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A English mathematician and philosopher, William Kingdon Clifford was born in Exeter, the son of a justice of the peace. At the age of fifteen he went to Kings College, London. There he gained a minor scholarship to Trinity College, Cambridge, to which he went in 1863. He began to exhibit powers of originality in mathematics, publishing a number of mathematical papers during the year in which he first entered Cambridge.

At the university Clifford distinguished himself not only by his intellect but also by his singular character. As one of the most prominent undergraduates, he was soon invited to join the Apostles, an exclusive Cambridge club made up of the twelve most distinguished undergraduates of the time. Here he exhibited some of that breadth of learning and clarity of mind for which he was to be noted all his life. It appears that he was highly concerned about religious questions because he studied Thomas Aquinas and learnedly supported the Catholic position. Later, however, he became an agnostic and turned against religion; Herbert Spencer and Charles Darwin became the most important influences upon his thinking in many areas.

Clifford was elected a fellow of Trinity in 1868. In that year he began the practice of giving public lectures, a source from which most of his published work stems. He participated in a scientific expedition, which was wrecked off the coast of Catania, Sicily. In 1870 he was appointed professor of applied mathematics at University College, London. Soon after, he became a member of the most distinguished intellectual society of the day, the Metaphysical Society, as well as of the London Mathematical Society. Tragically, his life was drawing to a close, for he had contracted tuberculosis. His condition worsened, until by 1878 it was evident that the disease was far advanced. In 1879 he traveled south to try to counteract the disease, but he died on March 3 of that year.

During Clifford's lifetime he published only a textbook on dynamics and some scattered technical and nontechnical papers based on his lectures. It remained for a number of his friends to gather together his work. H. J. S. Smith edited the mathematical papers, F. Pollock the philosophical ones. The young Karl Pearson edited and completed his popular work on science, *The Common Sense of the Exact Sciences*.

Scientific Epistemology

Clifford's philosophical views must be placed within the context of several major influences upon his thought: the Kantian frame in epistemology, the Riemannian frame in geometry, and the Darwinian frame in biology. On the basis of these and other influences, Clifford constructed a scientific epistemology and attempted to construct a scientific metaphysic. A discussion of his epistemology is first in order, since out of it grew his metaphysics. Clifford conceived of knowledge as a biological response to the world. Its structure, therefore, is determined by that adjustment. Nevertheless, any analysis of knowledge as such reveals that within it the form and the content of knowledge are distinguishable from each other. Immanuel Kant believed that he had determined a method to make this distinction in all cases. Clifford, taking his cue from Kant, believed that he too could make this distinction, but in a way that took into account the ultimately biological character of knowledge. He thought that an analysis of the foundations of science, and in particular of the axioms of geometry, would reveal that these axioms are forms of experience in the life of any particular individual. Thus, since the biological adaptation of the race has crystallized three-dimensional Euclidean space, this spatial framework has become the one in which individuals see spatially locatable objects. Clifford went even further in this direction by claiming that such a construction is ultimately a growth of experience which has been transformed into neural capacities. Thus, Clifford conceived of the form-content distinction of knowledge as one relative to the biological development of the race. What is at one time the content of experience is later, through a biological process, transformed into a form of experience.

The principles of geometry and arithmetic serve, for individuals, to structure their experience. They are or correspond to ways in which our sense data are "spatially" or "numerically" organized. Their logical status is therefore closely akin to the one that Kant assigned to them. They are a priori, for no experience is capable of verifying or falsifying them, whereas at the same time they are synthetic, since the predicate term is not contained in the subject term.

Within this framework of thought it is intelligible to discuss Clifford's concrete epistemological ideas. He offered analyses of what might be called (1) perceptual statements, (2) geometric, arithmetical, and even physical principles, and (3) belief statements in general.

perceptual statements

In various essays Clifford offered an analysis of perceptual statements concerning objects, persons, and the spatial aspects of objects and persons. In general, he refused to admit a phenomenalist analysis of such statements. In all cases some ideal conception, be it of "an eject" (a technical term that will be explained later) or of "a form of experience"—in other words, a conception which is not itself definable in terms of a set of sense experiences—enters into the meaning of the statement, either explicitly or implicitly. This is true with the qualification that Clifford sometimes suggested that statements about physical objects are reducible to statements about sense experiences.

geometric, arithmetical, and physical principles

The analysis that Clifford provided of the several kinds of statements differed somewhat from one another, and it would be wise to examine them in sequence. As has already been indicated, the statements of geometry and arithmetic state universal and therefore formal characteristics of experience. In the case of geometric statements, Clifford asserted that they are universally true about the objects of our perceptions, in the sense that all perceptions of spatial relationships must conform to them. Furthermore, they are necessary, since the perceptions compatible with the negations of such statements are impossible. Clifford contended that Kant had established the necessary properties of space by a subjective method, a method of introspection, whereas Clifford attempted to demonstrate such properties by a consideration of the neurological bases of perception. The limits of what is perceptible, given man's neurological structure, were, for Clifford, what is known a priori to the individual, while those perceptions whose contradictions are not imperceivable, again given man's neurological structure, are known a posteriori. Clifford proceeded to demonstrate, to his satisfaction, that at this level of analysis both Euclidean and non-Euclidean space are compatible with the neurological structure of perception, and that it is a matter of the general explicatory value of a geometric theory as to which of the various geometries is to be accepted. Of course, man's neurological structure evolves over time, so that what is necessary at one time is not necessary at another—this indicates that Clifford used the term *necessary,* in this context, in a relative sense.

Clifford's analysis of arithmetical statements differs somewhat from his analysis of geometric statements. He thought that their validity depended upon several factors: (1) the tautological character of certain parts of language, (2) the acceptance of a general principle of the uniformity of nature of the kind that J. S. Mill suggested, and (3) the acceptance of an analysis of arithmetical operations in terms of the physical operation of counting. Numerals are assigned in a one-to-one correspondence with standard sets of objects, each set containing one member more than the preceding set. The operations of addition, multiplication, and, by implication, subtraction and division are next defined in terms of the physical operations of juxtaposition of sets of objects. Clifford then claimed that if the meaning of "distinct objects" were granted, along with the assumption that all objects maintain their identity through space and time (the uniformity of nature), then the laws of arithmetic can be seen to hold for all objects. On the basis of the natural numbers, he sketched the development of the more complex number systems.

Clifford did not have much to say about the status of physical laws and theories, except to suggest that there are some principles of physics that are, like the principles of geometry and arithmetic, rules for the ordering of sense impressions.

belief statements

Clifford's examination of the basis of belief in the natural sciences led him to a more general analysis of belief. Indeed, it was this general analysis of belief and the agnostic and antireligious conclusion to which it led that occasioned great opposition on the part of William James and others. Clifford claimed that no statement is worthy of belief unless all the possible evidence points to the truth of the statement. He recognized that in practice it is impossible to have available all the possible evidence about the truth or falsity of a proposition. Failure of memory, the expenses of collecting information, and a host of other factors contribute to this impossibility. But he claimed that an acceptance of the principle that similar causes have similar effects (another version of the principle of the uniformity of nature) permits our acceptance of many beliefs in cases where the standard of all possible evidence is not met. Such a principle permits an inductive inference from known facts to unknown ones, and thus permits us to make up for evidence we do not possess. These ideas are contained in his essay "The Ethics of Belief," to which James's famous essay "The Will to Believe" is a reply. In that essay James claimed that a belief is worthy of acceptance in some cases where there is no empirical evidence either for or against the content of the belief. And this criterion permitted James to believe in the existence of God.

Scientific Metaphysics

Clifford's epistemological views were the occasion for his speculative metaphysical ideas. He had been wrestling with the problem of whether the existent world is wholly phenomenal in character or whether there are entities of a nonphenomenal character which go to make it up. In earlier essays—for example, "The Philosophy of Pure Sciences"—he inclined toward a purely phenomenalist view, but in his more mature and well-known essay "On the Nature of Things-in-Themselves" he reversed his former stand. Not all existence is phenomenal in character. He was clear, for example, that the ego cannot be analyzed in purely phenomenal terms. Clifford thus postulated the existence of what he termed "ejects" as well as of phenomenal "objects." An eject is distinguished from an object in the following way: An object can be an object of *my* consciousness, an eject is something *outside* my consciousness. Thus, another's ego (and this holds for all persons) is an eject; it is never in my consciousness. Clifford postulated that there are nonpersonal as well as personal entities that are ejects. The elements of ejects are themselves what Clifford called feelings. They are constituents of everything, he claimed, since the fact that there is a continuity of forms in nature gives assurance that, at least to some degree, any entity in nature possesses the same qualities that all others have. Since feelings are elements of consciousness, all entities therefore have this aspect of consciousness to a certain extent, although it is only to more complex entities that we ascribe consciousness. The elementary entities that are called "feelings" were considered by Clifford to be absolute existents and therefore things-in-themselves. Clifford then named these elementary entities mind-stuff, since they participate somehow in the character of the mental. Their necessarily incomplete representation in the mind of man is what is known as the material world. There exists a complex mirroring relation—indeed, Clifford used the image of two reflecting mirrors—between the external world and its representation in knowledge. Thus, Clifford's speculative metaphysic ultimately postulated a Spinozistic world in which the mental and physical are really two different ways of looking at the same world. Another possible interpretation of his thought is that all existence is ultimately infused with a psychic aspect, that is, that panpsychism is the most correct view of reality.

In conclusion, it is worthwhile mentioning several areas of thought in which Clifford was ahead of his time:

(1) Clifford recognized the fact that scientific laws are always "practically inexact." By this notion he wished to point out that a scientific law is never exactly confirmed by the evidence for it but rather is confirmed within the limits of experimental error. A law is accepted on the basis of experimental evidence even if that experimental evidence does not exactly coincide with what, on the basis of deductions from the law, one might expect to be confirming evidence. This is so simply because all measurement of evidence in modern scientific practice involves taking into account errors of measurement, and such errors of measurement must be "factored out" before a definite conclusion is reached as to the relevance of the evidence.

(2) Clifford, in the brief note "On the Space-Theory of Matter," declared himself to be in the geometric tradition that holds that the determination of the truth or falsity of geometrical axioms is empirical. Clifford saw that through a change in the basic assumptions of microgeometry (geometry of the infinitesimally small) he could work out a system of geometry and physics that would clear up the anomalies in physical theory that existed in his day. He saw that a reformulation of microgeometry in non-Euclidean terms could achieve this result, and in this respect he anticipated, at least in part, Albert Einstein's program. He never, however, carried through this program on his own; he merely suggested that such a program was feasible.

(3) Clifford showed the possibility, at least in principle, of constructing a wholly empirical geometry in the following special sense: Geometry is considered to be a set of statements about the relations between geometrical objects such as points, lines, planes, and volumes. These geometrical objects and relations, however, are themselves characterized in a completely empirical way, not as ideal objects, as they are usually characterized in most treatments of geometry. That is, they are identified with the physical objects or aspects of physical objects. The principles of geometry are then empirical statements whose truth or falsity is a matter of observation. This point of view is close to a geometric operationalism. Clifford's account of it is found in his book *The Common Sense of the Exact Sciences*.

See also Darwin, Charles Robert; Einstein, Albert; Epistemology; Geometry; James, William; Kant, Immanuel; Mill, John Stuart; Pearson, Karl; Perception; Thomas Aquinas, St.

Bibliography

For works by Clifford, see *The Common Sense of the Exact Sciences,* edited by Karl Pearson (New York: Appleton, 1885), reissued with a preface by Bertrand Russell and a new introduction by James R. Newman (New York: Dover, 1955); *Lectures and Essays,* edited by F. Pollock, 2 vols. (London: Macmillan, 1879); and *Mathematical Papers,* edited by H. J. Smith (London: Macmillan, 1882).

For literature on Clifford, see George S. Fullerton, *A System of Metaphysics* (New York: Macmillan, 1904), which contains a criticism of Clifford's theory of mind-stuff; and A. S. Eddington, *The Nature of the Physical World* (Cambridge, U.K.: Cambridge University Press, 1929).

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