

LANGUAGE, THOUGHT, and REALITY
SELECTED WRITINGS OF **BENJAMIN LEE WHORF**

Copyright © 1956, by The Massachusetts Institute of Technology

FOREWORD

He grasped the relationship between human language and human thinking, how language indeed can shape our innermost thoughts. We are thus introduced to a new principle of relativity, which holds that all observers are not led by the same physical evidence to the same picture of the universe, unless their linguistic backgrounds are similar, or can in some way be calibrated.

Indo-European languages can be roughly calibrated—English, French; German, Russian, Latin, Greek, and the rest; but when it comes to Chinese, Maya, and Hopi, calibration, says Whorf, is structurally difficult if not impossible. Speakers of Chinese dissect nature and the universe differently from Western speakers. A still different dissection is made by various groups of American Indians, Africans, and the speakers of many other tongues.

Whorf was a profound scholar in the comparatively new science of linguistics. One reason why he casts so long a shadow, I believe, is that he did not train for it. He trained for chemical engineering at M.I.T., and thus acquired a laboratory approach and frame of reference. The work in linguistics was literally wrung out of him. Some driving inner compulsion forced him to the study of words and language—not, if you please, the mastery of foreign languages, but the why and how of language, any language, and its competence as a vehicle for meaning.

Linguistics, he boldly proclaims, "is fundamental to the theory of thinking, and in the last analysis to all human sciences." He is probably right. Every considerable advance in science, such as quantum theory, involves a crisis in communication. The discoverers have to explain first to themselves, and then to the scientific world, what has been found.

Whorf as I read him makes two cardinal hypotheses: First, that all higher levels of thinking are dependent on language. Second, that the structure of the language one habitually uses influences the manner in which one understands his environment. The picture of the universe shifts from tongue to tongue.

Language, observes Whorf, is the best show man puts on. Other creatures have developed rough communication systems, but no true language. Language is cardinal in rearing human young, in organizing human communities, in handing down the culture from generation to generation. Huxley goes so far as to venture that adaptation through the culture, depending, of course, on language, may be displacing the biological processes of evolution.

The power to reason constitutes the "uniqueness of man," to philosophers as well as biologists.

Perhaps driving a car furnishes a good analogy for Whorf's initial hypothesis. Light waves and sound waves are enough to guide the driver's hand on the wheel along straight roads. But threading his way through a cloverleaf intersection, or reading a road map, will require a good deal more than reflex action. The first, a very clever chimpanzee might learn to do; the second is forever beyond it.

Aristotle invented the syllogism, and fashioned his Three Laws of Thought, beginning with the Law of Identity, A is A, now and forever—against which we semanticists sometimes protest.

The Greeks took it for granted that back of language was a universal, uncontaminated essence of reason, shared by all men, at least by all thinkers. Words, they believed, were but the medium in which this deeper effulgence found expression. It followed that a line of thought expressed in any language could be translated without loss of meaning into any other language.

This view has persisted for 2500 years, especially in academic groves. Whorf flatly challenges it in his second major hypothesis. "A change in language," he says, "can transform our appreciation of the Cosmos."

Whorf - Language, Thought and Reality

If there is thus some difficulty among Western peoples, all speaking varieties of Indo-European, it is not surprising that a much wider chasm yawns between languages from wholly different stocks—between the language of Hopi Indians, say, and English. This is the field which Whorf cultivated intensively, and on which he largely bases his concept of linguistic relativity.

The thoughts of a Hopi about events always include both space and time, for neither is found alone in his world view. Thus his language gets along adequately without tenses for its verbs, and permits him to think habitually in terms of space-time. Properly to understand Einstein's relativity a Westerner must abandon his spoken tongue and take to the language of calculus. But a Hopi, Whorf implies, has a sort of calculus built into him.

"The formal systematization of ideas in English, German, French, or Italian seems poor and jejune"—in dealing with certain classes of phenomena, when contrasted with the flexibility and directness of Amerindian languages.

Both languages have been developed over the ages, largely unconsciously, to meet the experiences and problems of their speakers, and we cannot call one higher or more mature than the other.

For, while human societies vary widely in their supply and consumption of artifacts, the human mind, reflected in language, shows no examples of primitive functioning. . . . "American Indian and African languages abound in finely wrought, beautifully logical discriminations about causation, action, result, dynamic or energetic quality, directness of experience, all matters of the function of thinking, indeed the quintessence of the rational."

There is no one metaphysical pool of universal human thought. Speakers of different languages see the Cosmos differently, evaluate it differently, sometimes not by much, sometimes widely. Thinking is relative to the language learned. There are no primitive languages.

Somewhere along the line it may be possible to develop a real international language. Some day all peoples will use language at capacity, and so think much straighter than we now do.

Stuart Chase

INTRODUCTION

It may come as a surprise to some that Whorf's interest in linguistics stemmed from one in religion. The reader may incidentally be reminded of the considerable connection which has long existed between linguistic and religious enterprises—the philological work represented in the Septuagint, in Ulfilas's creation of the written Gothic into which he could translate the Bible, in the study of hundreds of non-European languages by missionaries in the seventeenth and eighteenth centuries, and in the thoroughly scientific investigations being carried out by contemporary linguistic missionaries. Whorf, however, was not interested in any translation of the Bible, at least not in any ordinary sense; he seriously believed that fundamental human and philosophical problems could be solved by taking a new sounding of the semantics of the Bible.

John B. Carroll

ON THE CONNECTION OF IDEAS

I have not been able to find a term that I need to denote a kind of connection or relation, approximation, closeness, allied character, between ideas. The only psychological term I know of that expresses connection between ideas is "association," but this has quite a definite meaning and one that will not do for the meaning I have in mind. The "connection" of ideas, as I call it in the absence of any other term, is quite another thing from the "association" of ideas. In making experiments on the connecting of ideas, it is necessary to eliminate the "associations," which have an accidental character not possessed by the "connections." The subject must not jump at the first idea that comes to mind as in a "free association" experiment; hence the experiment might be considered a form of "controlled association"; yet it may be quite "free" in its own sphere, for any connection may be permitted.

Whorf - Language, Thought and Reality

"Connection" is important from a linguistic standpoint because it is bound up with the communication of ideas. One of the necessary criteria of a connection is that it be intelligible to others, and therefore the individuality of the subject cannot enter to the extent that it does in free association, while a correspondingly greater part is played by the stock of conceptions common to people. The very existence of such a common stock of conceptions, possibly possessing a yet unstudied arrangement of its own, does not yet seem to be greatly appreciated; yet to me it seems to be a necessary concomitant of the communicability of ideas by language; it holds the principle of this communicability, and is in a sense the universal language, to which the various specific languages give entrance.

So, in further definition of this concept of connection, it may be said that connections must be intelligible without reference to individual experiences and must be immediate in their relationship. Mediate connections, i.e., connections through the medium of other connections, are to be called rather chains or paths of connection, or possibly "communications."

Hence I concluded either that an unpleasant past really had colored his way of thinking, or that he wished to pose as somewhat of a misanthrope or cynic, or that he had been reading psychoanalysis: that in any case we had to do here with something personal, which was indeed an association yet not a connection.

This is an interesting commentary on the inability to distinguish theory from fact in what is learned, even in an exceptionally intelligent student. (Or perhaps especially in such a one? That is, if intelligent means quick to learn, perhaps it also means receptive and hence too credulous?)

ON PSYCHOLOGY

Psychology has developed a field of research that may no doubt be useful or valuable in itself, but it throws little or no light on problems of the normal human mind or soul.

The person who wishes to understand more fully the laws and, so to speak, topography, of the inner or mental life is as much thrown back on his own difficultly acquired store of wisdom and his native judgments, intuitions, sympathies, and common sense as though the science of psychology did not exist. Such a one, for instance, is the teacher, educator, sociologist, anthropologist, trainer, coach, salesman, preacher, manager, diplomat, executive: anyone who must deal with human intangibles, especially the man concerned in leadership of any sort. If he seeks aid from books, he will get far more information about this field from literature not intended to be scientific, that is, from the best works of the novelists, playwrights, and poets, than he will from any textbook of psychology.

There are certain courses that psychology has elected to follow that have estranged it, perhaps permanently, from the truly mental field.

First, the "old school" of experimental laboratory psychology has rather definitely assumed the character of a branch of physiology. Its findings and their value all redound back to physiology. It is undoubtedly valuable to the student of mental phenomena to know the mechanisms of the body, but rather in the character of auxiliary information than anything else; and knowledge about the oxidation of the blood and the details of brain and nerve responses, sense perceptions, and association times are equally of this character. Moreover, one is impressed (and depressed) by the appalling sterility of the vast mass of minutiae that this science accumulates, and the dearth of integrating principles.

Whorf - Language, Thought and Reality

Second, the school of behaviorism has begun to appear in its true character as simply the old experimental psychology over again in a more pick-and-shovel aspect. That it is in many ways an improvement on the old school and has enlarged our understanding in certain fields I personally believe. It has been of service by teaching us to think more in terms of behavior, but, when all is said and done, it can teach us little that is new. It has shown us how behavior may be conditioned by physical means, but along much the same lines that we already knew although they have been more systematically explained. It has become apparent that we may "condition" either with or against the cooperation of truly psychic considerations. This we already knew, but we are particularly interested in "conditioning" with the cooperation of and in accordance with the particular laws of the psychic. No doubt the same process of stimulus and response "conditions" a man into being a scientist or a maniac, a leader of men or a nervous wreck, a good workman or one who cannot hold a job, an inspiring helper or a resentful cog in the machine; but behaviorism does not show us which lines to work upon in order to be really in accord with human intangibles, except by way of announcing in behavioristic terms things already obvious to common sense.

Gestalt psychology does seem to me to have discovered an important truth about mind, the importance of configurations in the mental domain. At the same time the Gestalt psychologists have their hands full with the manifold mechanical, experimental, and personal data required to develop this large subject, most of which data are chiefly valid on the animal level. When we attempt to apply the configurative principle to the understanding of human life, we immediately strike the cultural and the linguistic (part of the cultural), especially the latter, as the great field par excellence of the configurative on the human level.

Here the Gestalt psychologists let the matter drop. They have neither the time nor the linguistic training required to penetrate this field; moreover their ideas and terminology inherited from the old laboratory psychology are a liability rather than an asset.

Psychoanalysis is the one school that really deals with mental material, and it sometimes gets results, but it works only in the sphere of the abnormal and the deranged, and it is becoming evident that the abnormal is not the key to the normal. Moreover, it is so resolute in its determination to deal with intangibles that it shows almost a contempt for the external world and strays continually into the realms of phantasm. It is too heavily stamped with the signature of its founder, Freud, an erratic genius with a faculty of apperceiving deep but obscure truths, and is notion-obsessed and cluttered with weird dogma. As an empirical tool for the clinic it may serve for a while, but I do not see how it can possibly be a means for the careful scientific scrutiny of the normal mind.

One fact that stands out to a detached viewpoint, but is not stressed by any of the schools, is the great and perhaps basic importance of the principle we denote by the word "meaning." Meaning will be found to be intimately connected with the linguistic: its principle is symbolism, but language is the great symbolism from which other symbolisms take their cue.

AN AMERICAN INDIAN MODEL OF THE UNIVERSE"

I find it gratuitous to assume that a Hopi who knows only the Hopi- language and the cultural ideas of his own society has the same notions, often supposed to be intuitions, of time and space that we have, and that are generally assumed to be universal. In particular, he has no general notion or intuition of time as a smooth flowing continuum in which everything in the universe proceeds at an equal rate, out of a future, through a present, into a past; or, in which, to reverse the picture, the observer is being carried in the stream of duration continuously away from a past and into a future.

At the same time, the Hopi language is capable of accounting for and describing correctly, in a pragmatic or operational sense, all observable phenomena of the universe. Hence, I find it gratuitous to assume that Hopi thinking contains any such notion as the supposed intuitively felt flowing of "time," or that the intuition of a Hopi gives him this as one of its data.

Just as it is possible to have any number of geometries other than the Euclidean which give an equally perfect account of space configurations, so it is possible to have descriptions of the universe, all equally valid, that do not contain our familiar contrasts of time and space. The relativity viewpoint of modern physics is one such view, conceived in mathematical terms, and the Hopi Weltanschauung is another and quite different one, nonmathematical and linguistic.

Whorf - Language, Thought and Reality

Yet, if mystical be perchance a term of abuse in the eyes of a modern Western scientist, it must be emphasized that these underlying abstractions and postulates of the Hopian metaphysics are, from a detached viewpoint, equally (or to the Hopi, more) justified pragmatically and experientially, as compared to the flowing time and static space of our own metaphysics, which are au fond equally mystical. The Hopi postulates equally account for all phenomena and their interrelations, and lend themselves even better to the integration of Hopi culture in all its phases.

The metaphysics underlying -our own language, thinking, and modern culture (I speak not of the recent and quite different relativity metaphysics of modern science) imposes upon the universe two grand cosmic FORMS, space and time; static three-dimensional infinite space, and kinetic one-dimensional uniformly and perpetually flowing time—two utterly separate and unconnected aspects of reality (according to this familiar way of thinking). The flowing realm of time is, in turn, the subject of a threefold division: past, present, and future.

A LINGUISTIC CONSIDERATION OF THINKING IN PRIMITIVE COMMUNITIES

The ethnologist engaged in studying a living primitive culture must often have wondered: "What do these people think? How do they think? Are their intellectual and rational processes akin to ours or radically different?" But thereupon he has probably dismissed the idea as a psychological enigma and has sharply turned his attention back to more readily observable matters. And yet the problem of thought and thinking in the native community is not purely and simply a psychological problem. It is quite largely cultural. It is moreover largely a matter of one especially cohesive aggregate of cultural phenomena that we call a language.

One of the clearest characterizations of thinking is that of Carl Jung, who distinguishes four basic psychic functions: sensation, feeling (Gefühl), thinking, and intuition. It is evident to a linguist that thinking, as defined by Jung, contains a large linguistic element of a strictly patterned nature, while feeling is mainly nonlinguistic, though it may use the vehicle of language, albeit in a way quite different from thinking.

Thinking may be said to be language's own ground, whereas feeling deals in feeling values which language indeed possesses but which lie rather on its borderland. These are Jung's two rational functions, and by contrast his two irrational functions, sensation and intuition, may fairly be termed nonlinguistic. They are, it is true, involved in the processes of talking, hearing, and understanding, but only in an infinitesimal part of their entire range. We are thus able to distinguish thinking as the function which is to a large extent linguistic.

The linguistic side of silent thinking, thinking without speaking, is of a nature as yet little appreciated. Silent thinking is basically not suppressed talking or inaudibly mumbled words or silent laryngeal agitations as some have supposed. Such an explanation merely appears plausible to the linguistically unsophisticated "common sense" view. "Common sense" is unaware that talking itself means using a complex cultural organization, just as it is unaware of cultural organizations in general.

From this point of view many preliterate ("primitive") communities, far from being subrational, may show the human mind functioning on a higher and more complex plane of rationality than among civilized men. We do not know that civilization is synonymous with rationality. These primitive tribes may simply have lacked philosophers, the existence of whom may depend on an economic prosperity that few cultures in the course of history have reached.

Or perhaps too much rationality may defeat itself, or arouse some strong compensatory principle. These are all questions, essentially anthropological, to which a liaison between ethnology and psychological linguistics would seem to offer the soundest approach.

The second way in which linguistic consideration of thinking is significant for anthropology has more reference to the future, and perhaps most of all to the far distant future of the human species when it will have developed into something other, and let us hope far higher, than present-day man. Turning first to the nearer future, it is desirable that anthropology collaborate in preparation for the time, which cannot be too far postponed, when it will be both possible and urgent- necessary to make the cultural and psychological world-survey of languages that is envisioned in the work of James Byrne—this time in a way which will enrich our science with the prodigal wealth of new truth that lies in that field waiting to be discovered.

Whorf - Language, Thought and Reality

Every language of course seems simple to its own speakers because they are unconscious of structure.

The complex structure of English is largely covert, which makes it all the harder to analyze. Foreigners learning English have to absorb it unconsciously—a process requiring years—by dint of constant exposure to bombardment by spoken English in large chunks; there exists at this moment no grammar that can teach it.

We see here the error made by most people who attempt to deal with such social questions of language—they naively suppose that speech is nothing but a piling up of lexations, and that this is all one needs in order to do any and every kind of rational thinking; the far more important thought materials provided by structure and configurative rapport are beyond their horizons. It may turn out that the simpler a language becomes overtly, the more it becomes dependent upon crypto-types and other covert formations, the more it conceals unconscious presuppositions, and the more its lexations become variable and indefinable.

Man is distinguished from other animals by language, and by his great development of thinking. So far as we can envision his future, we must envision it in terms of mental growth. We cannot but suppose that the future developments of thinking are of primary importance to the human species.

The evolutionary concept, having been dumped upon modern man while his notions of language and thought were based on knowledge of only a few types out of the hundreds of very diverse linguistic types existing, has abetted his provincial linguistic prejudices and fostered the grandiose hokum that his type of thinking and the few European tongues on which it is based represent the culmination and flower of the evolution of language!

The relatively few languages of the cultures which have attained to modern civilization promise to overspread the globe and cause the extinction of the hundreds of diverse exotic linguistic species, but it is idle to pretend that they represent any superiority of type. On the contrary, it takes but little real scientific study of preliterate languages, especially those of America, to show how much more precise and finely elaborated is the system of relationships in many such tongues than is ours. By comparison with many American languages, the formal systematization of ideas in English, German, French, or Italian seems poor and jejune.

Does the Hopi language show here a higher plane of thinking, a more rational analysis of situations, than our vaunted English? Of course it does. In this field and in various others, English compared to Hopi is like a bludgeon compared to a rapier.

THE RELATION OF HABITUAL THOUGHT AND BEHAVIOR TO LANGUAGE

Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society; It is quite an illusion to imagine that one adjusts to reality essentially without the use of language and that language is merely an incidental means of solving specific problems of communication or reflection.

The fact of the matter is that the "real world" is to a large extent unconsciously built up on the language habits of the group. ... We see and hear and otherwise experience very largely as we do because the language of our community predispose certain choices of interpretation.

-Edward Sapir

Whorf - Language, Thought and Reality

My analysis was directed toward purely physical conditions, such as defective wiring, presence or lack of air spaces between metal flues and woodwork, etc., and the results were presented in these terms. Indeed it was undertaken with no thought that any other significances would or could be revealed. But in due course it became evident that not only a physical situation *t/ucz* physics, but the meaning of that situation to people, was sometimes a factor, through the behavior of the people, in the start of the fire. And this factor of meaning was clearest when it was a linguistic meaning, residing in the name or the linguistic description commonly applied to the situation. Thus, around a storage of what are called "gasoline drums," behavior will tend to a certain type, that is, great care will be exercised; while around a storage of what are called "empty gasoline drums," it will tend to be different—careless, with little repression of smoking or of tossing cigarette stubs about. Yet the "empty" drums are perhaps the more dangerous, since they contain explosive vapor. Physically the situation is hazardous, but the linguistic analysis according to regular analogy must employ the word 'empty,' which inevitably suggests lack of hazard.

Such examples, which could be greatly multiplied, will suffice to show how the cue to a certain line of behavior is often given by the analogies of the linguistic formula in which the situation is spoken of, and by which to some degree it is analyzed, classified, and allotted its place in that world which is "to a large extent unconsciously built up on the language habits of the group." And we always assume that the linguistic analysis made by our group reflects reality better than it does.

GRAMMATICAL PATTERNS AS INTERPRETATIONS OF EXPERIENCE

The work began to assume the character of a comparison between Hopi and western European languages. It also became evident that even the grammar of Hopi bore a relation to Hopi culture, and the grammar of European tongues to our own "Western" or "European" culture. And it appeared that the interrelation brought in those large subsummations of experience by language, such as our own terms 'time,' 'space,' 'substance,' and 'matter.' Since, with respect to the traits compared, there is little difference between English, French, German, or other European languages with the possible (but doubtful) exception of Balto-Slavic and non-Indo-European, I have lumped these languages into one group called SAE, or "Standard Average European."

GESTALT TECHNIQUE OF STEM COMPOSITION IN SHAWNEE

A discovery made by modern configurative or Gestalt psychology gives us a canon of reference for all observers, irrespective of their languages or scientific jargons, by which to break down and describe all visually observable situations, and many other situations, also. This is the discovery that visual perception is basically the same for all normal persons past infancy and conforms to definite laws, a large number of which are fairly well known. It is impossible here to do more than touch on these laws, but they bring out clearly that the basal fact of visual perception is the relation of figure and ground, that perceptions are largely in the nature of outlines, contrasted more or less with the grounds, fields, and fillings of outlines, and that perception of motion or action is figural in type, or connected with the perception of at least a vague outline quality.

The facts may differ slightly; the laws are the same for all. If the perceptual influences are such as to cause one normal person to see a definite outline, they will cause all other normal persons to see the same outline. For example, all people see the constellation Ursa Major as the outline which we call dipper-shaped, though they may not call it a dipper or have such a utensil in their culture, and though there are, of course, no lines connecting the stars into this or any other outline.

I have found this Gestalt method of describing referents and situations of so much service toward understanding puzzling points of languages, as different in viewpoints as English, Hopi, Aztec, and Maya,

DECIPHERMENT OF THE LINGUISTIC PORTION OF THE MAYA HIEROGLYPHS

The Maya were the only fully literate people of the aboriginal American world. The buildings and monuments of stone that they left are covered with their writings—writings of which little has yet been read except the dates with which they begin. Moreover, they wrote many books and manuscripts, and three such books of fairly late period have been preserved.

Whorf - Language, Thought and Reality

It may surprise many to know that, in the codices, the nonmathematical, linguistic signs outnumber the mathematical ones by more than a hundred to one (not counting repetitions of the same sign). So much for the belief that the Maya writings are mainly mathematical.

The linguistic scholar is interested in a text as the monument of a language arrested and preserved at a certain point of time. He is not primarily interested in the subject matter of the text, as either history, folklore, religion, astronomy, or whatnot, but in its linguistic form, which to him is the supreme interest of interests. From this proceeds his type of objectivity, an earnest that his reading will not be affected by theories concerned with the content of the writing. He puts aside content to concentrate on linguistic form.

SCIENCE AND LINGUISTICS

The familiar saying that the exception proves the rule contains a good deal of wisdom, though from the standpoint of formal logic it became an absurdity as soon as "prove" no longer meant "put on trial." The old saw began to be profound psychology from the time it ceased to have standing in logic. What it might well suggest to us today is that, if a rule has absolutely no exceptions, it is not recognized as a rule or as anything else; it is then part of the background of experience of which we tend to remain unconscious.

Never having experienced anything in contrast to it, we cannot isolate it and formulate it as a rule until we so enlarge our experience and expand our base of reference that we encounter an interruption of its regularity. The situation is somewhat analogous to that of not missing the water till the well runs dry, or not realizing that we need air till we are choking.

For instance, if a race of people had the physiological defect of being able to see only the color blue, they would hardly be able to formulate the rule that they saw only blue. The term blue would convey no meaning to them, their language would lack color terms, and their words denoting their various sensations of blue would answer to, and translate, our words "light, dark, white, black," and so on, not our word "blue." In order to formulate the rule or norm of seeing one blue, they would need exceptional moments in which they saw other colors.

The phenomenon of gravitation forms a rule without exceptions; needless to say, the untutored person is utterly unaware of any law of gravitation, for it would never enter his head to conceive of a universe in which bodies behaved otherwise than they do at the earth's surface.

Like the color blue with our hypothetical race, the law of gravitation is a part of the untutored individual's background, not something he isolates from that background.

... our psychic makeup is somehow adjusted to disregard whole realms of phenomena that are so all-pervasive as to be irrelevant to our daily lives and needs.

Natural logic contains two fallacies: First, it does not see that the phenomena of a language are to its own speakers largely of a background character and so are outside the critical consciousness and control of the speaker who is expounding natural logic.

Second, natural logic confuses agreement about subject matter, attained through use of language, with knowledge of the linguistic process by which agreement is attained: i.e., with the province of the despised (and to its notion superfluous) grammarian.

One of them, A, can give directions that will be carried out by the other, B, to A's complete satisfaction. Because they thus understand each other so perfectly, A and B, as natural logicians, suppose they must of course know how it is all done. They think, e.g., that it is simply a matter of choosing words to express thoughts. If you ask A to explain how he got B's agreement so readily, he will simply repeat to you, with more or less elaboration or abbreviation, what he said to B. He has no notion of the process involved. The amazingly complex system of linguistic patterns and classifications, which A and B must have in common before they can adjust to each other at all, is all background to A and B.

Scientific linguists have long understood that ability to speak a language fluently does not necessarily confer a linguistic knowledge of it, i.e., understanding of its background phenomena and its systematic processes and structure, any more than ability to play a good game of billiards confers or requires any knowledge of the laws of mechanics that operate upon the billiard table.

Whorf - Language, Thought and Reality

All real scientists have their eyes primarily on background phenomena that cut very little ice, as such, in our daily lives; and yet their studies have a way of bringing out a close relation between these unsuspected realms of fact and such decidedly foreground activities as transporting goods, preparing food, treating the sick, or growing potatoes, which in time may become very much modified, simply because of pure scientific investigation in no way concerned with these brute matters themselves.

Whenever agreement or assent is arrived at in human affairs, and whether or not mathematics or other specialized symbolisms are made part of the procedure, *this agreement is reached by linguistic processes, or else it is not reached.*

As we have seen, an overt knowledge of the linguistic processes by which agreement is attained is not necessary to reaching some sort of agreement, but it is certainly no bar thereto; the more complicated and difficult the matter, the more such knowledge is a distinct aid, till the point may be reached—I suspect the modern world has about arrived at it—when the knowledge becomes not only an aid but a necessity.

The situation may be likened to that of navigation. Every boat that sails is in the lap of planetary forces; yet a boy can pilot his small craft around a harbor without benefit of geography, astronomy, mathematics, or international politics. To the captain of an ocean liner, however, some knowledge of all these subjects is essential.

When linguists became able to examine critically and scientifically a large number of languages of widely different patterns, their base of reference was expanded; they experienced an interruption of phenomena hitherto held universal, and a whole new order of significances came into their ken. It was found that the background linguistic system (in other words, the grammar) of each language is not merely a reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock in trade.

Formulation of ideas is not an independent process, strictly rational in the old sense, but is part of a particular grammar, and differs, from slightly to great, between different grammars. We dissect nature along lines laid down by our native languages.

The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds—and this means largely by the linguistic systems in our minds.

We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way—an agreement that holds throughout our speech community and is codified in the patterns of our language.

The agreement is, of course, an implicit and unstated one, but its terms are absolutely OBLIGATORY; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees.

This fact is very significant for modern science, for it means that no individual is free to describe nature with absolute impartiality but is constrained to certain modes of interpretation even while he thinks himself most free.

We are thus introduced to a new principle of relativity, which holds that all observers are not led by the same physical evidence to the same picture of the universe, unless their linguistic backgrounds are similar, or can in some way be calibrated.

Whorf - Language, Thought and Reality

This rather startling conclusion is not so apparent if we compare only our modern European languages, with perhaps Latin and Greek thrown in for good measure. Among these tongues there is a unanimity of major pattern which at first seems to bear out natural logic. But this unanimity exists only because these tongues are all Indo-European dialects cut to the same basic plan, being historically transmitted from what was long ago one speech community; because the modern dialects have long shared in building up a common culture; and because much of this culture, on the more intellectual side, is derived from the linguistic backgrounds of Latin and Greek. Thus this group of languages satisfies the special case of the clause beginning "unless" in the statement of the linguistic relativity principle at the end of the preceding paragraph. From this condition follows the unanimity of description of the world in the community of modern scientists. But it must be emphasized that "all modern Indo-European-speaking observers" is not the same thing as "all observers."

That modern Chinese or Turkish scientists describe the world in the same terms as Western scientists means, of course, only that they have taken over bodily the entire Western system of rationalizations, not that they have corroborated that system from their native posts of observation.

When Semitic, Chinese, Tibetan, or African languages are contrasted with our own, the divergence in analysis of the world becomes more apparent; and, when we bring in the native languages of the Americas, where speech communities for many millenniums have gone their ways independently of each other and of the Old World, the fact that languages dissect nature in many different ways becomes patent.

That American Indians speaking only their native tongues are never called upon to act as scientific observers is in no wise to the point. To exclude the evidence which their languages offer as to what the human mind can do is like expecting botanists to study nothing but food plants and hothouse roses and then tell us what the plant world is like!

It will be found that an "event" to us means "what our language classes as a verb" or something analogized therefrom. And it will be found that it is not possible to define 'event, thing, object, relationship,' and so on, from nature, but that to define them always involves a circuitous return to the grammatical categories of the definer's language.

The Hopi actually call insect, airplane, and aviator all by the same word, and feel no difficulty about it. The situation, of course, decides any possible confusion among very disparate members of a broad linguistic class, such as this class (FC-B). This class seems to us too large and inclusive, but so would our class 'snow' to an Eskimo. We have the same word for falling snow, snow on the ground, snow packed hard like ice, slushy snow, wind-driven flying snow—whatever the situation may be. To an Eskimo, this all-inclusive word would be almost unthinkable; he would say that falling snow, slushy snow, and so on, are sensuously and operationally different, different things to contend with; he uses different words for them and for other kinds of snow.

What surprises most is to find that various grand generalizations of the Western world, such as time, velocity, and matter, are not essential to the construction of a consistent picture of the universe. The psychic experiences that we class under these headings are, of course, not destroyed; rather, categories derived from other kinds of experiences take over the rulership of the cosmology and seem to function just as well.

Thus the universe can be described without recourse to a concept of dimensional time.

A fair realization of the incredible degree of diversity of linguistic system that ranges over the globe leaves one with an inescapable feeling that the human spirit is inconceivably old; that the few thousand years of history credited by our written records are no more than the thickness of a pencil mark on the scale that measures our past experience on this planet; that the events of these recent millenniums spell nothing in any evolutionary wise, that the race has taken no sudden spurt, achieved no commanding synthesis during recent millenniums.

but has only played a little with a few of the linguistic formulations and views of nature bequeathed from an inexpressibly longer past.

LINGUISTICS AS AN EXACT SCIENCE

Whorf - Language, Thought and Reality

The revolutionary changes that have occurred since 1890 in the world of science—especially in physics but also in chemistry, biology, and the sciences of man—have been due not so much to new facts as to new ways of thinking about facts.

The new facts themselves of course have been many and weighty; but, more important still, the realms of research where they appear—relativity, quantum theory, electronics, catalysis, colloid chemistry, theory of the gene, Gestalt psychology, psychoanalysis, unbiased cultural anthropology, and so on—have been marked to an unprecedented degree by radically new concepts, by a failure to fit the world view that passed unchallenged in the great classical period of science, and by a groping for explanations, reconciliations, and restatements.

I say new ways of thinking about facts, but a more nearly accurate statement would say new ways of talking about facts. It is this use of LANGUAGE UPON DATA that is Central to scientific progress.

Of course, we have to free ourselves from that vague innuendo of inferiority which clings about the word 'talk,' as in the phrase 'just talk'; that false opposition which the English-speaking world likes to fancy between talk and action. There is no need to apologize for speech, the most human of all actions. The beasts may think, but they do not talk. 'Talk' OUGHT TO BE a more noble and dignified word than 'think.' Also we must face the fact that science begins and ends in talk;

Such words as 'analyze, compare, deduce, reason, infer, postulate, theorize, test, demonstrate' mean that, whenever a scientist does something, he talks about this thing that he does.

As I was concerned to point out in a previous article, "Science and linguistics," in the Review for April, we all hold an illusion about talking, an illusion that talking is quite untrammelled and spontaneous and merely "expresses" whatever we wish to have it express. This illusory appearance results from the fact that the obligatory phenomena within the apparently free flow of talk are so completely autocratic that speaker and listener are bound unconsciously as though in the grip of a law of nature. The phenomena of language are background phenomena, of which the talkers are unaware or, at the most, verily dimly aware—as they are of the motes of dust in the air of a room, though the linguistic phenomena govern the talkers more as gravitation than as dust would.

These automatic, involuntary patterns of language are not the same for all men but are specific for each language and constitute the formalized side of the language, or its "grammar"—a term that includes much more than the grammar we learned in the textbooks of our school days.

From this fact proceeds what I have called the "linguistic relativity principle," which means, in informal terms, that users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world.

Thus the world view of modern science arises by higher specialization of the basic grammar of the Western Indo-European languages. Science of course was not CAUSED by this grammar; it was simply colored by it. It appeared in this group of languages because of a train of historical events that stimulated commerce, measurement, manufacture, and technical invention in a quarter of the world where these languages were dominant.

The participants in a given world view are not aware of the idiomatic nature of the channels in which their talking and thinking run, and are perfectly satisfied with them, regarding them as logical inevitables. But take an outsider, a person accustomed to widely different language and culture, or even a scientist of a later era using somewhat different language of the same basic type, and not all that seems logical and inevitable to the participants in the given world view seems so to him.

Whorf - Language, Thought and Reality

Consider the answers that were at one time given even by learned men to questions about nature: Why does water rise in a pump? Because nature abhors a vacuum. Why does water quench fire? Because water is wet or because the fiery principle and the watery principle are antithetical. Why do flames rise? Because of the lightness of the element fire. Why can one lift a stone with a leather sucker? Because the suction draws the stone up. Why does a moth fly toward a light? Because the moth is curious or because light attracts it. If once these sentences seemed satisfying logic, but today seem idiosyncrasies of a peculiar jargon, the change did not come about because science has discovered new facts. Science has adopted new linguistic formulations of the old facts, and, now that we have become at home in the new dialect, certain traits of the old one are no longer binding upon us.

The researches of linguists into the ways of languages many and diverse are needed if we are to think straight and escape the errors which unconscious acceptance of our language background otherwise engenders. An increasing contribution from linguistics to the general philosophy of science is demanded by the new ways of thinking implied by those new realms of science cited at the beginning of this essay. It is needed for science's next great march into the unknown.

LANGUAGES AND LOGIC

The Indo-European languages and many others give great prominence to a type of sentence having two parts, each part built around a class of word—substantives and verbs—which those languages treat differently in grammar. As I showed in the April 1940 Review, this distinction is not drawn from nature; it is just a result of the fact that every tongue must have some kind of structure, and those tongues have made a go of exploiting this kind. The Greeks, especially Aristotle, built up this contrast and made it a law of reason. Since then, the contrast has been stated in logic in many different ways: subject and predicate, actor and action, things and relations between things, objects and their attributes, quantities and operations.

We are constantly reading into nature fictional acting entities, simply because our verbs must have substantives in front of them. We have to say 'It flashed' or 'A light flashed,' setting up an actor, 'it' or 'light,' to perform what we call an action, "to flash." Yet the flashing and the light are one and the same! The Hopi language reports the flash with a simple verb, rehpi: 'flash (occurred).' There is no division into subject and predicate, not even a suffix like -t of Latin tona-t 'it thunders.' Hopi can and does have verbs without subjects, a fact which may give that tongue potentialities, probably never to be developed, as a logical system for understanding some aspects of the universe.

For this reason I believe that those who envision a future world speaking only one tongue, whether English, German, Russian, or any other, hold a misguided ideal and would do the evolution of the human mind the greatest disservice.

Western culture has made, through language, a provisional analysis of reality and, with out correctives, holds resolutely to that analysis as final. The only correctives lie in all those other tongues which by aeons of independent evolution have arrived at different, but equally logical, provisional analyses.

LANGUAGE, MIND, AND REALITY

It needs but half an eye to see in these latter days that science, the Grand Revelator of modern Western culture, has reached, without having intended to, a frontier. Either it must bury its dead, close its ranks, and go forward into a landscape of increasing strangeness, replete with things shocking to a culture-trammeled understanding, or it must become, in Claude Houghton's expressive phrase, the plagiarist of its own past.

The frontier was foreseen in principle very long ago, and given a name that has descended to our day clouded with myth. That name is Babel. For science's long and heroic effort to be strictly factual has at last brought it into entanglement with the unsuspected facts of the linguistic order. These facts the older classical science had never admitted, confronted, or understood as facts. Instead they had entered its house by the back door and had been taken for the substance of Reason itself.

What we call "scientific thought" is a specialization of the western Indo-European type of language, which has developed not only a set of different dialects, but actually a set of different dialects, these dialects ARE NOW becoming MUTUALLY UNINTELLIGIBLE.

Whorf - Language, Thought and Reality

The term 'space' for instance, does not and cannot mean the same thing to a psychologist as to a physicist. Even if psychologists should firmly resolve, come hell or high water, to use "space" only with the physicist's meaning, they could not do so, any more than Englishmen could use in English the word 'sentiment' in the meanings which the similarly spelled but functionally different French utterance *le sentiment* has in its native French.

Every language and every well-knit technical sublanguage incorporates certain points of view and certain patterned resistances to widely divergent points of view. This is especially so if language is not surveyed as a planetary phenomenon, but is as usual taken for granted, and the local, parochial species of it used by the individual thinker is taken to be its full sum.

These resistances not only isolate artificially the particular sciences from each other; they also restrain the scientific spirit as a whole from taking the next great step in development—a step which entails viewpoints unprecedented in science and a complete severance from traditions.

This view implies that what I have called patterns are basic in a really cosmic sense, and that patterns form wholes, akin to the Gestalten of psychology, which are embraced in larger wholes in continual progression. Thus the cosmic picture has a serial or hierarchical character, that of a progression of planes or levels. Lacking recognition of such serial order, different sciences chop segments, as it were, out of the world, segments which perhaps cut across the direction of the natural levels, or stop short when, upon reaching a major change of level, the phenomena become of quite different type, or pass out of the ken of the older observational methods.

First, the plane "below" the strictly linguistic phenomena is a physical, acoustic one, phenomena wrought of sound waves; then comes a level of patterning in rippling muscles and speech organs, the physiological-phonetic plane; then the phonemic plane, patterning that makes a systematic set of consonants, vowels, accents, tones, etc. for each language; then the morphophonemic plane in which the "phonemes" of the previous level appear combined into "morphemes" (words and sub-words like suffixes, etc.); then the plane of morphology; then that of the intricate, largely unconscious patterning that goes by the meaningless name of syntax; then on to further planes still, the full import of which may some day strike and stagger us.

The idea, entirely unfamiliar to the modern world, that nature and language are inwardly akin, was for ages well known to various high cultures whose historical continuity on the earth has been enormously longer than that of Western European culture. In India, one aspect of it has been the idea of the mantram and of a mantric art.

On the simplest cultural level, a mantram is merely an incantation or primitive magic, such as the crudest cultures have. In the high culture it may have a different, a very intellectual meaning, dealing with the inner affinity of language and the cosmic order. At a still higher level, it becomes "Mantra Yoga." Therein the mantram becomes a manifold of conscious patterns, contrived to assist the consciousness into the noumenal pattern world—whereupon it is "in the driver's seat." It can then SET the human organism to transmit, control, and amplify a thousandfold forces which that organism normally transmits only at unobservably low intensities.

We do not think of the designing of a radio station or a power plant as a linguistic process, but it is one nonetheless. The necessary mathematics is a linguistic apparatus, and, without its correct specification of essential patterning, the assembled gadgets would be out of proportion and adjustment, and would remain inert.

But the mathematics used in such a case is a specialized formula-language, contrived for making available a specialized type of force manifestation through metallic bodies only, namely, electricity as we today define what we call by that name. The mantric formula-language is specialized in a different way, in order to make available a different type of force manifestation, by repatterning states in the nervous system and glands—or again rather in the subtle "electronic" or "etheric" forces in and around those physical bodies. Those parts of the organism, until such strategic patterning has been effected, are merely "innocent gadgets," as incapable of dynamic power as loose magnets and loose wires, but IN THE PROPER PATTERN they are something else again—not to be understood from the properties of the unpatterned parts, and able to amplify and activate latent forces.

Whorf - Language, Thought and Reality

We must find out more about language. Already we know enough about it to know it is not what the great majority of men, lay or scientific, think it is. The fact that we talk almost effortlessly, unaware of the exceedingly complex mechanism we are using, creates an illusion. We think we know how it is done, that there is no mystery; we have all the answers. Alas, what wrong answers! It is like the way a man's uncorrected sense impressions give him a picture of the universe that is simple, sensible, and satisfying, but very wide of the truth.

Consider how the world appears to any man, however wise and experienced in human life, who has never heard one word of what science has discovered about the Cosmos. To him the earth is flat; the sun and moon are shining objects of small size that pop up daily above an eastern rim, move through the upper air, and sink below a western edge; obviously they spend the night somewhere underground. The sky is an inverted bowl made of some blue material. The stars, tiny and rather near objects, seem as if they might be alive, for they "come out" from the sky at evening like rabbits or rattlesnakes from their burrows, and slip back again at dawn. "Solar system" has no meaning to him, and the concept of a "law of gravitation" is quite unintelligible—nay, even nonsensical. For him bodies do not fall because of a law of gravitation, but rather "because there is nothing to hold them up"—i.e., because he cannot imagine their doing anything else. He cannot conceive space without an "up" and "down" or even without an "east" and "west" in it. For him the blood does not circulate; nor does the heart pump blood; he thinks it is a place where love, kindness, and thoughts are kept. Cooling is not a removal of heat but an addition of "cold"; leaves are green not from the chemical substance chlorophyll in them, but from the "greenness" in them. It will be impossible to reason him out of these beliefs. He will assert them as plain, hard-headed common sense; which means that they satisfy him because they are completely adequate as a system of communication between him and his fellow men. That is, they are adequate linguistically to his social needs, and will remain so until an additional group of needs is felt and is worked out in language.

But as this man is in conception of the physical universe, of whose scope and order he has not the faintest inkling, so all of us, from rude savage to learned scholar, are in conception of language.

Natural man, whether simpleton or scientist, knows no more of the linguistic forces that bear upon him than the savage knows of gravitational forces. He supposes that talking is an activity in which he is free and untrammelled. He finds it a simple, transparent activity, for which he has the necessary explanations.

But these explanations turn out to be nothing but statements of the needs that impel him to communicate. They are not germane to the process by which he communicates. Thus he will say that he thinks something, and supplies words for the thoughts "as they come." But his explanation of why he should have such and such thoughts before he came to utter them again turns out to be merely the story of his social needs at that moment. It is a dusty answer that throws no light. But then he supposes that there need be no light thrown on this talking process, since he can manipulate it anyhow quite well for his social needs. Thus he implies, wrongly, that thinking is an OBVIOUS, straightforward activity, the same for all rational beings, of which language is the straightforward expression.

Actually, thinking is most mysterious, and by far the greatest light upon it that we have is thrown by the study of language. This study shows that the forms of a person's thoughts are controlled by inexorable laws of pattern of which he is unconscious. These patterns are the unperceived intricate systematizations of his own language—shown readily enough by a candid comparison and contrast with other languages, especially those of a different linguistic family.

His thinking itself is in a language—in English, in Sanskrit, in Chinese. And every language is a vast pattern-system, different from others, in which are culturally ordained the forms and categories by which the personality not only communicates, but also analyzes nature, notices or neglects types of relationship and phenomena, channels his reasoning, and builds the house of his consciousness.

If asked to invent forms not already prefigured in the patterment of his language, the speaker is negative in the same manner as if asked to make fried eggs without the eggs!

Whorf - Language, Thought and Reality

We saw in Part I that, in linguistic and mental phenomena, significant behavior (or what is the same, both behavior and significance, so far as interlinked) are ruled by a specific system or organization, a "geometry" of form principles characteristic of each language. This organization is imposed from outside the narrow circle of the personal consciousness, making of that consciousness a mere puppet whose linguistic maneuverings are held in unsensed and unbreakable bonds of pattern. It is as if the personal mind, which selects words but is largely oblivious to pattern, were in the grip of a higher, far more intellectual mind which has very little notion of houses and beds and soup kettles, but can systematize and mathematize on a scale and scope that no mathematician of the schools ever remotely approached.

And now appears a great fact of human brotherhood—that human beings are all alike in this respect. So far as we can judge from the systematics of language, the higher mind or "unconscious" of a Papuan headhunter can mathematize quite as well as that of Einstein; and conversely, scientist and yokel, scholar and tribesman, all use their personal consciousness in the same dim-witted sort of way, and get into similar kinds of logical impasse. They are as unaware of the beautiful and inexorable systems that control them as a cowherd is of cosmic rays. Their understanding of the processes involved in their talk and ratiocination is a purely superficial, pragmatic one, comparable to little Sue Smith's understanding of the radio, which she turns on in such a way as to evoke a bedtime story.

Men even show a strong disposition to make a virtue of this ignorance, to condemn efforts at a better understanding of the mind's workings as "impractical," or as "theories" if the condemner happens to be a yokel, or as "metaphysics" or "mysticism" or "epistemology" if he happens to be wearing the traditionally correct turnout of a scientist.

Because of the systematic, configurative nature of higher mind, the "patternment" aspect of language always overrides and controls the "lexation" (Ndma) or name-giving aspect. Hence the meanings of specific words are less important than we fondly fancy. Sentences, not words, are the essence of speech, just as equations and functions, and not bare numbers, are the real meat of mathematics. We are all mistaken in our common belief that any word has an "exact meaning."

As we have seen, reference is the lesser part of meaning, patternment the greater.

Science, the quest for truth, is a sort of divine madness like love.

And music—is it not in the same category? Music is a quasilanguage based entirely on patternment, without having developed lexation.

Children of course are constantly repatterning, but the pressure of adult example eventually brings their language back to the norm; they learn that Mississippi is not Mrs. Sippy, and the equator is not a menagerie lion but an imaginary line. Sometimes the adult community does not possess the special knowledge needed for correction.

In parts of New England, Persian cats of a certain type are called Coon cats, and this name has bred the notion that they are a hybrid between the cat and the 'coon' (raccoon). This is often firmly believed by persons ignorant of biology, since the stress of the linguistic pattern (animal-name 1 modifying animal-name 2) causes them to "see" (or as the psychologists say "project") objective raccoon quality as located on the body of the cat—they point to its bushy tail, long hair, and so on.

I knew of an actual case, a woman who owned a fine "Coon cat," and who would protest to her friend: "Why, just LOOK at him—his tail, his funny eyes—can't you see it?" "Don't be silly!" quoth her more sophisticated friend. "Think of your natural history! Coons cannot breed with cats; they belong to a different family." But the lady was so sure that she called on an eminent zoologist to confirm her. He is said to have remarked, with unwavering diplomacy, "If you like to think so, just think so." "He was even more cruel than you!" she snapped at her friend, and remained convinced that her pet was the outcome of an encounter between a philandering raccoon and a wayward cat!

Scientific language, being founded on western Indo-European and not on Hopi, does as we do, sees sometimes actions and forces where there may be only states. For do you not conceive it possible that scientists as well as ladies with cats all unknowingly project the linguistic patterns of a particular type of language upon the universe, and see them there, rendered visible on the very face of nature? A change in language can transform our appreciation of the Cosmos.

Whorf - Language, Thought and Reality

All this is typical of the way the lower personal mind, caught in a vaster world inscrutable to its methods, uses its strange gift of language to weave the web of Maya or illusion, to make a provisional analysis of reality and then regard it as final.

Western culture has gone farthest here, farthest in determined thoroughness of provisional analysis, and farthest in determination to regard it as final. The commitment to illusion has been sealed in western Indo-European language, and the road out of illusion for the West lies through a wider understanding of language than western Indo-European alone can give.

Again, through this sort of understanding of language is achieved a great phase of human brotherhood. For the scientific understanding of very diverse languages—not necessarily to speak them, but to analyze their structure—is a lesson in brotherhood which is brotherhood in the universal human principle—the brotherhood of the "Sons of Manas." It causes us to transcend the boundaries of local cultures, nationalities, physical peculiarities dubbed "race," and to find that in their linguistic systems, though these systems differ widely, yet in the order, harmony, and beauty of the systems, and in their respective subtleties and penetrating analysis of reality, all men are equal.

This fact is independent of the state of evolution as regards material culture, savagery, civilization, moral or ethical development, etc., a thing most surprising to the cultured European, a thing shocking to him, indeed a bitter pill!

But it is true; the crudest savage may unconsciously manipulate with effortless ease a linguistic system so intricate, manifoldly systematized, and intellectually difficult that it requires the lifetime study of our greatest scholars to describe its workings.

Or take the Coeur d'Alene language, spoken by the small Indian tribe of that name in Idaho. Instead of our simple concept of "cause," founded on our simple "makes it (him) do so," the Coeur d'Alene grammar requires its speakers to discriminate (which of course they do automatically) among three causal processes, denoted by three causal verb-forms: (1) growth, or maturation of an inherent cause, (2) addition or accretion from without, (3) secondary addition i.e., of something affected by process 2. Thus, to say "it has been made sweet" they would use form 1 for a plum sweetened by ripening, form 2 for a cup of coffee sweetened by dissolving sugar in it, and form 3 for griddle cakes sweetened by syrup made by dissolving sugar.

If, given a more sophisticated culture, their thinkers erected these now unconscious discriminations into a theory of triadic causality, fitted to scientific observations, they might thereby produce a valuable intellectual tool for science, we could imitate artificially such a theory, perhaps, but we could not apply it, for WE are not habituated to making such distinctions with effortless ease in daily life. Concepts have a basis in daily talk before scientific workers will attempt to use them in the laboratory. Even relativity has such a basis in the western Indo-European languages (and others)—the fact that these languages use many space words and patterns for dealing with time.

There is a universal, *Gefühl*-type way of linking experiences, which shows up in laboratory experiments and appears to be independent of language—basically alike for all persons.

Without a serial or hierarchical order in the universe it would have to be said that these psychological experiments and linguistic experiments contradict each other. In the psychological experiments human subjects seem to associate the experiences of bright, cold, sharp, hard, high, light (in weight), quick, high-pitched, narrow, and so on in a long series, with each other; and conversely the experiences of dark, warm, yielding, soft, blunt, low, heavy, slow, low-pitched, wide, etc., in another long series. This occurs whether the words for such associated experiences resemble or not, but the ordinary person is likely to notice a relation to words only when it is a relation of likeness to such a series in the vowels or consonants of the words, and when it is a relation of contrast or conflict it is passed unnoticed.

The noticing of the relation of likeness is an element in sensitiveness to literary style or to what is often rather inaccurately called the "music" of words. The noticing of the relation of conflict is much more difficult, much more a freeing oneself from illusion, and though quite "unpoetical" it is really a movement toward Higher Manas, toward a higher symmetry than that of physical sound.

Whorf - Language, Thought and Reality

The scientific study of languages and linguistic principles is at least a partial raising of the intellect toward this level. In the understanding of a large linguistic pattern there is involved a partial shift of focus away from the versatile psychic activity. Such understandings have even a therapeutic value. Many neuroses are simply the compulsive working over and over of word systems, from which the patient can be freed by showing him the process and pattern.

Science cannot yet understand the transcendental logic of such a state of affairs, for it has not yet freed itself from the illusory necessities of common logic which are only at bottom necessities of grammatical pattern in Western Aryan grammar; necessities for substances which are only necessities for substantives in certain sentence positions, necessities for forces, attractions, etc. which are only necessities for verbs in certain other positions, and so on.

Science, if it survives the impending darkness, will next take up the consideration of linguistic principles and divest itself of these illusory linguistic necessities, too long held to be the substance of Reason itself.