

**APHORISMS  
CONCERNING IDEAS,  
SCIENCE & THE  
LANGUAGE OF SCIENCE**

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Aphorisms Concerning Ideas, Science & the Language of Science by William Whewell

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**WILLIAM WHEWELL**

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# APHORISMS

CONCERNING

## IDEAS, SCIENCE, AND THE LANGUAGE OF SCIENCE.

BY THE

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*Λαμπάδια ἔχοντες διαδώσωσιν ἀλλήλοις.*

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THE views presented in the following Aphorisms are further developed in the *Philosophy of the Inductive Sciences*.

APHORISMS CONCERNING IDEAS.

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I.

MAN is the Interpreter of Nature, Science the right interpretation.

II.

The *Senses* place before us the *Characters* of the Book of Nature; but these convey no knowledge to us, till we have discovered the Alphabet by which they are to be read.

III.

The *Alphabet*, by means of which we interpret Phenomena, consists of the *Ideas* existing in our own minds; for these give to the phenomena that coherence and significance which is not an object of sense.

IV.

The antithesis of *Sense* and *Ideas* is the foundation of the Philosophy of Science. No knowledge can exist without the union, no philosophy without the separation, of these two elements.

V.

*Fact* and *Theory* correspond to *Sense* on the one hand, and to *Ideas* on the other, so far as we are *conscious* of our *Ideas*: but all facts involve ideas *unconsciously*; and thus the distinction of *Facts* and *Theories* is not tenable, as that of *Sense* and *Ideas* is.

VI.

Sensations and *Ideas* in our knowledge are like *Matter* and *Form* in bodies. *Matter* cannot exist without *Form*, nor *Form*

without Matter : yet the two are altogether distinct and opposite. There is no possibility either of separating, or of confounding them. The same is the case with Sensations and Ideas.

## VII.

Ideas are not *transformed*, but *informed* Sensations ; for without ideas, sensations have no form.

## VIII.

The Sensations are the *Objective*, the Ideas the *Subjective* part of every act of perception or knowledge.

## IX.

General terms denote *Ideal Conceptions*, as a *circle*, an *orbit*, a *rose*. These are not *images* of real things, as was held by the Realists, but conceptions : yet they are conceptions, not bound together by mere *name*, as the Nominalists held, but by an idea.

## X.

It has been said by some, that all Conceptions are merely *states or feelings of the mind*, but this assertion only tends to confound what it is our business to distinguish.

## XI.

Observed Facts are connected so as to produce new truths, by superinducing upon them an Idea : and such truths are obtained by *Induction*.

## XII.

Truths once obtained by legitimate Induction are Facts : these Facts may be again connected, so as to produce higher truths : and thus we advance to *Successive Generalizations*.

## XIII.

Truths obtained by Induction are made compact and permanent by being expressed in *Technical Terms*.



## XIV.

Experience cannot conduct us to universal and necessary truths:—Not to universal, because she has not tried all cases:—Not to necessary, because necessity is not a matter to which experience can testify.

## XV.

Necessary truths derive their necessity from the *Ideas* which they involve; and the existence of necessary truths proves the existence of *Ideas* not generated by experience.

## XVI.

In Deductive Reasoning, we cannot have any truth in the conclusion which is not virtually contained in the premises.

## XVII.

In order to acquire any exact and solid knowledge, the student must possess with perfect precision the ideas appropriate to that part of knowledge: and this precision is tested by the student's *perceiving* the axiomatic evidence of the *axioms* belonging to each *Fundamental Idea*.

## XVIII.

The Fundamental Ideas which it is most important to consider, as being the Bases of the Material Sciences, are the Ideas of *Space*, *Time* (including Number), *Cause* (including Force and Matter), *Outness* of Objects, and *Media* of Perception of Secondary Qualities, *Polarity* (Contrariety), Chemical *Composition* and *Affinity*, *Substance*, *Likeness* and Natural *Affinity*, *Means* and *Ends* (whence the notion of Organization), *Symmetry*, and the Ideas of *Vital Powers*.

## XIX.

The Sciences which depend upon the Ideas of Space and Number are *Pure* Sciences, not *Inductive* Sciences: they do not infer special Theories from Facts, but deduce the conditions of all theory from Ideas. The Elementary Pure Sciences, or Elementary Mathematics, are Geometry, Theoretical Arithmetic and Algebra.

## XX.

The Ideas on which the Pure Sciences depend, are those of *Space* and *Number*; but *Number* is a modification of the conception of Repetition, which belongs to the Idea of *Time*.

## XXI.

The *Idea of Space* is not derived from experience, for experience of external objects presupposes bodies to exist in Space. Space is a condition under which the mind receives the impressions of sense, and therefore the relations of space are necessarily and universally true of all perceived objects. Space is a *form* of our perceptions, and regulates them, whatever the *matter* of them may be.

## XXII.

Space is not a general notion collected by abstraction from particular cases; for we do not speak of *Spaces* in general, but of universal or absolute *Space*. Absolute space is infinite. All special spaces are *in* absolute space, and are parts of it.

## XXIII.

Space is not a real object or thing, distinct from the objects which exist in it; but it is a real condition of the existence of external objects.

## XXIV.

We have an *Intuition* of objects in space; that is, we contemplate objects as *made up* of spatial parts, and apprehend their spatial relations by the same act by which we apprehend the objects themselves.

## XXV.

*Form* or figure is space limited by boundaries. Space has necessarily *three* dimensions, length, breadth, depth; and no others which cannot be resolved into these.

## XXVI.

The Idea of Space is exhibited for scientific purposes, by the *Definitions* and *Axioms* of Geometry; such, for instance, as these:—the *Definition of a Right Angle*, and of a *Circle*;—the *Definition of Parallel Lines*, and the *Axiom* concerning them;—the *Axiom* that *two straight lines cannot inclose a space*. These *Definitions* are necessary, not arbitrary; and the *Axioms* are needed as well as the *Definitions*, in order to express the necessary conditions which the Idea of Space imposes.

## XXVII.

The *Definitions* and *Axioms* of Elementary Geometry do not *completely* exhibit the Idea of Space. In proceeding to the Higher Geometry, we may introduce other additional and independent *Axioms*; such as that of Archimedes, that *a curve line which joins two points is less than any broken line joining the same points and including the curve line*.

## XXVIII.

The perception of a *solid object* by sight requires that act of mind by which, from figure and shade, we infer distance and position in space. The perception of *figure* by sight requires that act of mind by which we give an outline to each object.

## XXIX.

The perception of form by touch is not an impression on the passive sense, but requires an act of our muscular frame by which we become aware of the position of our own limbs. The perceptive faculty involved in this act has been called *the muscular sense*.

## XXX.

The *Idea of Time* is not derived from experience, for experience of changes presupposes occurrences to take place in Time. Time is a condition under which the mind receives the impressions of sense, and therefore the relations of time are necessarily