

BELIEF AND FAITH IN SCIENCE¹

Analysts of the scientific scene observe that psychologists are remiss in studying such important types of cognitive behavior as belief and faith, though they are of the greatest importance as bases for understanding hypotheses and postulates. What appears most remarkable about such behavior is the continuity, indeed similarity, of their performance as between laymen and scientists, especially when palpable fallacies are involved. It is the purpose of the following comments to bring to light the conditions whereby belief and faith behavior which perpetuate many fallacies in science are prolonged to the detriment of research. It is suggested that such conditions center about the origin and protraction of cognitive institutions.

Psychologists, especially those specializing in the study of cultural events, may well find it important to study the continuity of belief and faith behavior among scientists and nonscientists in the important situations bordering the realms of knowledge and ignorance. For it is obvious how much general intellectual and scientific progress is impeded by the fallacious thinking which is attributable to the perpetuation of institutions of belief and faith. While the analysis of the conditions that foster this intellectual continuity is an interdisciplinary responsibility, the psychologist versed in the study of complex behavior may contribute to the understanding and alleviation of this obnoxious situation.

Now it is pertinent to specify briefly what sort of behavior belief and faith are. Belief is a probabilistic form of intellectual attitude or stance which corresponds to a type of stimulation frequently only sparingly available to the reacting individual. In this sense, believing behavior contrasts with perceiving behavior in which the reacting individual is more definitely in contact with stimulus objects. In perceiving situations there may be little or no ambiguity or uncertainty about the objects interacted with despite the many illusions induced by various setting conditions. Believing behavior segments always involve so much ambiguity that the reactions vary along the dimension of doubt and uncertainty toward positive disbelief and the inhibition of further performance with respect to the stimulus objects involved.

By comparison faith behavior may be looked upon as altogether different from believing behavior inasmuch as direct stimulus objects are not just maximally ambiguous but entirely nonexistent. As such, faith behavior is of a different class from belief behavior. In the latter behavior situation, the stimulus objects may be reacted to either directly or by means of substitute stimulation. Faith reactions obviously always require substitute stimulation. Another way of

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describing faith behavior is to point out that it is a mixed form of reaction not exclusively intellectual but cognitive behavior fortified by affective components.

Obviously, the scope is extremely wide for the performance of belief and faith behavior, as the range of unknown or dimly known things and events is so much greater than that of the known and familiar. The gloom of night is the fertile source of every variety of mysticism and the stimulant for the unbridled verbal creation of innumerable figments of imagination. There loom problems of controlling attitudes and restraining judgment while the search for evidence proceeds. How difficult this is becomes clear when we examine the role of established institutions in hindering such precautionary measures.

Securely ensconced among the general cognitive institutions of all stages of civilization is the inveterate belief in the sacredness of the veiled, the arcane, the unknown. Basic belief institutions are naturally best observed in the religious domain. Sophisticated theologians have always held that a true god is invisible, intangible, unknowable, and inscrutable, all the more so when faith is strong in some inexistent but omniscient and omnipotent personality of power.

From the standpoint of intellectual progress probably the most harmful aspect of this cognitive institution lies in the fallacies it breeds in everyday thinking and in science. A shining example is the agnostic argument that if no one can prove the existence of God, neither can anyone prove the nonexistence of such an entity. The insidious fallacy here is overlooking the palpable fact that both parties of the argument blindly accept a theistic premise which when critically analyzed demolishes both aspects of the argument. The beginning of such an analysis at once brings to light the following crucial questions: What is the source of the original premise? On what ground has it been formulated? What is the credibility of the formulator? What were the conditions attending the formulation? The psychologist would condemn the argument as based not only upon belief which as we will see is an attitude founded on incomplete evidence but also on faith, which rests upon no evidence at all but only upon extraneous factors, for example, some conditions of the formulator or his environment.

What concerns us deeply is the presence and operation of belief and faith institutions in scientific situations. It is the continuity of venerable belief institutions in both everyday and scientific situations that constitutes a fault in modern culture. Though the mystic belief in things may have first developed in the religious domain, it has been carried over into science, where it has proved to be a cor-

rosive element. Into the scientific domain the belief institution has seeped in in the form that what is hypothesized or postulated can only be spoken of but never manipulated or observed. Examples are the "sensations" and "ideas" that are verbally projected into a non-existent frame of reference, "engrams" that are forever to be searched for but never found, and innumerable potentialities that can never be actualized.

That such transparent illogic could pass through the impermeable membrane that divides science from theology may be accounted for on several grounds. First, scientists are persons who have only partially outgrown their early indoctrination into myth and fancy. Persons do not completely cast off traits developed in early life. Again, institutions established in the age of faith constitute a large part of the inevitable cultural heritage. Frequently, thinkers adapt themselves to their institutional molds by weaving about them a veil of defensive gossamer or otherwise modify them to look different though their original structure and potency remains the same. The following paragraphs illustrate the injection into the various sciences of belief attitudes that have originally been instituted under religious auspices.

BELIEF AND FAITH INSTITUTIONS IN THE INORGANIC SCIENCES

A prime example is the postulate of impotence as formulated by the mathematician Sir Edmund Whittaker. While discussing Eddington's principle to the effect that all the quantitative propositions (of physics) may be deduced by logical reasoning from qualitative assertions without benefit from quantitative data derived from observation, the late Edinburgh professor asserted that it is not unreasonable to look forward to a time when the entire science of physics can be deduced by syllogistic reasoning from postulates of impotence (Whittaker, 1952, p. 53). As examples of such postulates Whittaker offers the following negative propositions:

1. Perpetual motion is impossible.
2. It is impossible to set up an electric field in any region of space enclosed by a hollow conductor of any shape or size by changing the outside of the conductor.
3. It is impossible to detect a uniform translatory motion possessed by a system as a whole by means of observation of phenomena taking place within the system.
4. No machine can exist which is capable of converting the heat-energy of surrounding bodies, all at the same temperature as itself, into mechanical energy.
5. When several electrons are present, it is impossible at any instant to assert that a particular one of them is identical with one which has been observed at an earlier instant.

6. It is impossible to measure precisely the momentum of a particle at the same time as a precise measurement of its position is made.

Throughout his discussion Professor Whittaker displays his faith in the intuitive power of the human intellect and the validity of its beliefs. On the plea that he is concerned with theoretical and not with experimental physics, and with the philosophy of science he chooses to espouse, he ignores the inevitable experiences of everyday and scientific observers who have contributed to the drawing of such conclusions. None of the six samples of impotence propositions can be employed as evidence to support any blind faith in authority as against the findings resulting from probing and testing objects and conditions actually encountered. His belief in the efficacy of faith and ignorance as against the labor of investigation was long ago discounted by the epistemology of the Greek physicians as exemplified by the Hippocratean "Life is short and the Art long, the occasion fleeting, experience fallacious, and judgment difficult." Whoever created this aphorism intended it as a leading principle not for creating mystical vagaries but for earnest and perspicuous labor with actual patients. The contrast between the two viewpoints is excellently underlined by Whittaker's comment,

We stand in awe before the thought that the intellectual framework of nature is prior to nature herself—that it existed before the material universe began its history—that the cosmos revealed to us by science is only one fragment in the plan of the Eternal.

Are the postulates of impotency extreme examples? Hardly. Recent literature of physics with its constructs of acausality and indeterminism exhibits views with similar origins and with equally invalid authority.

BELIEF AND FAITH INSTITUTIONS IN THE ORGANIC SCIENCES

The existence and influence of belief institutions are probably more evident in the organic and psychological sciences than in the physiochemical disciplines. This may be accounted for by the easier penetration of ideas of control and guidance into such events as cellular structure, tissue patterns, growth, and adjustment to surroundings. Surely there is indicated here an easier projection of originally theological notions into scientific circles. In the aggregate, the undesirable conventional beliefs of biology are called *vitalism* and manifest themselves in primarily physiological situations, for example, reproduction and behavioral adjustments. Vitalistic views on the whole involve the diremptive polarization of the physical and me-

chanical as against the controlling and ordering principles of a pre-visual intelligence.

In the twentieth century, of course, it is not to be expected that the invisible hand of crude teleology should remain undisguised. And so in the genetic situation the disposing power determines the characteristics of the offspring by transmission of potencies. An obvious untoward intellectual consequence of building hereditary or genetic doctrines on the basis of belief and faith institutions is the emphasis of organic factors as over against the inevitable interacting factors of the environment. The futile and invalid abstractions of *heredity* and *environment* and *nature* and *nature* have arisen from this illegitimate polarization.

Biologists less than physicists and psychologists are given to formulating postulational propositions. However, though it is difficult to set up a system of postulates for reproductive physiology, the task is an easy one for neurophysiology. This is true because neurologists frequently summarize the basic propositions of their biological specialty. Anyone desiring to formulate a set of postulates for neurology can make good use of a broadcast symposium such as Laslett organized in 1950 (Laslett, 1957). It is from this publication that we can compose a postulate system comparable to that of Whitaker for physics:

1. That the brain is the bodily organ of mind we have to accept as an established fact (Sherrington, 1957, p. 2).
2. Aristotle, 2000 years ago, was asking how is the mind attached to the body? We are asking that question still (Sherrington, 1957, p. 4).
3. The brain is responsible for all the complicated things we can do. . . . The part of our picture of the brain which may always be missing is, of course, the part which deals with the the mind, the part which ought to explain how a particular pattern of nerve impulses can produce an idea—or the other way round, how a thought can decide which nerve cells are to come into action (Adrian, 1957, p. 5).
4. Psychology can scarcely get along without coming to terms with the relation of body and mind (Adrian, 1957, p. 6).
5. We know that it takes a few seconds for a memory to be securely fixed in the brain (Adrian, 1957, p. 6).
6. The anatomist is primarily concerned with the brain as the material substratum of mental processes (Le Gros Clark, 1957, p. 12).
7. The mind of a man, like that of an animal for that matter, is something we cannot see or touch or stimulate, it is the faculty which is responsible for that portion of human be-

- haviour which does not seem to be automatic (Penfield, 1957, p. 56).
8. Everyone knows that the mind of a man is something that depends upon the action of the brain. Things are seen, heard, felt, or smelt only when electrical currents are conducted along appropriate nerve tracts to the brain. Problems are worked out by using the brain. A voluntary act is dictated somehow at a high level of organization within the cranial cavity (Penfield, 1957, p. 57).
 9. What is the real relationship of this mechanism to the mind? Can we visualize a spiritual element of different essence capable of controlling this mechanism? When a patient is asked about the movement which he carries out as the result of cortical stimulation, he is never in any doubt about it. He knows he did not will the action. He knows there is a difference between automatic action and voluntary action. He would agree that something else finds its dwelling-place between the sensory complex and the motor mechanism, that there is a switchboard operator as well as a switchboard (Penfield, 1957, p. 64).

The psychologist sees in these neurological propositions the clearest exemplification of belief and faith institutions and their operation. Along with the fervent assertion of the invariable coupling of mind and brain, the emphasis is on ignorance and the total absence of evidence of how such association is possible. Furthermore, there is not a word to indicate the appreciation that the difficulty of explaining the interaction of spatiotemporal cells and tissues with mentality might be owing to the nonexistence of spiritistic entities and powers aside from their verbal representation. The potency of venerable beliefs is manifest from the fact that a great deal of neurological knowledge is accumulating without making anything of the alleged mental any more available than was true in the dim past when it was first invented. A further estimate of the power of belief institutions is to observe how biological scientists assimilate them when they interpret psychological behavior as manifestations of hidden and unknown faculties despite the ready availability of perceiving, feeling, choosing, and manipulating behavior for scientific description and experimentation.

BELIEF AND FAITH INSTITUTIONS IN THE PSYCHOLOGICAL SCIENCES

That the belief and faith institutions of psychology are not merely similar but actually identical to those of biology is not surprising, since psychological events are partially biological. Both sets arise culturally out of the same dualistic matrix. But while physio-

logical students specialize upon the bodily functions, the conventional psychologists brood over the alleged mental functions. The cause-way between the two domains is broad and well trodden. Still it is not difficult to point to belief and faith institutions pertaining particularly to the psychological domain. Since these comments appear in a psychological journal, it is hardly necessary to formulate psychological propositions, yet a few illustrative statements will not be amiss, while at the same time indicating variations of belief as prompted by differences of time and circumstances:

1. Knowledge remains an enigma unless one faces the mysteries of body and mind (Moore, 1939, p. v).
2. The psyche is that which acts in every state of awareness and in the adjustment of the individual to his changing environment (Moore, 1939, p. 4).
3. If there is experience, there must also be someone who experiences; if there is adjustment, there must also be someone who adjusts. That which experiences and adjusts is the psyche (Moore, 1939, p. 4).

These twentieth century propositions clearly point to the earliest belief in the existence of a soul in coordination with a body but now called *psyche*. As we proceed with these comments we observe the shift in belief from a unified entity baptized mind, personality, or self to discrete processes or functions variously referred to as consciousness of a sensory or ideational type, alias experience.

4. We may hold to the faith that ultimately the conscious reality and the physiological reality should merge into a single identity (Boring, 1933, p. 17).
5. Scientific psychology began as introspective psychology, a psychology which has to do with the world of consciousness as distinguished from the physical world (Boring, 1933, p. 17).

It is no trick of rhetoric to point out that the transcendental psychologists realized that it is only faith that can support the belief in mentality as a contrasting domain to the physical world. That faith generates the delusion that experience which is a sum of confrontations with stimulus objects is really psychic substance or process in the guise of Wundtian or Titchnerian "sensations" or Gestaltian "mental structures or patterns." It is metaphysical delusion to transform the qualities and organizations of confrontable things and events into "immediate" or "direct" psychic "experience." The spiritistic philosophy that nourishes the faith in "experience" is well stated in the following propositions:

6. A stone, a plant, a tone, a ray of light are when treated as

natural phenomena objects of mineralogy, botany, physics, etc. Insofar, however, as they are at the same time *ideas*, they are objects of psychology (Wundt 1907, p. 2).

7. Sensory units have acquired names, have become richly symbolic, and are now known to have certain practical uses, while nevertheless they existed as units before any of these further facts were added (Köhler, 1947, p. 139).

Is it not a test of the strength of the belief and faith institutions that the proponents of psychistic views should resort to the semantic dodge that after all sensations, consciousness, or Gestalten are not things *in rerum natura* but just verbal constructions. As a matter of fact, neurophysiologists as well as psychologists fervently believe that mental states or processes are actually experienced when the physiological effects of light reach the brain, as indicated in the following statement:

8. Colored papers and other pigmented surfaces . . . owe their 'color' to the fact that they selectively absorb light, reflecting those waves which, when sensed, yield sensations of color. It is vital that the concept of 'color' be reserved for the sensation. Light, physically speaking, has no color; a color is not a color until it is seen (Geldard, 1953, p. 17).

What is so harmful to scientific theory and practice is the insidious manner in which institutionalized beliefs, after arising in the folklore of certain cultural groups, impose themselves upon scientific workers. How many neurophysiologists or psychologists are aware that the "sensations" and "sensory units" assumed to be parallel to or isomorphic with physiological events are really spiritistic inventions of the early Fathers of the Church? Unless such institutions are known to be established assumptions underived from critical confrontations with things and events, they are treated as occurring data or verified hypotheses. An effective agency in the acceptance and perpetuation of intellectual institutions is to borrow them from presumably more eminent disciples.

SUMMARY

Among the rewards accruing to psychologists who study complex behavior, an outstanding benefit is the information gained about the psychological aspects of scientific events, including psychology itself. A salient example is the observation of how belief and faith impede scientific advancement. This is especially the case when beliefs are institutionalized and consequently carry over from region to region, and across from generation to generation.

Because scientific work consists of reciprocally decreasing the realm of the unknown and increasing the range of the known and

the controlled, it necessarily involves belief and faith. For these modes of behavior consist of intellectual attitudes assumed when the corresponding stimulus objects are ambiguous, partially present, or nonexistent altogether. The burden of the above comments is to indicate the penetration of illegitimate belief and faith institutions into the various domains of science and the obstructive operation of such institutions in the physiochemical, biological, and psychological sciences.

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