do any thing of the kind. Do you not know that the clock is not ticking in your absence? It is moving and setting particles of air in motion There is no sound in the untenanted room. Do you not know that your sight of the room results from the stirring of the nerves of the eye by movements of the ether? There are no sights, there is no light even in the unoccupied room. No room is warm when no one is in it. The chairs and tables appear as systems of molecules and atoms, with interspaces immensely greater than the diameters of the molecules themselves. In the room

where there is not a single soul, there are no sounds, no sights, no tastes nor touches nor odors, nothing but ether and atoms; perhaps ether alone, for some of us have found a way of imagining the molecules as formed out of ether. That is the way I think of it." So far some scientist.

But the uninhabited space of science as little satisfies the metaphysician as the uninhabited space of common sense. "This ether," he says, "and these atoms are only the counter-glare of your common-sense experience." Waves of water and bullets of lead—these, attenuated, diminished, refined, flung throughout space, are the original of your conceptions. They explain nothing and have no other justification in my judgment than that they serve as counters to calculate with, the result in any case requiring to be translated into the realities of common sense. These things are only what you imagine them to be there. My question is: "What is there"? and the answers to this question will give me what I shall call Realities of Existence.

Again, here is an apple; it has certain qualities; it is different from its qualities; its qualities change; we can say of it: It is red, it is round, it is mellow. What is this "it" that we are talking about? The qualities, it is said, cannot exist by themselves; they belong to

something. We will call this something, whether we find it or not and whatever it may turn out to be, the Principle of Substance, or the substance-reality.

Again, when we say that every event has a cause (and you do not question this), we want to know the real cause and do not want to be put off with merely sham causes, we want the principle of cause or the cause-reality. By this is not meant what the layman or the scientist calls cause, not the sensible or the objective cause, not any merely conceived cause; but a cause the reality of which is, in some way, guaranteed as independent of our experience.

I come now to the assignment of yet another metaphysical principle. You would say that there exist in nature what you call classes. But these classes, for you, consist of a number of individuals which resemble one another, do they not? Now have you ever thought what this implies? There are cats, trees, whales, and so forth; if you are asked whether an object is a cat or not, you compare it with perceived or remembered cats, and according to its likeness or unlikeness to these you decide whether it is a cat or not. What, I ask, is the foundation of this resemblance? How came these objects to resemble one another, unless there is a something which they have in common? Is not this common something one

thing; and yet present in each and every one of the objects which you call cats, for instance? No two of these cats are precisely alike; they all differ in countless particulars; and yet each as a cat, somehow partakes of the nature of that cat-reality which determines it to be that which it is so far as it is a member of the class of cats. This cat, the real cat, which is latent in each phenomenal cat, this metaphysical entity, this being the reality of which immeasurably transcends the so-called reality of those things which the layman and the scientist call real, is a *universal;* and there would seem to be as many universals as there are distinct or different classes. These universals I will call the Principles of Classes or the class-realities. These principles of metaphysics, to even a greater degree than any other, have occupied the thoughts of men, if we may judge by the number of books extant and the fame of their expounders. Where hundreds now gather to hear Weierstrass or Lord Kelvin explain their great discoveries in the sciences of which they are respectively masters, thousands once flocked to listen to the disclosures of the great thinkers on the doctrine of universals, an Anselm or a William of Champeaux.

I have not yet finished the enumeration of the principles or, if you please, the realities of

the metaphysicians. Here emerges another: Is each individual a member of an infinite number of classes, or is there always one class, to which in strict sense it may be said properly to belong,—a class of one? Metaphysicians have chosen the second alternative. Now what is there that constitutes any individual in this class and makes it that which it is, an individual? Could this be detected, discovered, discerned, disclosed,—what shall I say?—envisaged, intuited, we might find in it the Principle of Individuation, the individual entity.

But how many principles have we already? This too is a point debated among metaphysicians. How many entities, realities, are there? *Entia non sunt multiplicanda praeter necessitatem*, "There may not be as many entities as you suppose"; but what is the criterion of necessity? Can an enumeration be exhaustive? Cannot one determine in advance, deductively, the actual number, or approximate to it with some probability? We have, I think, five already: The principle of existence, the principle of substance, the principle of cause, the principle of class, and the principle of individuation. Why just five principles? Why not more than five? Why not fewer? Let us linger a moment and inquire how these words and the conceptions

for which they are presumed to stand came into our minds.

As respects the words that denote these metaphysical entities, they are plainly taken from the names of perceived and experienced things. It was of course not possible to take any word whatever, but only such as seemed to denote something not altogether unlike the thing, for thing we must call it, that was to be named. All along, however, the protest has been uttered that these words were intended to stand for something different from that which they had previously meant, and the warning has been given that the old associations must not be permitted to intrude into the new sphere. As for the conceptions themselves, if conceptions they may be called, for we must call them by some name however unfitting,—one story of their origin runs somewhat as follows: Primitive men were haunted by the images of their fellows. The actual presence, the remembrances, the shadows of their forms, the reflection of them from any polished surface, the dreams and the visions—what shall I say?—not animated, but "corporated" everything else. Even now cultured people cannot rid themselves of the habit of seeing human faces and forms in the shapes of clouds and the patterns of wall-paper; even now poets and sculptors and

painters hearken back to the old illusion. Critics talk of personifications of beauty, youth, justice, vice, death, pleasure and the rest, without seeming to be aware that these words stood originally for persons, and that they have not yet become so thoroughly depersonified as clearness of thought requires that they should become. If it is still thought a finer thing to see "the wind's feet glance along the sea" than to think the thought of sea and air sundered from human elements,—a thought to which a few have attained; how could the men of earlier time escape this obsession of the throng of recollections of their man-environed life which spread themselves through their world as gods, angels, spirits, fairies, devils, goblins, ghosts, materializations and all the fair and ugly humanities of old and new religions? As time wears on and experience slowly displaces these images from one realm of thought after another and in spite of many reversions and back-slidings, a new world builds itself up within us; we become able to look back over the long process of the gradual obliteration of the old conceptions, and to see that the metaphysicians without being aware of the fact were wrestling in their minds with the dim lingering traces of the old concretions that had clung necessarily to their ancestors' thoughts.

It is a century-long struggle so to revolutionize our spirits, that all things shall become new to us. *Humanitas* began as a word for that which was in man, in men; it stood originally for a reality that was corporeal enough, and the scholastic battles over Universals, the disputes of the realists, the conceptualists, the nominalists were unavoidable stages in the evolution of mankind. Let not anyone flatter himself to-day that he has finally emerged from this entanglement of ideas. Many of us are as deeply involved in it as ever and there are some who, in lieu of struggling to extricate themselves, resist the efforts of others to extricate them. Hegel had not emerged from it, nor has Herbert Spencer. The treatment of gravitation, heat, light by the former; of force, energy by the latter, attest this. The biologists have not released themselves from the bonds of the past as long as they seek for what was called the natural system of classification. Those mathematicians have not risen above the scholastic point of view who still wrangle over their zeros, their infinitesimals, their negatives, infinites and imaginaries. No one of us but is still in bondage if he believes in the existence of any one of these principles that we have enumerated, if he holds that there are any other realities than those of common sense or if he ascribes to

these more persistence, extent and value than the evidence warrants; in short, if he believes that a science of metaphysics is possible.

Now most philosophers are as little content with this account of the origin of these ideas as they are with this estimate of their value. They are somewhat better satisfied with the first description of their nature that I gave in trying to make them intelligible to you and to myself. In accordance with this, these ideas are arrived at by a process of abstraction which thinks away what is peculiar to any individual or to any one state of that individual, and retains what is common to all. Let me say rather, There remains what is common to all which is not to be accounted for on any theory of the survival in our minds of some residues of the irrelevant conceptions of our ancestors.

What are these principles then for? At this point the opinions of metaphysicians are divided; but before exhibiting the divisions, I must present another mode of deriving these principles and also adduce a few more of the principles themselves.

It has been stated (in the lecture on Epistemology) that every inference resembles the rule of three, and runs in this way nearly: As a is to b, so is a' to b', where a' is something thought to resemble a, and b' is a conception which resembles b. In conformity with this

scheme, one may say: As your idea of the elm tree on our corner is to the tree which at this moment you do not see, so is the tree as you gaze at it to—what?—to a something which stands to the tree in the relation that the tree stands to your idea of it. Of course the desire is to test this inference, to find out whether this thing that the tree is said to stand for, to represent, is as it is conceived to be. That we are unable to do so, is no impugnment of the inference; we are as little able to test our inferences as to the nature of the interior of the earth. There is however no question that the center of the earth exists in the same sense in which the surface exists; here we are dealing with the product of a precarious inference which is not merely inaccessible to our tests, but unamenable to them.

Out of the multitude of metaphysical principles I select one more, which I will try to describe. That which thinks, knows and feels, it is said, is not itself either thought or knowledge or feeling. It is that of which these are the acts, the properties, the attributes. What is its nature, or as he would add, its inmost nature, its essence, is the metaphysician's question. He even finds here a fourth mode of essaying the problem of his science in general.

Not by the abstraction of perceived qualities,

not by the survival through inheritance of the residual conceptions of a vanished barbarism, not by inference from the extension to another realm of the relation between idea and percept, were the metaphysician's principles attained; but the mind is itself now apprehendent of its own essence and of these other principles; and a knowledge or something higher than knowledge is vindicated to man, an intuition of realities that are really real, that is, are metaphysical realities. Through the disguises of appearances, the shows and shadows and reflections of things, to the metaphysician first and after him to others of mankind belike, stand revealed things as they are in their own nature, things in themselves. Or, looking not forward, but backward, some have maintained that in some prior state of existence, those realities were beheld of which the things of sense are the transient and temporary adumbration.

Are there any other ways of establishing the existence of a reality independent of our consciousness? Do these ways lead to that? And if by these or any other paths the metaphysician attains what he seeks, can he tell us anything of his quarry? We do not want eloquence; we do not want emotions; we do not want edicts; we want knowledge, and since knowledge is as ambiguous as the word

dollar unfortunately is, we want knowledge of the weight and fineness that was described in our epistemology. I do not deny that they may have reached something other than that, and, that this other may be something better than that; but that precisely is what I want of them, at least in my present mood. Let us hear their statements first.

These principles are many. They are reducible to a few which are absolutely distinct from one another. They are reducible to one. They are unknowable beyond the mere fact that they exist. They are knowable, and assertions are possible about them. It is matter. It is mind. It is the unity of both. It is neither. We may pass over the answers that were given before the scientific problem was definitely distinguished from the metaphysical problem; as, it is water; it is fire; it is air; it is spirit. To resume the later answers: It is consciousness. It is unconsciousness. It is intelligence. It is will. It is imagination. It is timeless. It is spaceless. It is God, either invested with all the attributes that the popular mythologies ascribe to the object of their adoration, or divested of them all. It is as independent of God as of man. And then follow all the more abstract determinations: It is fate. It is power. It is substance. It is cause. It is tendency. It is habit. It is

distinct from the knowable world. It precedes nature. It pervades nature. It follows on nature. Then there are the verbal substitutions that predicate of this "It" words that have more show of meaning and a fuller sound: It is the Infinite. It is the Absolute. It is the Unconditioned. It is the Uncaused. It is—but stop!

Here arises, not only the man of common sense, but the man of science-sense, and says: You are paying us with words. We grant that you are not always aware of it yourself. We see into you and through you. You are leading us no-whither. You profess to stand among a world of realities; you do stand amid the images, the reflections, the shadows, the refractions of our worlds. You believe or make believe that you are supporting the higher interests of humanity against sloth and sensuality, appetite and hate, conceit and dearth of ideals. You do this; but it is only a part of your influence—you turn the best minds away from thinking and doing those things on which knowledge, faith, conduct and happiness depend. Give me rather the world of my boyhood, the world of warmth and light, of colors and sounds, of roses and cherries, yes, of colic and rhubarb pills than the things that are dreamt of in your philosophy. Or let me keep the world of my

maturer age with its air-waves, ether-vibrations, eddying atoms and molecules, its calculus of numbers and vectors, of classes and groups, of infinitesimals and infinites; its strifes and victories, its failures and defeats even, rather than this unimaginable, inconceivable, unverified and unverifiable hypothetical world of yours. We are amazed that you seek God and souls in that inane, or call it after your fashion, The Inane, though I am unable to pronounce the initials as capitals.

But a voice from another quarter is heard,—dreaded alike by the metaphysician, the scientist and the way-faring man. You might call it the utterance of a "State Board of Arbitration." Really, the decencies and proprieties must be observed. Let us be courteous. You are hypothesis-makers all of you; and hypothesis for hypothesis, the metaphysician's seems to us others to be eminently desirable for the promotion of utility, nobility, beauty and sanctity, for the preservation of Church and State, for the continuance of our administration of them, in a realm where men must believe that you are standing on the bed-rock, whether you are or not, and they will believe it all the more readily if they cannot comprehend the arguments by which you claim to support it.

Now there are candid souls that abhor this

duplicity as it seems to them to be. To some these metaphysical conceptions are realities, and they refuse to call them hypotheses. To others these conceptions are hypotheses indeed, but illegitimate ones, and by no means conducive to human welfare in any respect, least of all in contributing to keep a certain eminent statesman in office. Nothing can be done with them, nothing can be made of them; nothing can be inferred from them. The sooner humanity leaves them behind, the better; renounces too its notion that these thoughts are high and exalted, that they are God and Immortality, that they lead to God and Immortality, that they are any nearer to them than the mud at our feet. The constitution of mud, its causes and conditions, its effects, what can be inferred from mud and from what mud can be inferred, the feelings, beliefs, purposes and intentions of men in regard to it,—these can be ascertained, known; and this is the only knowledge we need or can use. There is no principle nor reality of mud apart from these. Existence means the known and the knowable. An unknowable existence as something different from the known and the knowable, is a contradiction. Non-existences are neither known nor knowable; and there is no desire to know them. An unknowable existence is simply an

existence that is not directly presented or that we have no data for ascertaining the nature of; not something different in nature from the known and the knowable. Knowledges are psychical states; but what is mud? Mud is something known or knowable. Would there be no mud, if there had been no consciousness? We have no data for answering this question. Consciousness *is* as much as mud *is*. Both are existences; and the question can be answered when we are in a condition to answer this other question: Would there not be three-eighths of existence, if the other five-eighths had not been? Perceived mud, remembered mud, foreseen mud, imagined mud, desired mud, hated mud,—these exist, and resemble one another in certain aspects; but a mud which is not one of these or like one of these does not exist. A principle of mud, the reality of mud, a mud out of all relation to me, I neither know nor desire to know. If anyone asserts an existence of a perceived chair where there is no one to perceive it, I can attach no meaning to his assertion. If he says that it is always perceived when I do not perceive it by some being whom he may, if he please, identify with his God, I have not his insight nor evidence. If he says that there is then an unknown something there, I say, it is surely unknown to me; and as he declares

that it is unknown to him, we cannot talk about it, particularly if he too identifies it in part at least with his God. "Well, don't you at any rate believe that it exists?" I reply, "To exist means to me to be known or like the known." If you mean differently, I do not begrudge you the satisfaction of ruminating on you know not what; though I will listen to you when you go on to say: "*Das Sein ist Nichts*, (Pure Being is Nothing); but in positing itself, nothing necessarily posits the possibility of its negation, but the negation of nothing is something, and indeed something in its nakedness, something as yet undetermined, unlimited, the nascency of existence, related to the previous (not antecedent in time, note, for as yet time is not) state of nothing through the intermediation of the Becoming (*das Werden*) and, as all philosophers know, the continued application of the dialectic process will at length establish the existence of mud." I listen, I say, because you finally arrive at a point where you say something about the world in which I live that no one else has noted.

I have purposely avoided all mention of materialism, idealism, monism, identism, nihilism, realism, and the many other names by which the theories of metaphysicians are called. These names originated at a time

when the sciences, particularly psychology, had not attained the development which they have at present. They have been taught to those who did not know the conditions under which they were first introduced. They have been repeated in such vague groupings of words that they convey no precise meaning even to those familiar with these speculations. Their meaning can be acquired only by living in imagination through the state of thought they represent. And many both within and without that sacred confine subscribe to the Frenchman's definition of Metaphysics: *L'art de s'égarer avec méthode;* or, *La science des choses inconnues.*

But the situation seems to me to be this: Many years, perhaps centuries, must pass, many sciences be perfected of which we discern merely the intimations, many things that we wish now must have ceased to be of concern to us, the knowledge of many facts of mind and language, now restricted to a few, must become the possession of the people; before we have even the foundation laid of the superstructure which some fancy that they have built already; and yet it is only by the downfall of their towers that we can learn where the foundation needed strengthening. All honor then to those who have tried and who have failed.

Logic

ABOUT THINGS AS RELATED

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"The Highlanders," said Dr. Johnson, "are not much accustomed to be interrogated by others, and seem never to have thought upon interrogating themselves; so that, if they do not know what they tell to be true, they likewise do not distinctly perceive it to be false." No one has ever thought of interrogating himself before he has been interrogated by others. Then he begins to discern the necessity of being prepared for the next interview. He might prefer to kill the troublesome questioner; but failing that alternative, he must answer him. *To converse with one's self* is a Greek phrase for thinking. There are very few to-day that have emerged from the condition of thinking conversationally, that is, as if others were present. Knowledge is, as I hope we see, a social product. Knowledge implies thinking; thinking involves self-questioning; and this results from being interrogated by others. This in turn is not possible without language, without society.

A community that talks matters over, debates, discusses, disputes, may come to per-

ceive that the discussions sometimes result in a convincement, sometimes not; learns at length that there is a right way and a wrong way, that certain rules must be followed or no progress can be made. Out of such conditions as these arose *logic*. In its origin it was a body of rules which must be observed by all disputants who wish other than a merely verbal agreement. From the places where men met together these rules were carried to the retirement of groves, caves and halls by those given to solitary musings, and were found necessary in the conduct of that self-converse to which they were devoted. In time these rules came to be regarded as laws of thinking by some that believed a profounder view was needed. We find them appearing later as laws of the product of thinking. They appear again under a slightly different aspect as conditions to which the objects of thought must conform. They are viewed later as laws of phenomena, that is, as facts of the world we live in; general aspects which things as we know them present. But this was not enough, and some philosophers have maintained that whatever might have been the origin, the purpose, the applications, the transformations of these precious discoveries, they are metaphysical truths, laws of a Universe absolutely independent of all human volition and cognition.

Not only have such controversies raged in regard to the nature of these—what shall I call them?—principles, but these principles themselves have been derided and rejected as frivolous subtilities unworthy the attention of any sensible man. Others have seized the name *logic* and applied it at one time to theological mysteries, to metaphysical speculations, to scientific procedures and to psychological processes. But the confusion which is the inevitable accompaniment of the origin and growth of ideas appears to be giving place to order and system, to the organization of great sciences. In the realm of thought into which few penetrate there are revolutions and developments that are the conditions, the parallels, the consequences of those great changes which manifest themselves to the eyes of all, the vast industrial and commercial equipments of modern times. The part of Logic that dealt with language has been handed over to grammar, rhetoric, linguistics, philology. Another, dealing with a peculiar class of relations which much vexed the old logicians, has passed under the domain of the Calculus of Probabilities, a branch of mathematics of singular refinement and delicacy, and of extreme importance in statistical investigations. Still another portion, the very nucleus of the Aristotelian logic, has rounded

out to a symmetrical whole they saw not when they moved therein, has been furnished with a system of signs, borrowed indeed from ordinary algebra, in order that skill acquired in the manipulation of algebraic formulas may be utilized in the new province, but having in reality as little to do with algebra as the keyboard of a typewriter has to do with the keyboard of a piano. This is called by some the Exact Logic and Symbolic Logic; and is made up of several related disciplines; as, the calculus of classes as having some, or all, or no members in common, the calculus of relations as existing or not existing, and the calculus of relatives. I am going to give you some description of this nucleus, as I have termed it, of the Aristotelian logic; and contrast the ancient and the modern methods of treatment. This contrast is very significant, and shows that one of the triumphs of modern culture is the emancipation of the mind from the tyranny of language.

My first aim is to show what the subject-matter of the exact logic is. My next endeavor will be to show wherein it differs from the subject-matter of the old logic, as that subject-matter really was; and to contrast this with what it was supposed to be. In the third place, the admirable notation of the modern science which lends itself so readily to

purposes of calculation is to be contrasted with the clumsy unmanageableness of the former modes of expression.

Where now do we find the things with which our science deals? Objects there are, castles, toads, fears, loves, oceans, shovels, planets, angels, pebbles, fairies—why, if I could call over the names of all the languages in the world, there would still remain just as many objects unenumerated as when I first began. Again there are among these objects relations. You cannot think a relation without thinking at least two objects. You cannot think of any two objects without discerning one or more relations between them. You may never have thought of it before perhaps, but it is also true that you never have thought without it.

Objects are groupable into classes. All the objects that agree in the fact that each possesses certain specified attributes are one class; those objects that possess another set of attributes are another class. Now the logician would fain deal with such classes and all the relations among them, but nature is too intricate for him; and he is compelled to do what all scientists are driven to do, each in his own province, to abandon the complexity of nature and to substitute some simpler contrivance of his own. Nature's objects change unceasingly, are constantly acquiring

and losing attributes, and altering their intensities or degrees. The artificial nature which the logician puts in the place of the real nature behaves quite otherwise. Indeed a set of chalk-lines on a black-board, each carrying some letter of the alphabet, will amply suffice for our present purpose. A line is our object and the letters on the line are the qualities of that object. A set of lines is called a universe—a grand name for so slight a thing. Some of these lines are *a*'s or all are or none are; some are *b*'s perhaps and all are *c*'s and none are *d*'s and so on. The question now is what are the different relations that are found to exist between any two classes, as the *a*'s and *b*'s for instance? 1. In our first universe all the *a* are *b* and all the *b* are *a*. 2. In the second all the *a* are *b*, but some of the *b* are not *a*. 3. In this third universe some of the *a* are not *b*, but all of the *b* are *a*. 4. See in our fourth universe some *a* are *b* and some are not, and some *b* are *a* and some are not. 5. Lastly, we have a universe in which none of the *a* are *b* and none of the *b* are *a*.

These were the only classes and relation of classes that the old logic occupied itself with for ages; and the only problem to which it gave a solution at all approaching completeness was: Given the relations of two classes to a third, required to determine their relation

to each other. But we should be doing them a great injustice if we suppose that the problem could possibly have presented itself to them in any such simple guise as that in which I have exhibited it to you. Their thoughts were not shallow; they were confused. Perhaps "there 'burned' a truer light of God in them . . . than goes on to prompt this low-pulsed, forthright, craftsman's 'brain' of mine." They approached the subject entangled in the meshes of language, and of one language at that. But it was not merely the misleading associations of language and the ambiguities of expression that they had to contend with; there were connections of thought which no force of genius, nothing but long experience of a variety of relations could break up. Even now there prevails among the logicians of the old school a natural enough inability to comprehend what it is that the exact logicians are aiming at. The logician was a rhetorician in disguise; he still retained, often without knowing it, traces of his previous condition. In theology, in law, in the schools, in controversies, every contestant sought to win the victory by showing that his contention was necessarily implied in some admission of his adversary. The question which science raises: How can the prevalence of that admission be tested, has given rise to another science, the

science of "inductive logic," with which we have no present concern. Nor would I call this exact logic of ours deductive logic, though they are frequently and, as I think, mistakenly identified. It is merely an application of induction and deduction to the ascertainment of the class-relations that certain class-relations imply. We study the properties of these universes, as I have called them, just as the naturalist studies an oyster. The science of these universes is as little or as much inductive or deductive logic as is the science of oysters.

But let us survey some aspects of the old logic. There are three so-called laws about which much ado has been made: the law of identity, the law of contradiction, and the law of the excluded middle. The first is simply the requirement that when you have specified what lines of your universe you will call a, you must keep calling them a to the end of the chapter, and what lines you have called not-a you must go on calling not-a. The second merely says that the a-lines must not be called not-a, and the not-a must not be called a-lines. The third is only the injunction that you must say of any line in that universe: it is either an a or it is not. Important enough are these rules indeed when we are engaged in controversy or thinking by ourselves in the seclusion of our studies or pursuing in a

laboratory some scientific investigation; and the violation of them entails pretty serious consequences, whether the disregard of them is intentional or unintentional; but why should we logicians exalt our province and magnify our function, insisting that not only our fellow men but all nature is subject to these regulations; and not the nature alone which we know, but the nature none but metaphysicians claim to know, the Absolute, the Real, the Existentially Existent? The *a*'s of nature manifest no such fixity. The apple which a moment ago you regarded as not ripe has become ripe,—at what instant? Evolutionism, whether that of a Spencer or a Hegel, is in one aspect a protest against the notion that muscles and sensations behave as we agree to play that the lines behave which we draw for our universe. So much for the laws of thought; they have a simple expression in the formulas of the exact logic. With their purport to others, if we are mistaken about it, we really do not need to concern ourselves at all; and we may safely leave the more profound meanings which it would be foolish to deny that they may have to the devotees of other sciences, or nesciences.

I pass to another feature of the old logic,—the syllogism. Here is a specimen of that curious product of human ingenuity:

1. "Babies are illogical.
2. Illogical persons are despised.
3. Babies are despised."

It consists of three artifices called propositions. The schools maintained that any sentence could be transformed to propositions. Propositions were built up of *all* and *some*, *is*, and *are*, *no* and *not*, *a*, *b*, *c*, *d*, and so forth. There were four types of propositions:

A. All *a* are *k*.

I. Some *d* are *h*.

E. No *v* are *m*.

O. Some *g* are not *l*.

There are, you see, two letters in each proposition. The former is named the subject; the latter, the predicate. The syllogism with which the logicians actually dealt appears in the following form:

Some *x* are not *m*.

No *y* are *m*.

All *x* are *y*.

Two of the propositions have one letter in common, and are the premises. There are three letters in all; and the proposition which contains the two remaining letters is the conclusion. Its subject is the minor term; its predicate the major term. A premise is major or minor, as it contains the major or the minor term.

Of the four types of propositions and three

letters 512 distinct syllogisms can be made. These are divided into valid and invalid. If the premises involve the conclusion, the syllogism is valid; otherwise, invalid. The valid syllogisms are 24. The elaborate rules for constructing, for transforming, for testing syllogisms interest very few. They have now been all superseded by the brilliant discovery of Mrs. Ladd-Franklin of Baltimore, who has succeeded in replacing them all by a simple test and expressing it, together with all the varieties of mode and figure, so called, in a single, simple formula of the exact logic. This formula, $(ax=0)\ (b\bar{x}=0)\ (ab\neq 0)=0$, is of course meaningless to one who has not studied the symbolic logic, but even children have been shown how completely and triumphantly it solves the one great problem of the old logic.

How has this triumph of the new logic been brought about? Here is an enumeration of some of the circumstances that have led to this result: Logicians withdrew their attention from language, from its sentences and words; they ceased to let themselves remain involved in all the complexities of psychical processes; they saw amid the mass of material that embarrassed the old logicians a definite structure which only required to be freed from the foreign conceptions obscuring its propor-

tions to be recognized as the nucleus and germ of logic, if not logic itself; they had seen numbers and their relations, lines and their groupings represented by symbols in such a way that the symbols took the place of the numbers and lines in thought and bore the mind along to results that without the symbols it never would have attained; they had seen the vast sciences of botany, zoölogy, astronomy, geology bud and blossom, grow and fruit, unassisted by any of the artifices of the old logic, and all these reflections have set them to distill the soul of usefulness out of things idle. From the lumber-room and dust-heap where the out-worn philosophies have been flung by the pride of science there has been rescued this fair garment that science herself may wear unto her latest day with profit and honor.

I want to show you what the exact logic proposed to do and has done. I had said that the efforts of the old logic culminated in the solution of the problem of three classes, and that the new logic had taken that solution and all its numerous rules and had reduced them to a single formula. From this achievement it advances to fresh conquests. It attacks the problem of an unlimited number of classes. It says, give me any combination of the five fundamental relations among any number of

classes, and I will tell you the whole of the class-relations that the former imply. It goes even further than this and brings into its purview many relations which the school logic had overlooked. We must admit that it does not get outside of classes and that it does not deal with all the relations of classes, but only with the inclusion, the exclusion and the overlapping of classes; but its scope is again widened by the fact that many relations are so associated with class-relations that the consideration of the one may be substituted for that of the other, and the conclusion when obtained can be translated out of the class-relations to which the calculation has led us back into the other relations desired. A simple illustration will make this plain. We say oranges are yellow; and the oranges are the only class we have before our mind. We seem to see the yellow oranges as we have actually seen them many times. Where then is the other class to come from? We form the class of yellow things which we were not thinking of before perhaps, and say oranges are yellow things; thus substituting for the relation between thing and attribute the relation between two classes. Even such a statement as "That story of yours about your once meeting the sea-serpent always sets me off yawning," can be brought under the class-rela-

tion point of view. The argument of the old logicians was: Everything can be expressed in sentences. Any sentence can be reduced to propositions. All that is implied in a proposition or combination of propositions can be determined by the use of syllogisms. Now no one of these assertions is true. It is not true that everything can be expressed in words. It is not true that every sentence can be reduced to propositions. It is not true that all the implications even of a proposition can be elicited by any logic or indeed by any method whatsoever: and all that the syllogistic ascertained in its laborious fashion was some, not all, of the merely class-relations involved. How then did it come to pass that logic was hailed as the science of sciences, the queen of the sciences? that it was regarded as the foundation of all knowledge? that thousands of eager, earnest students flocked to hear the doctrines of the great masters of the art in the Middle Ages? that Europe echoed with the names of Peter Lombard, Bernard of Clairvaux, Hugo St. Victor, William of Couches, Adelard of Bath, Joscelyn of Soissons, Abelard and the thousand other names of men who were striving to lead themselves and their fellows out of ignorance and error? How could it be otherwise when all knowledge and especially the highest knowledge was

believed to be derivable solely from groups of words which had been handed down from the past. It is not strange that men should have sought some science of this description, should imagine that it was attainable and even fancy that it had been attained. It was by no means what they had supposed it to be, and the moderns have decried its claims without taking the trouble to understand the reasons for rejecting them. But it has accomplished a wonderful work in the world. I speak not of the controversies it has aroused and provoked to solutions; I speak rather of its great achievement in taking Romans, Goths and Britons, of the type of Dr. Johnson's Highlander, and making them recognize the necessity of being interrogated and of interrogating themselves by definite methods. Such nascent intelligences exist to-day even in highly civilized countries, and to these the knowledge of the old logic would be useful, even necessary, as a stepping-stone to higher things; though niggling may be the only word that the modern investigator would apply to its trivial distinctions and elaborate rules.

Over against the magnificent claims which the old logic made set the humble attitude of the new logic. Contrast the mighty interest among the devotees of the ancient doctrine with the few and rare cultivators of the

modern science. The student of the exact or the symbolic logic, of the writings of Peirce, Schroeder, McColl, Johnson, Venn, and of nature itself, is disposed to underrate rather than overstate the importance of his researches. This is about all he claims: There are some phenomena which are not themselves classes or class-relations, but which are so connected with them that any discovery in the one field can be interpreted in terms of the other. Moreover, classes and their relations have been made to coexist with a set of symbols in such a manner that reasoning about the symbols takes the place of reasonings about the things signified by them; that is, a process which can be performed in all cases takes the place of a process that can be performed in the fewest instances.

Here is an easy problem for the exact logic:

The annelidæ (a) are soft-bodied animals (s), and either naked (n) or enclosed (t) in a tube. Moreover, the order of the annelidæ consists of all invertebrate animals (i) which have red blood (r).

Here are six classes. Add to these the classes which can be made by putting together two or more of these. Add further the classes that can be made by taking the individuals common to any two, or to any more than two of these. Add the classes that are left when

each of the preceding is taken out of the universe. Add the classes that can be made by combinations and selections among all the above classes.

The exact logician will readily tell you what relation (logical only) exists between any two of these classes, under the conditions implied in the above statement.

Contrast with this the work of the logician of the brave old days of yore. Though he was really doing little more than studying the relations of classes, he fancied that he was studying the laws of thought, the principles of existence, the art of arts, the science of sciences, and so on. He had no notation and so was obliged to look at his problems and to work them in the medium of ordinary language with all its imperfections. He attacked mainly problems that involved but three classes, and even these in a partial and unscientific way, by means of a host of special rules, which were very ingenious, it is true, and calculated to sharpen the wits, but likely to divert the mind from nature and the infinite number there of classes and properties to be studied. What a small part of the properties of the hydrocarbons would their logical properties appear to any chemist!

Here is a sample of a problem in the syllogistic logic, which I take from the logical pro-

ductions of the author of *Alice in Wonderland:* "Some epicures are ungenerous. All my uncles are generous. What relation exists between epicures and my uncles?"

Notice that it is only a logical relation that is asked for. My uncles may hate epicures; but the inclusions and exclusions of logic involve no emotions, or treat them like x's and y's.

The answer is left to you to discover by the rules either of the old logic or of the new, or by your own unaided intelligence, that is, your mother-wit. One never hears of father-wit, unless perhaps it be this unfortunate business of logic.

A Universe of Hegel

Darkness and light, and the dawn and twilight that span the chasms between—how many consciousnesses of these successions and these recurrences there have been on earth that did not go beyond these phenomena themselves, or associated them with the revisiting promptings of hunger and sleep merely, or it may be with sensations of warmth or cold! What do swimming, creeping and flying things know of a ball of fire that climbs the sky from that quarter and goes down again to the horizon over yonder? It must have been a long time before men found out whether the yellow globe brought the light or the light brought the yellow globe. Early man's ignorance of what we think is exceeded only by our ignorance of what he thought. Very few indeed are called to refeel the feelings that preceded speech; and of these fewer still are chosen; and these even come back and cannot tell the world. For the words and phrases of civilized man stand for grown thoughts and not for thoughts that were ere thought was born. It is a puzzle how men ever ascertained that it was the same globe of

fire that passed overhead day after day. They must have believed this for a long time before there was any reason that justified them in doing so. You have no time to do what seems so much like mere dreaming and musing; and that is, to remove one after another the acquired beliefs and habits of your mind, and put yourself back to barbarism or childhood again, to savagery or infancy, to the life of fowl and brute. Absurd and baseless fictions of the diseased imaginations of the degenerate men of our epoch that can pretend that our thoughts have any relation with the vague thinking of birds and beasts! Light, twilight, darkness may be replaced by the conceptions of sun-presence, sun-absence, sun-disappearance; but what connection have these with the vision of the resting sun and the revolving earth? There cannot be many whose minds are set to this tune, the foundation of whose thought is the habitual recognition that "swift with wondrous swiftness fleeting, the pomp of earth whirls round and round; the glow of Eden alternating with shuddering midnight's gloom profound."

But there is another cycle, the long cold and the long heat, the summer and the winter. You hardly deem it worth while to think of them in these terms only, and leaving sky, earth and sea out of your consciousness,

remember and foresee nothing but alternations of heat and cold. You see no use in doing this, no result that can come from breaking up the whole of consciousness into parts or phases, to study or describe one of these isolated from the rest. Well, if you have not done this, if you will not or cannot do it, you will never know what philosophy is, or what science even is, though you should read all the books of all the philosophers that have ever written. This reciprocation of hot and cold weather you associate with the alternate northings and southings of the sun; but you do not connect them as Herodotus did, who thought that the sun was driven southward by the cold and carried with it the water which it had drawn up from the sea. But again there is substituted for all this that we can see, and any child might see, might even discover for himself, something no one ever saw or ever can see, a conception so different from the world of our sensations and perceptions, however sublimated, that the connecting links, if connecting links there are, between this conception and our ordinary perceptions are utterly unknown to thousands that entertain both—the conception namely, of an earth that no one can ever behold revolving about a massive globe millions of miles away, so as to bring this globe, this new

sun which we have substituted for our old sun, in alternate half-years now over the northern and now over the southern hemisphere. Astronomers and teachers of astronomy are not always aware that there is any difficulty, not always sure where the difficulty is. Let me put the question in this way: The half-million-miles-diametered, ninety-million-miles-distant globe of the astronomer's conception—the little red and yellow ball that dazzles the eyes of us all—what has the former of these to do with the latter? From the latter and various other indications, the former has been inferred. It has been built up in the mind of one man after another, sometimes in one way, sometimes in another way—sometimes by a process which discloses that the new is connatural with the old, sometimes by a process which makes the believer in the astronomer's sun fancy that it is more real than the perception from which it was derived. But the perceived sun, when actually perceived and not merely beheld in imagination, in memory, in foresight, in dreams, in hallucinations—even this perception itself is an inference, or is inference-like; has grown up in our minds by inference-processes in a manner which "a few discern, and the rest, they may live and learn."

The transition from day to night or from summer to winter takes place during our life-

time, seems in consequence to be more within the range of the individual's experience, and not so indisputably inference as the next grand alternation to which I shall ask your attention. Our race had forgotten all about it; forgotten that it had ever had any such experience. Surely no one individual of that remote time ever did have the world-experience which we remember now; his world was bounded by the hills that shut in his valley. We do not say that we remember when the northern hemisphere was covered with ice thousands of feet thick, and the southern pole was tropically hot; and back farther still, when all this was completely reversed, and the north pole was a garden and the southern hemisphere one mass of ice; and still farther back to the time when the conditions were as they are now. We had long forgotten these occurrences as well as the vast duration of the transition from one of these states to another. But now one thing after another has recalled (observe the word), recalled them all to our minds. Surely that cannot be recalled which was never experienced; and surely too the sneaking, cowering cave-dweller that was frozen up in his dismal lair never experienced this. Where was the mind then that recollects these things to-day?—that remembers how for thousands of years the earth's orbit

was becoming more and more elongated, how the north pole happened to be turned away from the sun just when the earth was farthest from the sun, how the winter in the northern hemisphere exceeded the summer by some thirty days for year after year, till those not gifted with astronomical minds at that time must have thought that it always was thus and thus it always would be? You and I did not live then to console that ignorant folk by telling them that matters would speedily mend, that in 20,000 years or so all would be reversed.

This recurrence of glacial epochs, this succession of ice-ages and steam-ages, is a grander cycle than that of summer and winter, and dwarfs the sequence of day and night, but it shrinks into insignificance in comparison with those stupendous transformations of the Universe when there was no human life. Whence did we get this conception? the conception, that is, of a mass immensely larger than the astronomer's sun, including indeed in itself sun, planets and satellites, all sublimed to a tenuous vapor, formless, vast, but sure through stage after stage to eventuate in the solar system of our astronomers, and equally sure to resume its ancient solitary reign through the collapse of that very solar system itself?

We have passed long since the bounds of scientific knowledge, of anything that merits the name of knowledge indeed, as the "epistemologist" understands knowledge; and yet all this infinite dilation and contraction of worlds on worlds through countless æons humbles itself before the religious consciousness, which, amid all these, before all these, after all these, pervading, following, preceding all these changes, "faiths" the somewhat, the unnamed and unnamable, the unthought and unthinkable, the unknown and unknowable—this somewhat which profane men have sought to comprehend by likening it to love, imagination, reason, will, unconsciousness, nothing, and many things else; which foolish men have named and at the same time declared that the name did not mean what one could suppose it to mean; this somewhat which holy men have deemed like the god of the Hindu or Arabic consciousness; this somewhat on which, as on a majestic scroll, men have projected religions, philosophies, sciences, fancies innumerable, Copernican and Newtonian dreams, even now fading away; this somewhat would seem to be that whereof no account can be given after all, no story told. We are still asking questions about it, even while hesitating to apply the noun "it" to what is so unlike any other it that we know. Does it have only

a subjective existence? that is, exist only in some minds? Or does it have a metaphysical existence,—that is, exist independently of any mind? Is it, even when naught else is? And how are other things related to it?

These are certainly questions that men may entertain, or dismiss as insoluble or useless or fantastic. Day and night may roll their courses; summer and winter burst and close; ice-ages interchange with warmth-ages; vapors condense into worlds, and worlds be dissipated to vapor; god exist before, amid, through, after all, though space and time themselves lack the infinity or eternity that we ascribe to them;—or again in terms of consciousness, sensations may merge into perceptions; perceptions be replaced by conceptions, the frame-work of common knowledge; science outgrow common knowledge; religion absorb all these into itself—but will you deny that even this may be transcended; that here and there (I really mean not here nor there, but in some favored region and era) there may arise the philosophical consciousness that shall rend the bonds of the senses and the understanding, leap the barriers of reason and faith, and attain the universe and god, all existences and all possibilities of existence?

You refuse credence to such claims? And yet you, geologist or astronomer, claim to

know what happened millions of leagues away and millions of winters ago. You, the political economist, claim to know what cannot be expressed in ordinary language, not indeed in language at all except the condensed and symbolic language of the generalized algebra. You do not expect that the possessor of this philosophical consciousness can transport you at once to the height that he has attained by the toil of years. Royal roads may be built to the summits of lofty mountains. There are even royal roads to certain geometrical truths that the tutors of princes have been constrained to discover. But he must not commence king who attends this insight. Vigils and fasts, penances and prayers must lift you to where

> "About him all the sanctities of heaven
> Stood thick as stars, and from his sight received
> Beatitudes past utterance."

The vision and the faculty divine are promised only to those who are born to them; you must not only have been born to this philosophy, but you must have familiarized yourself with the languages, some half dozen, in which the seekers after these truths have involved their half-discovered mysteries; you must have followed with eye and ear and mind the speculations of the ages; you must have espe-

cially considered what took place in Germany some hundred years ago, when Kant's irrefragable demonstration of the impossibility of metaphysics was followed by the assertion of Fichte that he willed the actuality of its object; of Schelling that he beheld that actuality; of Hegel that he was that actuality and was possessed of the demonstration of that which in others had been mere volitions and contemplations.

Here was nothing that claimed to be so plain that a wayfaring man need not err therein. Here was nothing that was concealed from the wise and prudent and revealed to babes. Here was nothing that some semi-god, not to be educated by rules and tutors, some musical, tremulous, impressional being, shall have for the asking and gain with a glance. Here is something that you can get, if you get at all, only as you get geometry or chemistry or art; and we know how very few get these. Here is something which does not content itself with pæans in praise of the knowledge it has won, while it refrains from stating a single proposition of its profound, but occult lore. Here is something which is spread out in thousands of statements, stretching through a dozen volumes; axioms, theorems, chains of reasoning—all the diversity and detail that would characterize a treatise

on electricity. You do not suppose that ohms and farads stand for nothing because you do not know what they stand for. You may detect many false statements, many false conceptions of things that had long been known or that have been learned since. One may have discovered how to make a correct chart without being able to guarantee that the chart he has made is correct. You may wish for examples or illustrations of these assertions about being, existence, reality and appearance; but you must learn that the abstract can get along without the concrete as well as, perhaps better than, the concrete can do without the abstract. You may not know German; and if you do, you may get little help from that. If you have read other philosophies you cannot be certain that you will understand these of Hegel, and what if you should get to know his meaning? Why, it would change you, your entire conception of the scheme of things, your whole theory of conduct, if not the actual course of your own conduct, your relation to life and art, your notion of the things around you. There are no two greater puzzles to each other than the philosophical and the non-philosophical head. As is likely, you do not wish your view of things to be changed. You need fear no ill results. The change must be very slow, and

perhaps may never take place in your case, wish it as much as you may.

But let us draw nearer to the world according to Hegel. The term negation is used in connection with language. Are you familiar with it as the name for a process of thought? Few have thought of it as a name for a process in things; still less as the name of a metaphysical process. Now this process is based on what there is already in store at the time of its occurrence; there is no need for its performance to gather materials from any extraneous source. But, it is maintained, every position necessarily implies its negation, and now emerges this negation, not merely as a logical consequence, not only as a physical effect, not solely as a motived act, though it may be all or each of these; but primarily as a metaphysical necessity, an inevitable step in the world process, whether in the stellar universe or in the decaying vegetable. Note again that, if you call what exists at any given moment one thing, upon the emergence of its negation, there are two things; now any two things have something in common, through which they are united in a higher unity. This new unit necessarily implies, that is, creates or generates its negation and the new unit and its negation are in their turn taken up into a higher unity. And so the process goes on

everywhere and forever. It may be possible to give a diagram or rough scheme of this process; in which scheme, however, the mere blank form is alone retained, and not the contents of the real processes.

This process is thesis, antithesis, synthesis. One must take care not to be misled by the etymological meanings of the words, or by their use in any other connection. (As instances: Parallel lines exist; these imply non-parallel lines. What can be more unlike than these; and yet they are subsumed or taken up in the higher unity of intersecting lines, according as these intersect at a finite or an infinite distance. You say that this line intersects the circle and that that line does not intersect the circle; the geometer unites them under one conception and says that the former intersects the circle in two real, the latter in two ideal, points. In politics, a states-rights party implies an anti-states-rights party; these coalesce in a higher whole, which evokes opposition by necessity, to eventuate in a deeper agreement, that that which Hegel spake unto our fathers may be fulfilled.)

Now if you would trace out the perpetual recurrence of this process in all the details of nature and life and science and art, you would only be consciously thinking the unconscious thoughts of your protæonic self, you would be

in your own person further exemplifying the process that has been going on through all time and space. But it is only in its grander outlines, in its relation to the beginnings of time and space, of nature and spirit that the formula of thesis, antithesis, synthesis has been much talked of in recent times.

Let us ascend. We *are* (or rather, *we* are not) before matter and mind, where Pure Being, Being divested of all its attributes, posits or puts itself. Long before, æons before the indefinite, incoherent, homogeneous Spencerium started on its evolutionary career, Hegel's *Sein* was beginning that process of self-unfolding which was to result in *Wesen* (Essence) and in its course originate all those forms or moulds or categories or receptacles of things and things themselves and the sensations which poor Kant had simply said are given without indicating when or where or by whom, and quality and finiteness and unity and multiplicity and quantity and measure and the rest, of which it was to make use in thinking, that is, in creating the world. Over against itself, when it had enucleated, explicated, disentangled these forms which implied their own applicability, there succeeded to the thesis the antithesis; to the Absolute Self by a necessity which you may call at once metaphysical, physical, logical,

moral, æsthetic, arose the not self, nature. Where now is the synthesis? Before answering this question, let us look a little more closely at the thesis and antithesis. These two processes, which are manifested or exemplified in every chemical combination, in the budding of plants, in the growth of animals, in the destinies of nations, in the development of worlds, are the same processes which were involved in the emergence of nature as the negation of the Absolute Reason.

No goading of sense to activity, no opiate intensification of the imagination, no plodding industry of the understanding, will bring the philosophical consciousness. It does not have its roots in English insular prejudice that the forms, categories, ideas, and so forth, that is, the great conceptions under which we classify things, had their ultimate origin in experience. No German Kantian notion that these great principles are native to the individual mind merely, as the conditions of the possibility of its knowledge, will bring the philosophical consciousness. You must have passed through all these, however, through all phases, too, of materialism, idealism, realism, nihilism, and whatever else there may be until these myriads of influence and the contradictions they involve shall compel you to the philo-

sophical consciousness. In this you behold the truth of this relation of thesis and antithesis between Spirit and Nature, but the two opposites come together and the contradiction is annulled in the higher unity of consciousness.

Seven Processes of Language

SEVEN PROCESSES OF LANGUAGE

Where is the English language? This question seems to imply a misuse of the word "where," unless indeed one means "In what localities on earth speakers of English are found?" But this is not my meaning. Why not then ask the question in such a way as to convey your meaning? Because I cannot. And yet, if I only knew how! Perhaps, after hearing the seven different answers that I give to this question, you may discern more clearly than at present that we lack an interrogative of a signification more general than that of "where."

Where, then, is the English language? On innumerable bits of paper, parchment, papyrus, wood, stone, metal, and other material, in nearly every land under the sun. There it exists to-day as some of it has been existing at any moment in these last 800 years. Yes, much of it has been existing in this way for more than 800 years, shading off in place and time into other languages without number; so that it is hard to say where the English language ends, and where something else

begins—some language that is not English. It may seem singular to you that our copious English has no word to stand for this manifestation of itself. This is the seen language, the visible language, the language that is or may be read. I might call it the "lect." I want a term that shall draw your attention away from the mode in which this "lect" is produced, and make prominent the fact only that we use our eyes to recognize it with; and that is something which fails to be expressed by the phrases, written language, printed, engraved or type-written language. There it is, reposing in thousands of libraries, or moving from place to place over the great land and ocean highways of the world—an incessant stream which swells from year to year, its eddies sprinkling your desk with letters every morning. Picture to yourself this universe of script and print and inscription. Does it not seem as if man had added a new realm to nature? Everyone that has eyes can see this language, and few suspect their liability to confound it with anything else. Where it is all can learn, but what it is, its origin, its changes, its relation to other phenomena both in and out of language, are matters that few may understand. Here a character that stands for a single sound, and again for a group of sounds, and here one that represents

a whole word or sentence; and another that does not stand for a sound at all, but for some idea; here again characters that have ceased to stand for anything, and there others that never did stand for anything. This English has a story of its own; and most stubbornly has it resisted the most persistent efforts to mould it into new forms which would establish a one-to-one correspondence of itself to some other series. But let me pass to one of these other series, leaving this first and simplest answer to my question "Where is the English Language?" that it is found in sight-English.

But here is another answer. The English language exists at this instant in multitudinous movements of the particles of the air—vibrations and oscillations, as we call them; exists for a moment, and disappears as rapidly as it is called into being; exists in this way over a greater part of the earth's surface than any other language. In this state of existence, it is not discernible by any one of our senses, but only inferable from certain indications that our senses furnish. But we can picture to ourselves the unsensible, that is, the invisible, the inaudible, the intangible, in imagination; and very curious, hardly recognizable, not even surmised to exist by many, is this language of ours which floats in the air around us.

"Or like the snow falls in the river,
A moment white—then melts for ever;
Or like the borealis race,
That flit ere you can point their place;
Or like the rainbow's lovely form
Evanishing amid the storm."

Have you ever tried to represent to yourself the English language as it must exist between you and me, in the air there, if it is ever to get from you to me, or from me to you? If you have ever made the effort to imagine the space between us while we are talking to each other, there can be no limit to your admiration for the genius of Helmholtz, that great philosopher of our century, eminent as mathematician, as physicist, and as physiologist, the Newton of the nineteenth century, who has done in our time for sound what that great investigator did in the seventeenth century for light. No poet or priest can reveal these mysteries to us. We cannot expect him to concentrate his gaze on a cubic yard of air, and to experiment, reason and calculate, till he can, not merely assert, but prove his assertion, that thus it is in that cube of air, and not otherwise. Poet and seer may desire to "know what holds the earth together in its inmost sphere; see whence production has its birth, see all the germs of life appear;" but his emotions unfit him for

pursuing the only course that will lead to a result independent of his individual impressions. On the other hand, a scientist, a Helmholtz, takes his stand nor swerves till he triumphs over the secret hid in that volume of air; and tells the story of how he did it all in that huge book of his, so that anyone of our, or of any after, time can, if he will, hear the atmosphere's story told, and know that not only did such things take place once, but that they take place now whenever you supply the specified conditions. Just consider a moment. It has long been known that the duration of any sound I utter has for its counterpart, or correlative, a continuation of air-waves, one following the other; that the pitch of any sound I utter has for its counterpart the rapidity with which the wave passes a certain point, or the number of wave-crests that pass that point in a second; that the loudness of any sound I utter is represented out there in the air by the degree of condensation of the wave. Sounds may differ in pitch, in loudness, in duration; but sounds differ from one another in so many other particulars. All this *natura sonans*, this sonant nature, this world of sounds, this inexhaustible quarry for singer and musician and poet—does it have a corresponding *natura vibrans*, a vibrant nature, a world of vibrations in the air that surrounds

us? We surely distinguish *ball* from *kin*, even when both sounds, having the same duration, the same pitch, the same intensity, go along with air-waves that have the same duration, the same rapidity, the same degree of condensation. What is there then in the air that answers to this difference between *ball* and *kin?* This is the question which Helmholtz asked himself, and to which he found an answer. An illustration drawn from another source may make the answer plainer, not indeed in its detail and exactitude; will not tell you just what there is in air-English that matches *ball* and *kin*, but will tell you what is the character of that something. This is the illustration: Look out on the ocean; you see a line of billows, from crest to crest more than a vessel's length. Over the surface of these swelling billows climb waves. Flitting over the waves, as these sweep over the billows, are troops of wavelets; and there you see a swirl of eddies, skurrying over and amid these little waves, and whifts of ripples dance over the whole and run into the dizziest whirl of foam. Now something like this is going on in the air; and it is these eddies and ripples among the air-waves, the aërial vibrations, in other words, that we find the counterpart of that which makes the sonorous difference between *ball* and *kin*. Homer speaks of *epea*

pteroenta, winged words; and I am inclined to think that this epithet was then more scientific than poetic. How could he account for the fact that the word went from "me" to "you" more satisfactorily to himself than by supposing that it had invisible wings to bear it away? But we know that it is not the word that goes, but simply curiously intricate pulsations of the air. But it is not in the air alone that this vibrationary English exists. Walls, chairs, tables, windows, wires—but why enumerate?—your fire-screen there comports itself very differently in the presence of a Frenchman, let me assure you, from its behavior when an Englishman calls. In the air between two persons who are talking together in a room; in the chord by which they communicate when they use that toy called a lover's telegraph; in the wire that stretches miles in length from one telephone to another, exists this vibration-English. It is essentially the same in all. The phonograph simply sets up the same motions in the air that were originally produced by the mouth that talked into it. And in passing, let me observe that English exists in one of its forms on the cylinder of the phonograph, though I had not included this in my enumeration of the places or states in which the English language is found.

"The mouth that talked into it," I said; and

this brings me to a third whereabouts of English. Let me call it physiological English for the nonce, though mouth-English is a more significant term. Suppose that while an Englishman is speaking, it were possible to take instantaneous photographs every few seconds of the whole articulatory apparatus; we should have a series of pictures which would be as significant to one who had studied it as our written English is, and that series of motions which these pictures would in part represent, of palate, tongue, teeth, lips, would if we could interpret it, be as definite an expression of the speaker's meaning as are the words we hear. Why, the successive positions of those organs of speech which are visible suffice alone to enable those who have studied these indications to catch the speaker's meaning, but there is no doubt that the whole language—every hue and tinge and shade of it—is paralleled by these series of positions of the vocal organs. The study of these facts forms part of the science of phonetics. There are diagrams which are intended to show the various positions the articulatory apparatus assumes when pronouncing the sounds indicated by the letters. More attention is now given to this physiological English than ever before, with this result among others that a difference has been detected among sounds

supposed to be alike, when once the attention has been directed to a difference of position in the organs by which the sounds were made; on the other hand, sounds between which no difference can be discerned, have been shown to be producible in a number of different ways, that is, by different motions of the articulating parts. It is on this physiological English that the visible speech of Mr. Alexander Graham Bell is based. Every letter of this alphabet represents, not as in ordinary alphabets, a certain sound, but that position of the parts of the mouth by which this sound is made. The startling originality of this conception was well matched by the patience and assiduity which worked it out in detail; and in his studies of this other English, this mouth-English, which we all use without noticing it, lies the germ of the invention of his now more famous son, Graham Bell. It was by dropping those Englishes with which we are all familiar and taking up those with which we are not habitually occupied at all, that Visible Speech and the Telephone were worked out. Vibration-English and mouth-English, things that most Englishmen know nothing about, have, when once the attention of competent persons was fixed upon them, revolutionized the methods of instructing deaf-mutes, begun to change all our proc-

esses of teaching languages, made it possible for a traveler to take down the speech of a barbarian stranger with such exactness that his correspondent can reproduce it with the greatest fidelity, and enabled Boston and New York to converse together with as much ease as you and I in this room.

But we may enlarge our conception of mouth-English. Since the whole organism reacts in some degree in response to the action of any part, it follows that English is in a peculiar sense embodied in the children of English-speaking parents. All the testimony of all the statistics in the world would not convince me that an English-born babe would not learn English more easily than an infant of French parentage placed in the same surroundings.

This brings us to the English language existing as a nerve-process, or rather as a two-fold nerve-process, corresponding to the double attitude of hearer and speaker; yes, a four-fold nerve-process when we take into account reader and writer as well. No physiologist doubts that something different is going on in the brain when one writes and when one speaks, when one hears and when one reads. Sometimes one of these faculties is impaired without immediately involving an impairment of either of the others. This led Techmer to

recommend the separate and distinct learning of the spoken and the written language. Associate, that is to say, the spoken word with the meaning, and the written word with the meaning, and not, as is usually the case in schools, associate the spoken and the written word. As languages are now learned, aphasia, or an affection of the nerves that makes talking impossible, involves agraphia, or the inability to write down one's thoughts. According to Techmer's plan, the one of these would not be necessarily complicated with the other.

But not in visible signs, not in air or any vibratory medium, not in nerve or in the reactions of the organism, not in the successive position of the articulatory organs—not in any of these—can the language be said so truly to exist as in this very world or universe of sounds themselves. Here language lives and moves; and yet all the names that are applied to this, to this succession of sounds, are taken from some thing associated with this succession, and have misleading suggestions. Instance the English *tongue*, the English *language* (*lingua*); the English *speech* is somewhat better. The English *talk*, if we could use the expression, directs our attention still better to the sound itself, and withdraws it more easily from the tongue, the

teeth, the air, the ear, the letters, the perpetual accompaniments in nature and in thought of these sounds. It is a sad reflection that this, the spoken language, has been crowded out of men's thoughts by the written language. There can of course be no likeness between these, only a correspondence. This correspondence may have any degree of exactness. In no language, however, is the correspondence very exact; in English it is very inexact. Changes of stress, of pitch, of pause, of duration, of individual utterance, are not marked at all. Even what is left of the sound after deducting all this, is either under-indicated, or over-indicated, or mis-indicated; or, when indicated, indicated in a very unpractical and inelegant manner. Tennyson laments, as he composes his verses, that the subtle succession of sounds he has sought to seize cannot be preserved, can hardly be expressed by the symbols he tries to represent them by. Luckily the world clings to the bad, and it is hard to change all this. Luckily, I say, for how else can we hope that they will cling to the good when they get it?

This half-century has indeed witnessed a glorious revival, a veritable renaissance, of the sounds of the Latin and Greek languages. Even the long silent rhythms of the latter have awakened to life. Order, symmetry and

beauty have been discovered where all was confusion. But who would undertake to reconstruct our rhythms from the texts of to-day with no other key to them than the texts themselves? The English language has numerous faults at its best, and many of these our schools have done their utmost to perpetuate; but, by and large, there is no language fitted to cope with the English in the struggle for existence from the simple fact that the English represents the highest stage of linguistic development, and all progress in other languages is toward the English type. Were it not for the utterly indefensible difficulties of our orthography, we would have made even the thought of such a thing as Volapük impossible. But my aim was an exposition, not an argument, still less a declamation. But there is another English that awaits attention.

"What," says some one, "this complex of sounds and sights and air-pulses and wagging jaws and nerve tremors, singly or all put together, is that what you call English? Would the sounds, *sky*, *river*, *bird*, *tree*, *moon*, and so forth, be English, be language at all, if no thoughts went along with them? And does not the English language exist in this thought-series?" The reviews make sport of Prof. Max Mueller's assertion that language

is thought; that there is, there can be, no thought without language; that, in effect, if there were no word *tree*, or some such symbol, there would be no tree for us. Prof. Max Mueller, I grant, has many thoughts, for which it would be hard for anyone, even for the Professor himself to find any scientific foundation. Such was his unfortunate Turanian group of languages. Such was the notion which he shared with his time that the Indo-Europeans had their origin in Asia. Such was his theory, not his alone, of the three stages in the development of language. Such was his theory of mythology, and his reconstruction of the religious past. Deduct all these things and even more; we can still leave him his contention that language is thought and thought is language. Not that even here his doctrine needs not to be pruned of many excrescences, and its exposition translated into the language of another system of thought than his own. What is worth retaining of this doctrine, somewhat paradoxically expressed, "Without language, no thought"?

The change has been from homogeneous to heterogeneous, from indefinite to definite, from incoherent to coherent. I use Spencer's terms to express a fact that is admitted by all without committing myself to their implications in the Spencerian philosophy. Now a

mind that is at any stage of that process does violence, as it were, to itself, to retrace its course, to rethink what it has outgrown. What is it that has given our thoughts their present arrangement, has made there to be thoughts at all? What, but social intercourse, communication, and that which makes communication possible, language? Consider your experience of sights, colors, odors, stars, clouds, suns, moons, meteors, tempests, lightnings, thunders, that rush of ever-changing sensations that makes up one of the strands of life from infancy to maturity; were it not that you have the word "sky," how would you discern its meaning amid this cluster of impressions? Is it not this word that gives unity to that experience? Pass in review all the times when you have heard that word, all the myriads of sentences into which it has entered. Remember that you did not look up the meaning of the word in the dictionary, that you did not get at it through the medium of other words, that it was not told to you; but that you have been going on guessing more or less consciously what English speakers mean by that word. In time that symbol, that sound, "sky," groups and connects and unifies and substantializes all these elements, makes of them a coherent whole, which, in the absence of such a connecting link, would

have lain dispersed and disordered in the mind. "Words," says Sir William Hamilton, "are nothing but signs for the factitious unities of thought." "Factitious"—mark the word! Signs, not for things, but for what we have put together and agreed to call things. That perhaps is all that things are. Why we have put some experiences together and connected them by a name, and not put other things together in thought nor connected them by a name, is a question which it is almost useless for anyone to attack who has not an acquaintance with many languages and many minds. It should be the aim of some school to supply these conditions, and by neither attacking nor defending, in the present confusion, any single doctrine, to enable men to see of what elements it consists and what is its range.

Survey the scene that our minds present. We ascribe reality to what our names stand for. Adam probably thought till he learned better that the monkeys on the limb were a part of the tree, and gave, foolishly enough, a single name to what he mistook for a unity. We find it difficult to believe that our own minds are merely bundles of just such Adamitic conceptions. We do not often have occasion to speak, as of an indivisible whole, of the group of phenomena involved or con-

nected in the transit of a negro over a rail-fence with a melon under his arm while the moon is just passing behind a cloud. But if this collocation of phenomena were of frequent occurrence, and if we did have occasion to speak of it often, and if its happening were likely to affect the money market, we should have some name, as "wousin," to denote it by. People would in time be disputing whether the existence of wousin involved necessarily a rail-fence, and whether the term could be applied when a white man was similarly related to a stone wall.

Let us not flatter ourselves that we have no such words in our minds, centers of crystallization, around which are grouped our own concepts which we mistake for realities. Yes, reality is such a word; mind is such a word; English is such a word. After all the phases of existence which I have attributed to the English language, seen English, air-English, mouth-English, nerve-English, sound-English, sense-English—I fear that I shall have to admit, on nearer and closer scrutiny, that what we call English does not exist at all. English is an abstraction from a multitude of individuals or particulars. Does Bunyanese exist? Where shall we find Carlylese? If a book should be found, and one man should contend that Bunyan wrote it, and another

should deny this, each would assume the existence of some standard of Bunyanese by which the question might be decided. If you have ever read such controversies, and used your best endeavor to find out what was the Bunyanese of *A*, and what the Bunyanese of *B*, and what the real Bunyanese (the only one that would satisfy your love of truth), you might come to question whether there was such a thing as Bunyanese after all.

And now take that much wider abstraction, the English language. Here is a name. It stands for something in my mind and in yours. Whether the two agree or not, we have not many opportunities of ascertaining. Now what is the signification of your name? Can you give me any test by which what is English is without fail discriminated from what is not English? I have been looking and hearkening for this English at intervals my life long; all I can find is a scrap here, a bit there, and the English language I fear I shall never get to hear or to see or to know. Or shall I say of it as Saint Augustine says of Time: "Ask me what English is, I do not know; do not ask me, I know"? This general, this abstract, this ideal English, this standard which most appear to think exists somewhere, though few can agree as to where it is to be found, we may almost conclude that it never

has existed, does not exist now, and never will exist till the Pure and True is established among men.

Let us now briefly recapitulate, though in a different order. We may place at one end of the series thought-English, that is, emotions and feelings so grouped and arranged as to be communicable by an Englishman to an Englishman. The next stage is nerve-English which breaks up into several different dialects, as it were, according to the direction in which the nerve-force moves on to the muscles, where something exists which we had not previously noted but which might be called muscle-English. Next, we have movement-English, and this likewise divides itself into several species; for the fingers may move as in writing or typewriting or in making the so-called deaf-and-dumb alphabet, or the movement may be limited to the lungs and mouth. We come now to vibration-English and this again is of several kinds; inasmuch as the vibrations may be of the luminiferous ether, or of air or of some solid as a wire. The first results in sight-English, the others in sound-English. But at this point these Englishes are converted into nerve-English again, to become in its turn thought-English. But nowhere in all these transfers do we find the abstract, the ideal English.

So intricate is the language-process when viewed even thus cursorily. There are those who have studied each of these languages with as much detail as the present stage of our advancement allows. Exact measurements have taken the place of vague imaginings. Force, pitch and duration have been analyzed by means of instruments of precision; and there is already hope of general agreement on many points which are involved in the true theory of "mere words."

Nine Uses of Language

The shapes of animals that live to-day on the earth are but a remnant of the numberless forms that have existed. Tennyson says of Nature: "So careful of the type she seems, so careless of the single life." And then he adds: "So careful of the type? But no, from scarped cliff and quarried stone she cries: 'A thousand types are gone; I care for nothing; all shall go.'" The movements of animals as well as their shapes have undergone a similar succession of changes. The accumulations of nervous energy are discharged along muscles. These produce countless movements, visible and invisible. Some of these movements impair or destroy the organism that makes them. There survive then the movements that maintain or promote the efficiency of organisms; and, together with these, numerous motions that are practically indifferent. Some of these, however, turn out to be really useful in a new way, in expending a superfluous amount of energy which might else prove detrimental either by interfering with desirable movements or by setting up undesirable movements. Among the indifferent move-

ments are certain of those made by jaws, lips, tongue and palate. These indifferent movements are constantly associated with those that the organism must perform in the chewing and swallowing of food and in breathing. Accordingly they become the easiest to make and are constantly repeated without conscious effort. Now these motions are precisely such as communicate to air the vibrations that make the sounds of common speech; and the first use of talking—of "tonguing"—the first function of language is to dissipate superfluous and obstructive nerve-force. This first and earliest service language still continues to perform. These muscular movements that result in vocal sounds, some may hesitate to call language. They may be bound by the distinctions that words have fastened on their minds. They may at least call these mouth-made sounds the raw material of language, or language in the rough. Long before reflection, before consciousness even, through ages on ages, this stratum was, from which all speech of men has been quarried—all song, all poetry, all literature; but the material preceded the use made of it. Grant that this is language at so low a stage that man's fellow creatures may surpass him in it, still we must note the beginnings of things to understand the riper growths. These utterances repeat

themselves, they exhibit resemblances and differences, they recur in certain sequences, they reëmerge when the incidents happen again that first called them forth. The flow of nervous energy wears its own channel. The sounds become habits. They acquire definiteness in the chirping and twittering of birds, in howlings, roarings, bleatings, brayings, in whisperings, hummings, gruntings, sighings, ah-and-ohings, and so forth—names all too definite now to express that wonderfully varied infinitude of unintentional, unconscious modulations, which, originally accompanying necessary actions, become associated with feelings, and affording relief to pent-up energies, constitute the nucleus of human speech. Is it possible to find out what was first done with this accumulated material, and thus ascertain the second use of language?

This second use is the direction of motion in others, both men and animals. There may be little consciousness either in the utterer or in the hearer, and yet a cry may serve to attract or repel, to cause rest or motion, to establish relations of action among the members of a community. The utility of these actions may lead to their frequent repetition, although there may be no thought of their utility nor intention of producing the result which follows. A later stage of reflection may

disclose the usefulness of the connections thus established between sounds and actions, but it seems certain that no foresight of such utility led to their adoption. Pulses of air impinging on ear-drums might arouse very little consciousness even of sounds, might suggest no idea of the situation of things such as would be awakened in a developed intelligence, yet might unlock nervous energy which would be dissipated in motion. This condition was once all but universal, and still survives in the animal world and in many relations of human life. It is found too amid civilizations, even in our schools. So long as the utterance of certain sounds secures the performance of certain processes, there may be very little ideation required either in teacher or learner. This unconscious or subconscious response in action to unconsciously uttered sounds, plays a great part in all social processes. We are much more automatic than many of us suppose; and a great deal of what is called concerted action has its origin less in will and intelligence than in organization. It is the response of the bud to the sun, of the lungs to the influent air. Many of these reactions may never rise into consciousness; or, if once they emerge, may pass out of consciousness again, should the environment become constant.

Some change in surroundings brings about

a conflict of opposing impulses, awakens consciousness; and language assumes its third use or function; that of the communication of ideas. There is nothing mysterious about this, nothing more mysterious than that the odor of a rose should bring the memory of its shape. Those sounds which we call language have no other power to awaken ideas in our mind than that which they derive from having been previously associated in our experience with these ideas. The processes by which millions of men have come to think alike when they hear *book*, *mountain*, *the*, *when*, *political*, *conchoid*, *the sun will rise to-morrow*, *etc.*, was long and intricate; and the possibility of a knowledge of the details is lost to us forever. The general conditions and aspects of the process may be ascertained. At any rate it is no longer possible to believe that the sounds carry about the meaning with them. Bibles and oaths and creeds and platforms and laws have been discussed as if the connection between sound and sense was like that between two intersecting lines and four co-vertical angles—as if one could never think of the one without the other. Men seemed to believe that the meaning of words could be learned from verbal definitions. The possibility of communication rests less on language than on sympathy and similar experiences.

A sound goes at one time with an infinity of particulars—*Europe, the English Constitution;* at another, with only one or a few, *point, furlong.* The sound shifts from meaning to meaning, from like to like, from near to near, from less to more, from more to less, and across every possible link that exists between thought and thought. For the meaning of words we go to life, to experience, to thought, to things, and only in the last resort to the dictionaries. They can help only those that have helped themselves. Dictionaries are as meaningless to many as if they were not full of meaning. The phenomena that have been named vanish in comparison with those that have never been named. In no respect do the inferences that are made from language differ from the inferences that are made from any other signs or things, that is, as inferences. It would be hard to establish any important difference between the origin of our knowledge of the relation of language to other phenomena which are called its meaning, and the origin of our knowledge of the relation of the outside of a tree to its inner structure, or the relation between any two series of facts that imply each other's peculiarities. There are metaphors apart from language, metonymies, or rather metasemacies, synecdoches, ambiguities, and the like, in geology for

instance, in any present indications from which we infer what we do not immediately experience. Even in language intention is insignificant in comparison with other agencies; and to Nature intentions are still ascribed even by those who know better. In the versifications of overworn philosophies, we find: "For words, like Nature, half reveal and half conceal the soul within," and again: "But I who seeking everywhere her secret meanings in her deeds, and finding that of fifty seeds she often brings but one to bear." Where all is mystery, it is time to outgrow the provincial habit of finding something peculiarly mysterious in guessing at the thoughts of our fellows from the sounds their mouths make. Every parish has its pool that has never been fathomed.

The fourth use of language is for expression. The habit of communication has become so ingrained in social man that even when alone by himself, he puts his thoughts in words. If he does not speak or write the words, he imagines them. He feels dissatisfied until he has contrived some expression for his thought. He may talk to an imaginary hearer or to himself, or may think in words with no consciousness of his fellowmen. Curious languages have grown in this way in the minds of lone thinkers and investigators, which are

utterly unintelligible to others, but as consistent and decipherable as a cuneiform inscription. The language of expression may "spread the images abroad that else lie dark and buried in the soul," but it does not, like the language of communication, produce "that which makes thousands, perhaps millions think." It is often difficult for one who has caught new views of things to translate the language of expression into that of communication. The necessity of communication forces us to ask what the signs mean to others; for our own purposes we may use them in any relation we please. (Co-punct) (triangle-angle bisectors) and (Man sit table) (write) are expressions which, however intelligible and useful, and for some purposes, necessary to myself, must become in order to be understood, "The lines bisecting the angles at the vertices of a triangle meet in one point," and "The man who is sitting at the table is writing." Phenomena admit of very different classifications from those on which the makers of language have laid stress. New forms may be desired which shall be the same for expression and for communication. Perhaps they may get themselves introduced and one day become universal. Mathematics, chemistry, biology, and commerce are pointing the way.

The fifth use of language is for purposes of record. Long before the introduction of writing, sentences were committed to memory. They were made easier to learn by being thrown into some form of verse, and at the same time less easy to alter by omissions or insertions. Verse-forms have had many origins, but their introduction and retention were facilitated by the possession of the property of being easy to remember and hard to change; and they gained impressiveness from being associated with chronicles and precepts, prayers and hymns. Persons remarkable for a retentive memory must have been highly valued, whatever their deficiencies in other respects might have been. Yet the invention of writing and of printing gave a great extension to this function of language. The phonograph has added another possibility. Nothing is preserved but the symbols; the meaning they once had is recoverable by processes precisely analogous to those by which any facts not directly observable are ascertained. There are many other records than language proper; and the name language has been extended to all things that have served as records.

There is a sixth use of language—a natural consequence of its other uses. What compels actions and movements in our fellows, whether

men or animals, why should it not constrain those other things which the philosophers and poets even of the twentieth century endow with life and personality—set matter in motion and even call down the moon from the sky? Angels and demons respond to charms, spells, incantations, mystical sentences—relics oftentimes of old speech whose meaning has been forgotten. The gods have a language of their own, never used except in addressing them, or by those entitled to address them. This use of language still obtains with the great majority of the human race; but it has been abandoned by a few either because they have ceased to believe that there is anything to influence, or because they no longer believe that anything but visible and tangible animals can be influenced in that way. Moral grounds have been alleged for abandoning this use:

> "How pure at heart and sound in head,
> With what divine affections bold,
> Should be the man whose thought would hold
> An hour's communion with the dead.
>
> "In vain shalt thou or any call
> The spirits from their golden day,
> Except like them thou too canst say,
> My spirit is at peace with all."

That use of language which stands seventh in my enumeration is the most difficult to

exhibit intelligibly—the use of language as an instrument in thinking. By thinking I mean just simply the process of making inferences, whether from original data or from other inferences. The beginnings and the endings of this process may be almost exactly alike in a hundred individuals, but the intermediate steps may differ as a modern flour-factory from an ancient grist-mill. Each takes grain and delivers flour, but there all resemblance ends. Nearly all our thinking is symbolical, sometimes most absurdly and grotesquely symbolical; but still it serves its purpose. This symbolism is commonly made by dropping those aspects of the subject which do not immediately interest us; and carrying the mere skeletons and fragments of things through the thought-process. At times these skeletons of things are replaced by something more sketchy and shadowy and evanescent. Artists, musicians, poets come the nearest to reality; the thinker finds some bit of machinery which will transport him with his eyes shut and without loiterings by the way from start to finish. One of these machines is the speech-image. This surely is as little like the reality which we say it stands for as may be. But since words hang together with words as things with things, since there is a certain parallelism between the two series, we may

travel some distance along the word-way, instead of traveling along the thing-way; and we may appear to ourselves and to others to be thinking things, when we are merely thinking language. There are some symbols not so good for this purpose as language is. There are some which in certain matters are so much better that they do what language cannot do at all (ordinary language, I mean); while on the other hand there are results of thinking which could not be obtained at all without language or symbols of sight or sound analogous to language.

Suppose some one to assert: *The gostak distims the doshes.* You do not know what this means; nor do I. But if we assume that it is English, we know that *the doshes are distimmed by the gostak.* We know too that *one distimmer of doshes is a gostak.* If moreover *the doshes* are *galloons,* we know that *some galloons are distimmed by the gostak.* And so we may go on, and so we often do go on, not employing the words to stand for things or to call up thoughts to our minds, but to replace things, to be substitutes for thoughts. A whole paragraph may be composed in this way, statement being linked to statement, without any suspicion on the part of writer or speaker, that he is doing something quite remarkable. Rules learned in childhood, maxims and proverbs,

general statements quite as meaningless as the above, are frequently the sole contents of the mind of him who utters them. The classifications already made, the feelings that cluster about them, the words that express them, dominate the mind and incapacitate it from doing anything but repeat the old formulas. A language developed copiously and symmetrically makes easier this process of word-thinking. If there were noun, verb, adjective and adverb, related in form as well as in meaning, the substitution of phrase for phrase would require less attention than where, as in English, meaning and form so often conflict; as, *boy*, *boyish*, *puerile*. Thought may ebb very low, the stream of language may flow in its place; and this seventh use come to resemble the second, the liberation of motion, no longer instantaneous indeed, but after an interval. The old logicians had a glimpse of this use of language. They fancied that it admitted of unlimited extension. They believed that language had a quite peculiar relation to thought; and they converted its sentences into propositions, which they twisted into hideous shapes in order to elicit from combinations of them still other propositions. There was nothing objectionable in this practical testing of their hypothesis about the nature of language. The result did not justify

their expectations. But modern logicians have found better ways of attaining some of the things the old logicians sought; and have left the discussion of language to grammarians and rhetoricians, and to those who like to remember what even time forgets.

It is this aspect of language which has given some countenance to such beliefs as that language and thought are identical—no thought without language. Such ideas spring up readily in minds that are absorbed in reading and writing, that live in and on libraries, that find in books the sources of all they know. Sculptors, painters, musicians, architects, engineers, are exposed to different influences, are likely to come to quite different conclusions about language—the language, I mean, which men speak and write, and not those other things which are called languages by those who find in vague and fanciful resemblances grounds for misusing names.

Pass now to the eighth use of language. We delight in sounds, even in the noises from squibs and cannons. There is no disputing about tastes; else so many volumes on aesthetics would hardly have been written. Pleasure that sound gives, some think, is the result of some association of the sound with things that give pleasure—one's fellows for instance. Whatever its origin, to give delight merely as

sound is a distinct use of language. Language has its meter, its long-short series, its rhythm, its loud-soft series, its melody, its high-low series, but these it has in common with all successions of sounds. It has, besides, its peculiar quality, its vowel-consonant series. We justly pay great honor to those who mould this material of our common talk into new forms that reveal to us capabilities of speech before undreamed of. The whole language is lifted by such efforts. Each becomes ashamed of his mumblings and mutterings, and would rid himself of his shambling, shuffling, slouching speech, hopes indeed that instead of being taught to follow a fashion, he may learn what the fashion should be. He wants a moral pronunciation, a pronunciation determined by conformity to ideals, and not suffered to sink to the level of howling with the wolves, and doing at Rome as the Romans do. Composition waits on execution. There can be no great poets, in the sense of masters of the resources of speech-sounds, except among a people who are, in their measure and degree, masters of the sounds of speech. Meter, rhythm, melody, color of a phrase, in one word, its sound—rivals its meaning. Let us forget for a moment that language is anything else but sound, that it has ever ceased to be one with the chirping of crickets, the

patter of rain, the rustling of leaves, "the cooing of doves in immemorial elms and murmur of innumerable bees." What skill arrays such a sequence of syllables in our mother-English as the following:

> Look, I come to the test, a tiny poem,
> All composed in a meter of Catullus,
> All in quantity, careful of my motion,
> Like the skater on ice that hardly bears him,
> Lest I fall unawares before the people.
>
> —*Tennyson.*

But this subtle succession of the crotchets and quavers of speech cannot vie with the glooms and flashes of the varied resemblances and differences of the vowel-consonant system:

> All over the gray, soft shallows
> Hover the colors and clouds of the twilight, void of a star,
> As a bird unfledged is the broad-winged night, whose winglets are callow
> Yet, but soon with their plumes will cover her brood from afar,
> Cover the brood of her worlds that cumber the skies with their blossoms
> Thick as the darkness of leaf-shadowed spring is encumbered with flowers. —*Swinburne.*

But another poet shall delight us with the tumultuously regular interchange of soft and loud, of weak and strong syllables:

Nay, swart spinsters! So I surprise you
  Making and marring the fortunes of man,
Huddling—no marvel, your enemy eyes you—
  Head by head, bat-like, blots under the ban
Of daylight, earth's blessing since time began.

Back to thy blest earth, prying Apollo,
  Shaft upon shaft, transpierce with thy beams
Earth to the center—spare but this hollow
  Hewn out of night's heart, where mystery seems
Mewed from day's malice; wake earth from her dreams!
—*Browning.*

But longs and shorts, labials and gutturals, louds and softs are blended in any utterance with highs and lows, and from these derive an infinite variety, an indescribable wealth of forms. The repetitions and refrains, in the absence of any appropriate notation, indicate by their very sameness on the printed page, that inflection is required to give the diversity desired by ear and taste; not to mention at this point the differences of inflection demanded by differences of meaning in the same phrase when used in different passages.

To the nine uses of language which I am considering others might be added; nor, however easy it is to distinguish the uses from one another, does any one of them often appear unaccompanied by another. From our consciousness of sounds as sounds, we can rarely separate the emotions, not to say ideas,

that have accompanied the sounds in the past; and, while we are fancying that we are regarding language simply as sound, we may be compelled to note that the language is relieving nervous tension, liberating motion, generating ideas and feelings, mirroring our minds to ourselves, bridging time, invoking spirits, facilitating thought—in a word, performing at one and the same time all the functions of which it is capable.

The ninth use of language is the most remote, if not from general apprehension, at least from general interest. The purely scientific aspects of any subject, as animals, societies, spaces, has never appealed to many minds. There might be few alive, if it had. "Providence," said Kepler, "has kindly joined astronomy to astrology, that the latter may support the former." Philology, the pure science of language, has slowly emerged from a world of dreams and superstitions and idle hopes. To establish the unity of the human race, to prove ourselves the sons of gods, to discover some secret whereby nature and men could be controlled, to attain some principle for the solution of all the riddles of existence; or, lower yet, to remount to the sources from which the stream of language flowed, and to return, bathed and quickened in that spring, to move the hearts of men with speech and

song—who entertains now such hopes? But there has arisen meantime the study of stars and planets, of the growth of worlds, of millions of years of changes in the earth's crust before ever a sound was uttered or a being existed to utter a sound, of the tribes of plants and animals, of hundreds of thousands of years of brute humanity, of myriads of languages that have perished, of thousands of barbarous languages surrounding the few that have become vehicles of culture. There has arisen too the study of bones and muscles and nerves, of the nature of sounds and their dependence on vibrations, of the emergence and development of brute and human feelings and ideas, till language appeared as the late sequent of a multitude of phenomena the existence and properties of which had been established without any appeal to language; and then the study of the phenomena of language itself, the uniformities, the recurrences of likenesses among them, the so-called laws, the rules if you will. These are, of course, what some philosophers have called derivative laws, that is, laws or facts which must be resolved into phenomena outside of their own subject. Thus the persistences, the repetitions, the survivals, the uniformities, even the things which seem the hardest and fastest and firmest, have the unity and identity

of the rainbow or wave-curve, a formal constancy with incessant change of material, perpetually exposed to modification and even to extinction. The perishing and perishable states of language which I have in mind, are not, as you may be supposing, the fads of the nineteenth or the humors of the sixteenth century, the established slang of any epoch. These are the show-flowers of a season; tulips yesterday, chrysanthemums to-day, and it may be some strange form of sand-weed to-morrow. It is not shapes and colors such as these that effort may give to the most intractable material that I am thinking of. I do not even mean those deeper persistences which have endured for centuries, consisting merely in the repetition of countless individuals that resemble each other as everyone has come to see. Most minds discern some points of resemblance between two oysters; and *amicabalis* has many elements of likeness to *amiable*. The uniformities that I mean are deeper, more permanent than these. They stretch across the ages; they link together not like forms, but forms unlike, as you would call them, not only at first sight, but at second and third sight too. Perhaps we might not be educated or educable to see the connection, though we worked over it for a lifetime.

But even these highest abstractions of

linguistic science in seeking which some find more delight than in rich viands or costly apparel or popular applause or anything else the world offers, even these, like Herbert's rose, have their roots ever in their graves. They are the products of the agency of lips and teeth, of lungs and air, of nerves and sensations; things which are themselves very modifiable and very variable; things which are themselves highly derivative; things the laws of which, if any should be surmised, can only be established by tracing them back to the phenomena which precede and underlie them. But the philologist has no alternative. The methods of modern science are not now Baconian; in fact they never were. The collection of facts without some purpose, without some guiding theory, without some hypothesis to refute or confirm, in short without some test by which to distinguish relevant from irrelevant facts, would reduce us to barbarism in a century. Mendeléef has said that modern science is like the modern bridge. It does not rest, as the old, on piers placed at short intervals from bank to bank. Through the mist and over the chasm it is built out from either side. It has no strength and will sustain no weight till the two parts meet. Will they ever do so? Have we missed our calculation? We shall not know till the fabric

is complete; and with the driving of the last bolt, strength diffuses itself through the whole and the parts support each other. Language is among the most recent phenomena that have appeared on the earth. Its thousands of earlier years are to be restored only by probable deductions from the study of savage tribes. Of its later years many aspects have passed into oblivion. Moving amid hypotheses and ever seeking facts to test them by, the philologist presents to such as will take some pains to understand him a picture of the language life of the earth. Where did these three or four thousand languages come from? What are their relations to one another? What is their geographical distribution? What is their succession in time? What are their resemblances and differences? What were those missing links which we must suppose existed to connect and explain the fragments that we possess? The work has already progressed far enough to have established in some minds methods of investigation—formulas for building bridges, to recur to our former illustration. The philologist has risen above the limitation of his own time, his own country and his own language. He has beheld languages so different from his own that he can make no assertion about them in terms of the grammatical vocabulary of his own

speech. He has seen groups of sounds that clumsily expressed the rude classifications of a savage tribe strained and stretched and enlarged to communicate the thoughts of millions of civilized men, while yet they retain traces of their earliest structure, however changed in function, or even useless and obstructive they may have become. He has been led to see that language has many uses and must be looked at from many points of view; that it is sometimes a comparatively harmless discharge of troublesome nervous energy; that it liberates nerve force and sets muscles in motion, thus making co-ordinated action in large groups of men and animals possible without intelligence; that it establishes likenesses in thought and feeling among men; that it furnishes each in the privacy of his own musings with pegs and lines on which he may hang his thoughts to air and dry; that it is a set of boxes in which one may pack his ideas for future inspection, even if a rather insecure repository; that it is a collection of spells with which each may control the beings of his own other world, if he has one of his own, to his own satisfaction; that it will do his thinking for him sometimes even better than he can do it for himself; that its sounds are a symphony which some can compose and hear, and some can talk about; and finally the

philologist sees, though I cannot, that there is one use that transcends all other uses, that it is namely a subject for study, a subject superior to all others; for here theologian and scientist and classicist meet, here nature and art combine, here matter and spirit unite, here the old cannot dispense with the new, nor the new with the old.

Many Meanings of Money

"What terrible blunders we have made in finance," says one. "Not more terrible than others have made," retorts another; "not more terrible than we shall make again. We do not even know that there is any other way of learning than by actual experience; and so actual experience we must have, even if it kills us off, to make room for those who may be more capable of learning." "But," interrupts a third, "what you call blunders were the wisest things we ever did; we need the same measures now and we mean to have them."

Let us turn from the consideration of such conflicting views to the contemplation of ideals; we may come back as from a mountain journey with calmer hearts and with clearer vision.

There is a community where all are perfectly intelligent and perfectly honest. Each remembers distinctly every thing he ever did or thought. When one dies, the others inherit his knowledge. They have no visible language. There is no bookkeeping. They have never even experienced the need of a standard of value. Why have a medium of exchange,

when all things are at will media of exchange? Legal tenders—the conception has never found lodgment in their minds. No tyrant forces them to give more or to take less than they have voluntarily agreed to do. They tell you on the instant the exchange-ratios of a dozen different articles in terms of any one of the articles you please. They bear all this weight of knowledge lightly like a flower; and seem less anxious than our dealers and traders. Each makes his purchases with what he has to give or with what he promises to give or with what he alleges that some one has promised to him—he transfers, that is, his promise. You would fancy that there was in the mind of each a perfect picture of the world he lived in; and that every train of cars had its counterpart in his thought with images of the contents of the freight-wagons. I will not weary you with details; each can think them out for himself. Is there any money there? Yes; this very promise itself—this unspoken, unwritten, unrecorded promise; but still a promise known, a promise felt, a promise trusted, and with good reason. But if perfect intelligence and perfect integrity could ever have failed to meet the obligations incurred, the loss would have been distributed through all the community.

And here I encounter a difficulty in making

myself understood, which arises from no fault of mine, I think, and from no fault of yours, nor from any defect inherent in the English language. It comes from a quality which lies in the nature of all things, from the fact which the word "Evolution" expresses. Once men knew just what they meant by money, some time they will know again; now they do not know. Changes are taking place in society and in our ideas; and one word acquires amid the process many meanings. I can give you an example of such a change of meaning in the word "tangent." It was once a Latin word and meant any thing whatever that touched any other thing. But it is not with that old and vague meaning that I am concerned. It is with three or four meanings which will hardly appear to have anything to do with one another, if you are not familiar with these matters. 1. A tangent is a line which just touches a curve. 2. A tangent is the quotient of one leg of a right triangle by the other. 3. A tangent is the sum of the following infinite series:

$$x + \frac{2}{3!}x^3 + \frac{16}{5!}x^5 + \frac{272}{7!}x^7 +$$

4. A tangent is $\dfrac{e^{ix} - e^{-ix}}{i\left(e^{ix} + e^{-ix}\right)}$

Now all these different meanings and others besides are the result of sliding the word tan-

gent from one thing to another thing which had been found to be implied in the former. Each successive meaning is harder to grasp than the preceding. It is this shifting of the meaning of words, this extension, this spiritualization of their signification, that is merely the counterpart of a mental growth that does not proceed at the same rate in all minds. Human affairs are undergoing great changes, and human minds are changing to correspond with them. Money is the word bandied to and fro; but hardly two of the disputants are using it in the same sense or are aware of its many meanings. The last meaning may be the simplest, and yet, paradoxical as it seems, may be harder to make intelligible to one who has not thought about these things than were the earlier views. To this meaning, then, or to each and everyone of the instances of this meaning, let me give the name "money." But what meaning, you ask; what is it that you are talking about? You made a long digression to tell us what we all knew before, that words change their meanings; and now you talk about a something or other that you propose to name money. Oh, yes, words change their meaning. I was not trying to illustrate so trivial a truth as that. They change their meaning in the minds of thinking men in a certain definite way, so that the new meaning

is a something singled out from the old meaning as being all that was essential for the purpose we had in view; it drops superfluities. That is what I wanted to say, and I wish to show that the new meaning I give to money is a meaning implied in every other meaning of the word, a meaning that will remain when others have been abandoned, a meaning toward which the world has been slowly moving for centuries and is at length approaching. I call money then "a trustworthy promise to give certain specified goods or services at some sufficiently definite time." This invisible promise, rendered reliable by the condition, as respects integrity and intelligence, of the mind in which it exists, by the resources, corporeal or material, of the mind that makes it—this invisible promise, I say, is that by which the greater part of exchanges are effected.

"Well, this is a great discovery," laughs some one, "what we have always called credit, you propose to call money!" Perhaps I am in the wrong, but watch me and see. In the unreal community I was describing, every person that received goods or services, either gave goods and services immediately in return or gave his promise to be ready with goods and services at some future time. The only way in which he could get anything, was by giving something in exchange there and then,

or promising to give something in exchange at some other moment. Now I say he bought either with goods or with money, and that there is no other conceivable way of getting anything (excepting of course gift and theft). What you object to is the use of the word money in this sense. It seems strange, forced, unnecessary. So do some of the uses of the word tangent I instanced seem to a country surveyor; those who have done all his thinking for him in advance and supplied him with the ideas of which he makes practical application, have not been of that opinion. The higher the intelligence, the virtue and the ability, the better does the mere mutually understood promise suffice to effect all the exchanges of goods and services that the community wants to make. In default of intelligence or virtue or ability, more precautions have to be taken, securities given for the return of the goods and services or their equivalent, there must be witnesses, hostages, ceremonies, documents, oaths—yes, you may add all the machinery of courts of justice, police forces, armies and governments. At the one extreme is the actual delivery of the very thing required in return for the article given or the service performed; at the other extreme is the mere promise manifested in any intelligible way. At the one extreme the invisible money; at

the other, barter, no money, because the condition for the intervention of money does not exist. The interval between these is filled in two ways: by visible promises, that is, by some scrap of record; and by guarantees of requital. Bills, bank-notes, checks, book-accounts, store-orders are such scraps of record. Precious stones, gold, silver and such things are guarantees of requital; articles left in pawn, as it were, that they might be exchanged for the necessary food and clothing and shelter when these were not forthcoming or likely to be forthcoming on demand. We know how these scraps of record, these promises, often did not promise the very article or articles that would be wanted, but promised some other thing as gold or silver instead; we know that these guarantees of requital came to be regarded as the requital itself. The story has been told a thousand times how their desirability, their divisibility, their durability made them media of exchange. But the process of their introduction was not so simple as the imagination of our hasty reconstructors of the past is wont to depict it.

While on the one hand the pawns or pledges have been sliding into the place of the actual requital, so that he who proferred gold in requital could not be compelled to furnish anything else, on the other hand the promises

to requite had a growth of their own. That rude voucher of a promise made, the tally, has constituted the circulating medium of many a village community, nay, even of great states. The king's commission that gave the husbandman a tally for the appropriated cattle or grain, knew that it might pass through many hands before it should be presented at the exchequer in payment of taxes. We have then at an early time these two so-called moneys: on the one hand the visualized, recognizable, transferable promise; on the other hand the appropriated or confiscated pledge or pawn.

We have now four aspects of money and money's worth and money's sign, which may be exhibited in a diagram; though it is doubtful whether all minds are assisted by diagrams, the mere schemes and outlines of the realities of the world.

Promise, on
gold or silver.

Pawn or pledge
as security.

Things desired. } B.

A. Things desired.

Promise of
things desired. } B.

Promise of gold
or silver.

Promise, on
leather, wood, paper.

There are then other stages still, other aspects of this process of effecting the interchange of commodities and services when time must intervene between receiving and requiting.

When the pawn or pledge had become established as the final requital itself; the promise, on the one hand, came to specify, not the things ultimately desired, but the pawned gold or silver or precious stones or whatever else it might be that would bring their possessors the things they wanted; and, on the other hand, the gold and the silver came to be used as the material on which the promise was written.

When a thing has as many attributes as a piece of silver, attributes too that can be discerned, not by merely gazing on the silver-piece, but by the intellect alone; why should we wonder at the variety of views and expressions, the misapprehensions and half-apprehensions of those who cannot be expected to have any more distinct comprehension of sociological processes than they have of the processes going on in their own minds and bodies. This piece of silver is a commodity, can supply, that is, some ultimate want; it is a security for future requital; it is a written promise of future payment; it is a promissory note written on material that costs

half the face of the note; it has sometimes been forced by a sovereign on his subjects who are bidden to accept it at his own valuation. A curious state of affairs enough. But do you not see that in the minds of the disputants in private and in public the old and the new are contending for the mastery? the usages and the habits of centuries and the requirements of utterly changed conditions? We are coming to see that the essential thing, when exchanges are not effected by barter, is the reliable promise. Trustworthy promises, continually made and fulfilled, are the real money of the community; and in the corporations, in the boards of trade, in places where commerce flourishes, there are even in our reviled and execrated days more trustworthy promises than were to be found in the councils of the great ecclesiastical organizations of the past, if history describes their transactions with any accuracy. The satisfactory evidence of a reliable promise will exchange for merchandise as readily as merchandise will exchange for merchandise; and millions of exchanges are effected in civilized countries by means of acknowledgments of indebtedness. Their use is extending as rapidly as the nature of men's minds will permit. If the reliable promise is the essential thing, surely no very bulky or expensive article is needed

as the sign, the token, the expression of the promise. A promise written on leather, if the promise is reliable, is as good as one written on gold or silver; but if I have any misgiving about your willingness or your ability to deliver what you promise, I think I should like to have you write it on something which would exchange elsewhere if you should not fulfill your promise, for as much as you promise to give me. I have ventured to apply the term money to the reliable promise itself. If the burden of its meaning could be shifted there, if it could be made plain that this is what is essential, then all the propositions into which the word money enters would be habitually contemplated in a different light, and the relations of banks and governments to money would not be understood as implying that men whom you would not trust to manage a bank are competent to create money. But to-day the word money is not limited to the promise itself; it is applied to certain evidences of such a promise; it is applied to the material thing which guarantees the performance of the promise; it is applied to a material thing that is consumed, a commodity.

An oversight has been made in depicting the early interchange and distribution of commodities. Economists have represented barter

as the primitive fact, the original form of transfer; but they knew that earlier than that was force that not only compelled men to surrender the products of their industry, but obliged them to accept in return whatever the stronger party was pleased to give. This survives to-day in civilized communities and in great states. There was another form of transfer—fraud. This is still practiced. There was another form; namely, the bestowal of presents, in the hope that some return for them would be made in time of need. This also remains. Barter too continues among us, and every day great exchanges of property for property are being made without the intervention of any so-called money.

In the midst of all this stood the sovereign once, the actual, living, breathing, frowning, smiling, fighting, fondling sovereign; and interfered right and left, for good and bad; arrogated to himself the right to make or annul promises, to prescribe exchange-ratios, to decree what should be adequate pawns or securities for promises. The sovereign may have gone, but sovereignty remains, at least in the minds of those who see things through the medium of abstractions; and learned judges deduce thence a justification for substituting scraps of record for material guarantees of payment, justification for confounding

under the same denomination things that should be kept distinct in thought and practice. But we are in the boyhood, if not in the infancy of civilization; and we call ourselves civilized merely because our barbarisms are enacted on a larger scale and by indirect methods.

But manhood is upon us and we are struggling toward the conviction that commodities are not needed to effect the exchange of commodities; that no one substance like silver and gold need be diverted from the thousands of uses for which it might be employed to serve merely as a medium for exchange. Let silver and gold vanish from the earth and the producers of goods would continue to exchange what they make for what they want; certificates of indebtedness, tokens of ownership in houses, lands, mills, chattels of all kinds, would then as now pass from hand to hand in liquidation of claims. Or let silver and gold become so abundant that stones in New England are not more so, still the business of the world would go on, subject to great inconveniences, indeed, so long as men should lack intelligence and integrity, but when men should have acquired those two qualities, go on as well as if silver and gold still existed or had never become worthless. In fact by the progress of virtue and intelli-

gence, the precious metals are destined to be eliminated from the monetary systems of the world. He who sees that all the business and trade and industry and commerce of the world, call it what you will, all the great and small exchanges and distributions, are effected by barter and by honest promises—by goods, that is, and by money—will see in silver now as he may expect to see in gold hereafter, a material too valuable to write notes on and not valuable enough to serve as a guarantee for their payment.

Some Origins of the Number Two

SOME ORIGINS OF THE NUMBER TWO

When was Two discovered or invented, or won by some process which was neither, or a blending of both? Surely before a dozen, a score or a hundred were known. Its emergence in the mind of the beast-man antedated written and even spoken language. Are there to-day animals other than man that see a Two as Two? There are men, civilized men, who have never conceived Two in all its abstractness, in all its generality, in all its independence. For beasts and savages and most of their descendants the Like and the Unlike are touches, tastes, smells, odors, colors and temperatures; and only a few have forced on them the consideration of shapes, sizes, distances, of the more or less of this and that. One heap or series or pile or mass was larger than another, they might be aware; but exact comparison would hardly be made till men had to make it. Before Two could appear, some such notions were present as are all too definitely expressed by our many, few, more, less, some.

Our school-bred generation thinks of the symbols, *two*, *deux*, *duo*, *zwei*, or more often,

of 2, rather than of the idea or conception or phenomenon or reality, or whatever it may be that we are now seeking the origin of.

The likeness one man is conscious of, another cannot discern, though the things are before his eyes, and the likeness, says the former, "plain as day." There are tribes that have names for a couple, a brace, a pair, a yoke, a span, a deuce; but no name, like *two* for what is common to all these, no consciousness of that kind of resemblance in them.

Salutary inability to generalize, to burst the bonds that time and place and circumstance have imposed on us! Note in what precisely this inability consists. We who have seen the likeness over and over again, who have named it, and named things as having this likeness, forget that there must have been for a long time an utter lack of interest in these aspects of things; how does Two concern even you independently of other considerations? We are hardly aware how feeble the beginnings of memory must be; how frequently an experience must be repeated before it can be recalled. Weakness of imagination, the inability to present to one's self what is distant or different, is one feature of the slow growth of perceptions. One consciousness excludes another, and a wide survey of particulars is impossible. Fanciful and irrelevant general-

izations are easy and common enough in the first stages of existence; but they exclude relevant and exemplifiable generalizations from the minds of philosophers of to-day; witness the many attempts to find analogies between conceptions of metaphysicians and misapprehended mathematics. It is hard for man to generalize; it is harder for him to abstract. Even when he is beginning to discern what there is common to his eyes, his cheeks, his hands, his lips, his feet, his ears; even when the glimmer of a sense is slowly emerging that all these things, amid all their unlikenesses, have something in which they are alike; even then he can only think of this something in terms of his own experience. To call up Two to the minds of his fellows, as to his own, he points to the lips, the eyes, to a cleft stick. He learns very gradually to drop off the non-essentials, and to find out what the non-essentials are. He cannot as yet see that all the really important and useful elements of the idea, are present in these dots or specks (. .), even here mixed with much that is extraneous. No; when he thinks Two, long after he has attained the general conception, he can include under it, assimilate to it, only the most concrete phenomena. All his Twos are blue or yellow, sweet or sour, alive or dead; they are even virtuous or

vicious, perishable or eternal. He has not extricated his conception from the bewildering eddyings of the matter in which it is immersed. Even we who try to think Two with a minimum of representation, cannot think it without some representation, though it be but two points flung at random in space; that is, if we think it, or attempt to think it. We use it a great deal without thinking it at all.

Here then is a fact altogether noteworthy. After men had struggled for ages to gain this very useful conception, for useful in the course of time it had become,—after they had given it a name and a symbol; after they had discerned many of its properties and relations to other numbers—there were trained a class of men whose thoughts had to be concentrated on the symbol, never diverted to the thing it stood for. Rather let me say (for the symbol is itself a thing): When it had been found out that one thing always went with another thing (as 2 with . .), they turned their attention to one of these things and withdrew it from the other. There are thousands of accountants and calculators who have no occasion from one year's end to another to pay any heed to what their numerals stand for. They manipulate numerals and figures, and not only manipulate them with fingers and pen, but turn them over in their minds, thinking no more of the

numbers than a calculating-machine in which metal numerals are sliding and rolling to and fro. Why, children might be taught, children have been taught, to perform numeral addition, numeral subtraction, and many other processes of pure calculation with symbols in mind or on paper, without as much as being made to suspect that they implied numbers at all or the relations of numbers.

Such substitutive signs, as they have been called, are of very great utility. Skill in their employment can be acquired only by attending in early life to their relations to one another, apart from their relation to the things for which they are substituted. Such absorption of the mind in one of two related sets of things has sometimes been unduly reprobated. We need great calculators, expert accountants, rapid cipherers. For the services that these render a large contingent must be trained till the practice of their art becomes their chief pleasure; and yet it is not the training for those who are to do other things.

But let us return to our number. While this Two was getting himself established amid curious concretions and limitations, with looks very different from those of his purified and refined successor of to-day, Three and Four were also growing into view and not Three and Four alone. For these things re-act on

one another. When a few have gained a solid footing, others are soon assembled around them. Some comparisons must have been made, some relations discerned among them, even while they were in process of development. There was thus a network, an interaction of Twos and Fours and Fives; a body of truths which must have seemed something wonderful to savage minds, if savage minds ever wonder. When was the great truth beheld for the first time, I do not say established, that two stones and two stones are four stones? You fancy that four could not have been named without thinking of Twos. You can tell at a glance the number of stones in a small heap, yet you cannot tell without careful examination, how many a heap has in it that is only a little larger. You see the number of the small heap apparently as readily as you see any aspect of it. It would perhaps be hard to persuade you that anyone ever experimented to find whether the result would be changed by taking another set of stones or changing the arrangement of them, whether indeed two and two sticks would behave in this respect like two and two stones. "Experiment" and "sticks" and "stones" and "two" itself are all too definite terms with which to describe the movements of nascent intelligence. These words did not

then exist nor the classifications they denote with all their manifold implications. Multitudes of sensations (though "sensation" is itself too definite a word) must have occurred in ever varied combinations before even a stick or a stone, to say nothing of a Two, was distinguishable.

The processes of addition, subtraction, and so forth, mean to most of us "figuring" either in our head, as we say, or on paper; but these processes were once, were for a long time, are even now over most of the earth, processes that involve muscular exertion and the moving and grouping of external objects. There was the process of aggregation, the process of bringing a flock together to be counted. It must have been a long step in advance when it was perceived that a man might go from field to field, dropping a pebble into a pouch for every sheep, and get the correct result by counting the pebbles. But this talk of flocks, fields and pebbles is a mere travesty of the actual process, which does not admit of any brief description.

Two ones, two twos, two threes, and so on, one two, two twos, three twos and the like must have been often thought of and talked of before this way of thinking and speaking found philosophers to puzzle. How could the same thing be at one and the same time both

one and not one, or both two and not two; or how could it be called at once one and two? But the one and the two of the workers and investigators and scientists were not the one and the two of the philosophers. The worlds accordingly went on their way undisturbed by the difficulties that the philosopher tried to open their eyes to. Those engaged in buying and selling, in measuring and counting, in the use of numbers, were not troubling themselves with the search after the Real Two, the Essentially Existent Two, the Beingly Being Two, and the Real One, the Essentially Existent One, the Beingly Being One; but such things the philosopher cared for.

Twos then had become known and used. Stones and sticks, things animate as well as things inanimate, things of all kinds, had slowly revealed an aspect common to them all, that everywhere among them were Twos. A symbol was found for a Two; the same symbol was used for each and every Two. This symbol all but dislodged, from some minds at least, the thing it stood for, till it seemed to these minds that the two itself did not exist or was not necessary; somewhat as bills and cheques have replaced gold and silver. But the philosopher was not to be cheated in that way, he was not to be paid with words and signs. He started out in search of the Real

One and the Real Two. He could not help doing this. His thought was not so much more developed than that of his fellows as they both perhaps supposed. He simply asked himself questions which others were too busy to ask, for one reason; and he often went round and round in one spot, asking his question over and over again from mere force of habit. It is often so when new generalizations come into view. I do not mean those pulpit and platform generalizations which re-state resemblances which have been known and named for ages; but those generalizations which involve hidden and hitherto unperceived resemblances. What was the philosopher's question?

These apples are Two; there are Two trees; here are Two stones; these pencils are Two. Now the Two that is in the apples is not their color or scent or shape or size or taste; and yet it must be something—else why call the apples Two? It must be a reality; for the apples may change and decay and wither, but Two abides. Even if the apples perish utterly, are we to suppose that Two perishes with them? Might we but find out what this Two really is! Surely it is not to be discerned with bodily eyes. Is the Two in the stones, the same as the Two in the apples, or is it a distinct Two? Can there be as many really

existent Twos as there are transitory, perishable and material Twos? And what can be their relation to one another and to the Twos of the sensible world? Or is there only one Really Existent Two that pervades and permeates all the perceivable Twos? How are these questions to be answered? But a worse entanglement remains. May not the mind be deceived and merely fancy that it beholds the Real Two amid the Twos of sense, or apart from them, mistaking for the reality some adumbration and reflection thereof? some dream or vision or memory? Through sense, through imagination, through intellect, we may rise higher and higher to a purer, a more real and permanent Two; but are we sure that we have reached the Two in itself, by itself? the Two from which all other Twos (so-called) derive the property of being Two by being participants in the nature of the Ideal-Real? With his mind fixed on Two's unchanging clime, how he despised those Twos of the ordinary man's experience. It was The Two that he worshipped, not this Two and that Two. Was not this most excellent fooling? or was it unfathomable wisdom? Both views are still entertained. I have used the word "number" as if Two had always been a number, as if it had always been recognized as such. To many of the ancients one was not

a number, nor were there such things as fractional numbers, as our school-books define them, nor any incommensurable numbers (incommensurable quantities indeed) still less negative and imaginary and complex numbers—nothing but positive integers greater than one. It seems that it took centuries for Two to get recognized as belonging even to this grade of numbers, or rather for the resemblances between Two and Three and Four and Five and the rest to be discerned.

It was long debated for what reason, on what ground, Two was called a number, what property or properties it had to entitle it to rank as such. Resemblances had been felt, convenience had been consulted, names had been given, inconsistencies had been introduced, difficulties had been encountered—that Two appeared when a stick was laid by another; and when a stick was severed, Two likewise appeared. This something or other, no one could tell what, that was meant when Two was called a number, what else should it be, the philosopher opined, but the Really Existent Number, of whose nature the Really Existent Two partook in some mysterious way, not unlike that perhaps in which the Twos of sense had the Really Existent Two totally and simultaneously present in each and all of them, being, for instance, wholly

present in each of the six Twos that are found in four.

This explanation of the considerations that justified the placing of Two among the numbers, was unintelligible to some; but those who understand it or revere it, find that it renders impossible any other solution—undesirable at any rate, if not impossible.

The word "Two" comes of an ancient race with many kindred dispersed through many lands; but where the family originated or with what humbler meanings they consorted in their beginnings it is difficult to ascertain. With regard to the descent of its fellow, the character "2," many plausible conjectures have been made. But the histories of "Two" and "2" might never have been, or been very different, without affecting the number Two. This is any one of the pairs of which we are in any way conscious; this is all of them; this is what is common to them all; this is something abstracted from them all, existing either alone by itself, or in some mind, or not existing at all but in its symbol, or existing in some utterly inconceivable way; this has been forgotten, and "2" alone thought of. But the number Two, the numeral adjective or substantive or pronoun Two, the numeric symbol 2, are already discerned by some to be on the way to yet further changes, and likely to

become associated with something as different from each as each is from the other. We who are not mathematicians can only behold these transformations from afar.

Tantae molis erat Binorum condere gentem.

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