EPISTEMOLOGY AND LINGUISTICS
IN THE PHILOSOPHY OF THOMAS HOBBES

by

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Abstract

According to Hobbes sensation is a process in which the organism responds to the stimulation of objects in the external world. Motion is propagated through the nerves and conveyed to the brain. Endeavour is the reaction of the heart towards the surface of the organism which is produced by the transmitted motion. When a stimulating agent is no longer present certain vestiges of previous sensations remain. Imagination is the reproduction of an image in the absence of the original stimulus, and Memory is the ability to recall the relics of past sensations when the sense organs have ceased to operate. From a psychological point of view Prudence is mental discourse in which recollections of associated sensations in the past are combined with a present sensation in order to predict future sensations. We experience not only single images but whole trains of representations in which one member calls up another according to the laws of Contiguity and Similarity. Some sequences of images are random, in that no desire is involved to direct the flow of images that follow upon a given image. Other trains of conceptions exhibit a high degree of regularity due to some purpose which controls the associations.

Names ordered according to rules of syntax allow us to transcend the level of perception, by operating as substitutes for images. A Name functions as a Mark when it is used to recall any one of a number of similar images, and as a Sign when used to communicate the thoughts of the individual to others. However, general appellations do not denote anything "universal" in nature or in our minds. In the external world the extension of a universal term comprises all those singulars to which it refers. In our minds a particular image which represents indifferently any one of the things designated corresponds to the class term.

For Hobbes a proposition is true when the extension of the subject is included in that of the predicate and false otherwise. Error differs from falsity
in that it arises when an anticipated fact fails to conform to our expectation. Necessary propositions for him are those in which the subject term is always contained in the extension of the predicate due to linguistic conventions. Contingent propositions are those in which the inclusion of the subject term in the extension of the predicate depends on empirical facts, and is liable to exceptions. On the other hand, type confusions are due to the combination in one sentence of two names which belong to logically incompatible kinds. Such expressions Hobbes sometimes regards as devoid of cognitive meaning and therefore Absurd and at other times as merely false.

Attention is focussed upon the empirical factor which is present in Hobbes' thought. This tendency is exhibited in at least two ways; in the first place in his emphasis upon images as the content of the analytical and synthetical methods; and in the second place by his estimation of the reliability of induction, which he describes as Prudential reasoning, in terms of the frequency with which past associations of events have been observed to hold.
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INTRODUCTION

Thomas Hobbes was born at Malmesbury on April 5, 1588, and received part of his early schooling under Robert Latimer. At fifteen he went to Oxford and familiarized himself with the prevalent Aristotelian philosophy although it appears to have offered him little in the way of intellectual stimulation. Indeed, in years to come he was to show himself, especially in *Leviathan*, unsparing in his criticisms of what he took to be outmoded in the educational system of the English universities. From a philosophic point of view the importance of Hobbes' attendance at Oxford centers in large part on the question as to whether he may have been influenced while there by a latent tradition derived from William of Occam. Such a hypothesis would account in part for the decidedly nominalistic character of Hobbes' logical doctrines which he expounds at length in *Computatio sive Logica* (1655) which constitutes the first part of the volume of his collected works entitled *The Elements of Philosophy*. The repeated mention by Hobbes of such expressions as names of "first intention" and those of "second intention"
can scarcely be any coincidence and future research may establish his familiarity with the *Summa Totius Logices* of Occam. But unfortunately our information as to the dominant philosophic tendencies at Oxford during this period does not as yet make it possible to give a definite answer to this problem.

Upon graduating from Oxford in 1608, Hobbes obtained a position as tutor with the Cavendish family. He went abroad in 1610, 1629, and 1634. The third period of travel on the continent is of the most interest to us in appreciating the evolution of his thought. In Paris he was one of the members of the philosopher-mathematician Mersenne's circle. As Mersenne was on cordial terms with Descartes, we may infer that Hobbes was influenced at these meetings by Cartesian conceptions of the physical world. In 1636 Hobbes met Galileo at Florence. It was perhaps at this period that he had the notion of rendering the psychology contained in Aristotle's *De Anima* into the terms of the mechanistic world view. It is also known that he attended Bacon at Gorhambury and made notes of whatever he thought of importance in the latter's conversation. Thus Hobbes was well acquainted with several of the outstanding
leaders in the revival of science.

Hobbes had taken an enthusiastic interest in geometry since 1629 when he discovered by accident a copy of the *Elements* of Euclid. When he returned from France to England in 1637 he decided to work out a complete philosophic system, in which all phenomena would be exhibited as instances of the laws of mechanics. Philosophy, for him, has four main divisions. The first is Geometry, which has as its subject matter the relation of space and motion. The second discipline is Physics which deals with the changes which one body in movement produces in another. He next advances to Ethics (physiological psychology) which investigates organisms having the functions of imagery and hypothetical reasoning. Finally Politics is concerned with the interaction of minds in society. The aim of the whole scheme is to explain the behaviour of human beings by the same mechanistic principles which apply to the inanimate world. His materialism consists, in large part, in the attempt to pattern psychology after the model of the physical sciences by explaining all mental data in terms of motion.

Hobbes does not concern himself with the problem (whether it be genuine or spurious) of how the
mind comes to know an external world. In this respect his attitude is very different from that of Descartes, who had published his Discourse on Method in 1637. Like Hobbes he tries to form a comprehensive philosophy based on the new physics. But Descartes was exercised by the problem of self awareness. His central concept is that the mind knows itself directly and immediately but that our belief in the external world rests upon a more or less precarious inference from our sensations and percepts. The starting point of his philosophy is with the individual mind: "I think, therefore I am (Cogitato, ergo sum). The criterion of truth is an intuition or mental content so clear and distinct as to be indubitable.

It is the purpose of this study to follow several aspects of Hobbes' system, namely his philosophical psychology, some of the more important of his views on the nature of language, his conception of two kinds of method involved in scientific investigation, and finally, in somewhat less detail, one important type of reasoning which he calls Prudence. It is hoped that two results will thereby be achieved. In the first place the details of his studies in Semantics will be revealed and related to the presuppositions of his
of his prelinguistic psychology. In this way the coherent structure of Hobbes' thought will be exhibited. His views concerning Marks, Signs, and kinds of Names are discussed. Evidence is presented to show that Hobbes had developed criteria for distinguishing between what we should today term analytic and synthetic sentences; formulated the truth concept in Semantic terms, thus anticipating Tarski by nearly three hundred years; and even developed the rudiments of a primitive Theory of Types. While Hobbes has long been recognized as one of the most powerful, if not the most congenial, of ethical and political thinkers, these valuable contributions of his to Philosophy (in our narrower sense of the term) have been almost universally, and in the opinion of the author, quite wrongly, neglected.

In the second place, an attempt is made to show that there is present in Hobbes' philosophy a genuine element of empiricism. It is quite well known that there is in his thinking a strong rationalistic tendency. His ideal of science is a purely deductive system in which, beginning from real definitions, two propositions are combined to yield a conclusion, and the conclusion itself becomes a premise for a new syllogism. True science for him is a priori. This rationalistic
factor will not be dealt with in this paper. Instead, attention is drawn to the fact that Hobbes recognizes the importance of experience in at least two ways. The first of these is his stress on sense content comprising images, or what we should call concepts, as the subject matter for those scientific procedures he calls the analytical and synthetical methods. The second of these is the role he assigns to Prudential reasoning. These points will now be briefly touched on.

Philosophy for Hobbes consists in the knowledge of causal connections, of information we gain about effects by arguing from causes and about causes by arguing from effects. But to obtain such knowledge two methods are required. By means of what he terms the analytical method we take a discrete image and decompose it into general ingredients which are common to all bodies. Thus, to take a modern example, a chemist can resolve water into the elements of hydrogen and oxygen combined in a certain proportion. But both of these elements are to be found in many other chemical compounds than water, and these simples are what Hobbes would describe as "universal things." By the synthetical method abstracted types are recombined to construct a new image of an original datum. Thus given the notions of rectangularity,
straight line, and equality of angles, we can synthesize the concept of a square.

A second important concession which Hobbes makes to experience is his awareness of the role played by that type of reasoning which he calls Prudence. It is a widely prevalent misunderstanding of Hobbes that he fails to appreciate the importance of inductive argumentation. While it must be admitted that he does exclude it from his corpus of science, it is the belief of the writer that there is evidence available to support an interpretation of Hobbes as being one of the founders of a frequency theory of probability, despite the fact that he restricts prediction to extrapolation from past observed instances to the next instance.
CHAPTER I

The psychology that Hobbes advocates is a derivation in part at least from his view of the nature of Philosophy.

"Philosophy is the knowledge we acquire, by true ratiocination, of appearances, or apparent effects, from the knowledge we have of some possible production or generation of the same; and of such production, as has been or may be, from the knowledge we have of the effects".1

Although Hobbes had himself no taste for experiment, and no mastery of physics and mathematics, he was well aware of the importance of the work done by certain of the contemporary scientists of his day. This is shown by his remarks in the "Epistle Dedicatory" to the De Corpore. Astronomy he says, "is not to be derived from farther time than from Copernicus" and his work led to that of Galileo whose discovery was the "first that opened to us the gate of natural philosophy universal, which is the knowledge of the nature of motion". The science of man's body" was first established by Harvey, "the only man I know that, conquering envy, has established
a new doctrine in his lifetime”. The inquiries of Kepler, Gassendi and Marsenne are also noted. Hobbes saw the direction which the natural sciences of his day were taking. In the time of Galileo men had awakened to the insight of Pythagoras that the world was a system of number groups. Galileo considered that he could explain any set of natural motions in terms of mechanics, which is sufficient to give us an exhaustive account of the world. It gives the essential description of the natural order. Such a view of the world was homogeneous for all things are the same in substance and function, while the medieval world view was heterogeneous. The changes of place by material bodies are to be explained in terms of geometry. In their work Galileo and Kepler attempted to formulate quantitative laws which would apply to the greatest variety of perceived events. In this way final causes are eliminated from scientific inquiry. It is motion that Hobbes stresses and makes the basis of his system; we explain an event by resolving it into its basic components, that is, the motions of which the process consists.

In his attitude to immediate experience Hobbes takes a position that is in substantial agreement with that of Democritus. The secondary qualities of external entities are not objective; they are subjective
effects produced upon the organism, while body — that which occupies space and is independent of human thought — together with motion, are the causes of our sensations. Colours, smells, tastes and the like are only "appearances" within the percipient of the motions of matter. "All which qualities, called Sensible, are in the object that causeth them, but so many several motions of the matter, by which it presseth our organs diversely".\(^2\)

As the nervous system is also a material structure, the only effect that can be produced on it is one of the same kind as external objects produce on each other, a modification of previous motions. The sensible qualities themselves are nothing but motions. Hobbes clearly commits himself to this view in the following passage:

"Neither in us that are pressed, are they anything else, but divers motions; (for motion, produceth nothing but motion)."\(^3\)

Hobbes is an advocate of a Causal Theory of Perception; he believes that secondary qualities are not attributes of external things but are effects produced in the perceiver's organism. He summarizes his view as follows:

"Because the image in vision consisting of colour and shape is the knowledge
we have of the qualities of the
object of that sense; it is no hard
matter for a man to fall into this
opinion, that the same colour and
shape are the very qualities themselves;
and for the same cause, that sound and
noise are the qualities of the bell
or of the air. And this opinion has
been so long received, that the contrary
must needs appear a great paradox; and
yet the introduction of species visible
and intelligible ... is worse than any
paradox, as being a plain impossibility.
I shall therefore endeavour to make
plain these points:—

That the subject wherein colour and
image are inherent, is not the object
or thing seen.

That there is nothing without us ... which we call an image or colour.

That the said image or colour is but
an apparition unto us of the motion,
agitation, or alteration, which the
object worketh in the brain.

That as in vision, so also in conceptions
that arise from the other senses, the
subject of their inherence is not the
object, but the sentient".4

In more modern language Hobbes intends
to advocate the following points:

(1) The sense data with which we are acquainted are to
be distinguished from the physical object itself, that
is, the subject of causal properties.

(2) Sense data are effects produced in the sense organs
by the physical object.
(3) Sense data do not form part of the surfaces of physical objects.

(4) Sense data are not located in the object which produces them, but in the appropriate sense organ.

We have next to note the evidence which Hobbes advances to support these contentions:

(a) We may under certain conditions perceive images of objects located in regions where the subject of causal attributes which produces the image is not itself located, as e.g. when we see an image of the sun which seems to characterize the surface of water.

"Every man hath so much experience as to have seen the sun and the other visible objects by reflection in the water and glasses; and this alone is sufficient for this conclusion, that colour and image may be there where the thing seen is not." 5

Hobbes is also aware of the case of what today is called "Binocular Vision." If one eye is pressed out of its normal position, the visual pattern can be doubled. To assert that both coloured images were part of the same object would imply that the object could simultaneously occupy two different places. Since there is no warrant for one image in such cases to have a privileged status over the other, neither belongs to the
physical object.
(b) According to Hobbes, mirror images cannot in any significant sense be said to be located behind or in mirrors, nor can inverted images be said to be literally in or under the surface of water.
(c) When entities produce irregular motions in the brain, by which the optic nerve is stimulated, we see a light image which is not in the external world, since it is the result of movement impinging on the mentioned nerve.

"...we are to consider...that upon every great agitation or concussion of the brain...whereby the optic nerve suffereth any great violence, there appeareth before the eyes a certain light, which light is nothing without, but an apparition only, all that is real being the concussion or motion of the parts of that nerve; from which experience we may conclude, that apparition of light is really nothing but motion within."6

(d) There is a causal connection between entities which reflect light, "illuminate bodies," and the human organism, in which according to the laws of refraction, motion is transmitted from the eye to the optic nerve, which in turn sets up changes in the brain. The response of the brain activates the optic nerve once more and the light image is externalized. Since we do not introspect this process the image is supposed to belong to the external world.
"Now the interior coat of the eye is nothing else but a piece of the optic nerve; and therefore the motion is still continued thereby into the brain, and by resistance or reaction of the brain, is also a rebound into the optic nerve again; which we, not conceiving as motion or rebound from within, do think it is without, and call it light...." 7

Sounds, tastes, smells must likewise be considered as only effects produced in the organism according to Hobbes, since the attempt to maintain their objectivity would lead to the making of contradictory statements assigning properties to an entity. His conclusion is:

"... whatsoever accidents or qualities our senses make us think there by in the world, they be not there, but are seeming and apparitions only: the things that really are in the world without us, are those motions by which these seemings are caused." 8

In his treatment of the psychological development of human beings, Hobbes starts from the usual empiricist position that all mention life has its beginnings in sensation; "for there is no conception in a man's mind which hath not, at first, totally or by parts, been begotten upon the organs of sense. The rest are derived from that original." 9
For Hobbes, the basic situation involved is one in which the organism responds to the stimulation of objects in the external world. Other bodies, by impinging upon the organs of sense propagate motions through the nerves to the heart and brain. Such transmitted motion gives rise to a reaction of the heart towards the surface of the organism, called "endeavour". It is the outward direction of the response which leads us to believe that sensible qualities are in the external world. Sensation, then, is the phantasm which is produced by the joint process of the activity of the organs of the body and the stimulation of objects operating at the present time. Movements of this kind are called by Hobbes "Fancy" and "Sense". Depending on the organ involved we are acquainted with various sorts of phantasms. Thus by the eye we are aware of coloured shapes, by the ear, sounds, and by the tongue, tastes.

"Originally all conceptions proceed from the action of the thing itself, whereby it is the conception; now when the action is present, the conception it produceth is also called sense; and the thing by whose action the same is produced, is called the object of the sense."10

The subject of Sense is the whole organism, not just one or other of its organs, and the
object of sense is external entity standing in relation to it, as for example the sun, and not some Fancy, as a shade of colour.

Moreover, Sense requires a constant variation in the types of stimulation if it is to continue. If the organism were to be persistently given the same sort of stimuli a state of total lack of awareness would result: "It is almost all one for a man to be always sensible of the same thing, and not to be sensible at all of anything."

Awareness depends on some kind of contrast. Sense is not merely a simple reaction in the body but organs are needed to conserve the motion, if the phantasm is not to pass instantly. Although a flux of impressions are needed for Sense, a sense organ cannot be stimulated in different ways at the same time so as to produce different phantasms. According to Hobbes:

"...it is manifest that every endeavour of the organ outwards, is not to be called sense, but that only which at several times is by vehemence made stronger and more predominant than the rest; which deprives us of the sense of other phantasms...."12

Even when a stimulating agent is no longer producing motions in the sense organs, effects or changes are set up which do persist. Although the original
stimuli are exhausted, certain vestiges of previous sensations are retained. To such relics Hobbes applies the terms "image" and "conception." In our waking life the features of such phantasms are not readily distinguishable due to the new sensations which are produced by the objects succeeding the entity which caused the original stimulus. The representative image is overcome by newer sense experience against which it attempts to maintain itself. The absence of the external object does not eliminate the motion in the organ but the weakening of the image is due to the organ being repeatedly stimulated.

"...any object being removed from our eyes, though the impression it made in us remain, yet other objects more present succeeding and working on us, the imagination of the past is obscured and made weak...From whence it followeth that the longer the time is, after the sight or sense of any object, the weaker is the imagination. For the continual change of man's body destroys in time the parts which in sense were moved...."13

By the term "Imagination", Hobbes means the reproduction of an image in the absence of the original stimulus. It is the persistence in a less intense form of the organic process aroused by a stimulus after the external object has been removed. Imagination differs, therefore, from Sense in that we have an image
of an object which is no longer visible and the organ is no longer acting. The human organism is aware of the gradual obliteration of detail of the images which are the after effects of previous sensations.

"When a body is once in motion, it moveth (unless something else hinder it) eternally, and whatsoever hindereth it, cannot in an instant, but in time, and by degrees quite extinguish it. And as we see the water, though the winds cease, the waves give not over rolling for a long time after; so also it happeneth in that motion which is made in the internal parts of a man, then, when he sees, dreams, etc. For after the object is removed, or the eye shut, we still retain an image of the thing seen, though more obscure than when we see it. Imagination therefore is nothing but decaying sense...."14

Imagination while it depends on sensations

"in that we have no transition from one imagination to another whereof we never had the like before in our senses" has its own contribution to make. By it we can compound complex images from the relics of sensation. It is possible for us to have images of whole objects we have seen as they are presented to sense, but it is also in our power to compound two or more images to form an imagined entity which corresponds to nothing in nature. For instance, we can, from the image of a horse and the image of a man, put together the image of a centaur.
Hobbes is aware that sensations of more than momentary duration, which occur to a mind supplied with vestiges of previous sensations, require a sense of the past. This function is performed by Memory, which Hobbes treats as a specialized and complex development from Imagination. It is the capacity to recall and rehearse the decayed relics of past sensations when the sense organs have ceased to operate.

"This decaying sense, when we would express the thing itself... we call imagination... but when we would express the decay and signify that the sense is fading, old, and past, it is called Memory. So that imagination and memory are but one thing, which for diverse considerations hath diverse names."

Hobbes is aware of a difficulty that must be met by his theory. The question arises as to what criteria we have for determining whether a given image has occurred a long time ago or recently. He answers that an image is called "obscure" when it pictures an object as a whole, but omits all details. An image is called "clear" when it is produced in the act of sensation for the first time, and pictures the details of the parts of the object distinctly. The clarity of an image is a matter of degree depending on the amount of detail pictured. Thus when an image is recalled we classify it
as of late or recent origin on the basis of the amount of
detail it exhibits. If the image does not picture all the
parts of the object that caused it, the image is judged
of late origin. If the image does record all the features
of the constituents of the object which produced it, the
image is judged of recent origin.

"For example, a man that is present in a
foreign city, seeth not only whole streets,
but can also distinguish particular houses,
and parts of houses, but departed thence,
he cannot distinguish them so particularly
in his mind as he did, some houses or
turning escaping him; yet is this to
remember, but not so well...Seeing...
remembrance is more or less obscurity,
why may we not well think remembrance
to be nothing else but the missing of
parts, which every man expecteth should
succeed after they have a conception of
the whole?"16

There are a number of objections that
may be brought against the view of Memory that Hobbes
advocates. If our memory of an object consists in the
image we form of it, it is difficult to see how on
Hobbes' premises we can compare the object with the
image to determine the clarity of the latter. He has
not provided any adequate way of distinguishing the
memory image from the percept image of an object when
we are acquainted with both images at the same time.
Mere awareness of an image as faint or faded does not lead us on all occasions to take it for a memory image. Besides, imagination is taken by Hobbes to be confined purely to things past. But frequently we can imagine what will happen in the future just as easily as we can our past. What his view does not account for is the recognition of events as belonging to an order which is not that of the future or present, when we imagine what is past. He fails to grasp the importance of discrimination between a present and a former presentation by means of judgements of comparison. He neglects the role of selective attention and activity.

Hobbes is especially concerned with the phenomena of dreaming, for dreams are made up entirely of images. The flow of images in dreams are made up of past phantasms, and we find these constituents combining in an arbitrary way. The images in sleep exhibit a high degree of clearness and distinctness. This is due in part to the absence of an exciting object producing sense impressions which interfere with the images. In waking life the brain remains in motion from an external entity that is no longer present. In sleep the nerves and brain tend not to respond readily to the action of material
objects and no images occur except those that are caused by "the agitation of the inward parts of man's body."\textsuperscript{17} If these vital parts function in an abnormal manner through their linkage with the brain and other parts of the nervous system they set up changes whereby images are produced that are indistinguishable from the sensations of waking life.

The problem in such cases is as to what criteria we have in order to distinguish the images of dreams from the sensations we have when awake. In a broad sense, Hobbes relies on the test of coherence among experiences.

(1) In dreams we do not frequently or repeatedly have images of the same persons, places, objects and actions as we do when awake. The constituents of dream life tend not to recur.

(2) The sequences of images in dreaming are not so internally consistent as trains of images which occur at other times.

(3) We condemn dreams when we are awake on the grounds that they are relatively incomplete and fragmentary and do not integrate in a satisfactory way with waking life. Thus although when we dream we are not aware that we are dreaming - on the other hand, when we are awake we know
we are not dreaming.

"...because waking I often observe the absurdity of dreams, but never dreame of the absurdities of my waking. Thoughts; I am well satisfied, that being awake, I know I dreame not; though when I dreame, I think my selfe awake."18

(4) The causality involved in dream life differs from that of waking life. The series of images we experience when asleep are caused by our own organism while those sequences of sensations we have when awake are caused by the stimulation of the sense organs by external objects. Hobbes expresses himself as follows:

"In summe, our Dreams are the reverse of our waking Imaginations; The motion when we are awake, beginning at one end; and when we Dream, at another."19

Related to both Imagination and Memory is Prudence. By this term Hobbes understands the capacity men have to anticipate future experiences by means of the recollection of what has previously happened. Prudence is mental discourse in which we combine recollections of associated sensations in the past with the sensation which at present we are aware of, in order that we may predict the appearance of future sensations. We remember the succession of an event of one type upon another event of a
different type, and this remembrance is called by Hobbes an "experiment." The wisdom of the prudent man lies in his ability to recollect a greater number of associated events than do other people, and hence his anticipations of the future tend to be more reliable; "thus we make remembrance to be the prevision of things to come, or expectation, or presumption of the future."

The question arises as to how Hobbes makes the transition from his description of the decay of an image to a train of images, one member of which excites a whole chain of conceptions. He remarks that "Not every thought to every thought succeeds indifferently." We do not have any image which has not been preceded in the act of sensation by a sense impression produced in the appropriate organ by the action of external objects. Again, the images that we experience are relics of previous sensations and their order that we apprehend is determined by the succession in which their original sense impressions occurred. As Hobbes expresses himself, "we have no transition from one imagination to another, whereof we never had the like before in our senses." The explanation Hobbes offers for this phenomenon is a crude formulation of the "Law of Contiguity." All Fancies are motions in our organism, relics of impressions produced in the act of
Sensation. The motions which immediately succeeded to other motions in Sense persist together after it, so that when the earlier motions are revived, the later motions follow them, "by coherence of the matter moved, as water upon a plane table is drawn which way any one part of it is guided by the finger."  

Since we experience images succeeding one another in different orders, there is no certainty what image will follow upon another at a future time, although we know the order will be one in which they have been previously experienced.

"But because in sense, to one and the same thing perceived, sometimes one thing, sometimes another succeedeth, it comes to pass in time that in the imagining of anything, there is no certainty what we shall imagine next; only this is certain it shall be something that succeeded the same before, at one time or another."  

In imagination we have to consider not only the single image in its various forms but also the relationship that one image has to its predecessors and successors. Hobbes designates those whole sequences of images in which one member calls up another by the name "Mental Discourse".

"By Consequence or Trayne of Thoughts,
I understand that succession of one Thought to another, which is called (to distinguish it from Discourse in words) Mental Discourse."

Mental Discourse, according to Hobbes, is of two types. The first kind is "Unguided, without Designe, and inconstant", for there is no purpose or desire involved to regulate the images that follow upon a given image. The thoughts in such cases seem "impertinent to one another" as in a dream since the succession of images is directed by association alone the sequence appears to be casual. However, Hobbes remarks that even in "this wild ranging of the mind, a man may oft-times perceive the way of it, and the dependance of one thought upon another." Hobbes does not overlook the "Law of Similarity"; sometimes in random sequences of thoughts a given image A may call up an image B which it resembles in some definite respect.

"For in a Discourse of our present civill warre, what could seem more impertinent, than to ask (as one did) what was the price of a Roman Penny? Yet the Cohaerence to me was manifest enough. For the Thought of the warre, introduced the Thought of the delivering up of the King to his Enemies; the Thought of that, brought in the Thought of the delivering up of Christ; and that again the Thought of the 30 pence, which was the price of that treason; and thence easily followed that malicious question; and all this in a
moment of time; for Thought is quick."

The second kind of sequences of images involve some purpose or desire which controls the associations and accordingly the succession of thoughts is characterized by a peculiar regularity and harmony. We can re-establish order among our thoughts when they begin to wander by reflecting on the series of means by which some end we desire can be achieved.

"From Desire, ariseth the Thought of some means we have seen produce the like of that which we ayme at, and from the thought of that, the thought of means to that mean; and so continually, till we come to some beginning within our own power." 28

Regulated successions of images are subdivided by Hobbes into two types. From an image of a given effect we may investigate the causes of the production of that event in a temporal process. Also from an image of a given cause, we may investigate all the effects that it can bring about, "that is to say, we imagine what we can do with it, when wee have it." Orderly trains of thoughts of the first kind are found in both animals and men. The sequences of thoughts of the second kind are unique to man. Hobbes remarks of such trains of images, "I have not at any time seen any
signe, but in man onely...." Animals do not show any capacity to deduce effects from causes.

"In sum, the discourse of the mind, when it is governed by design, is nothing but Seeking...a hunting out of the causes of some effect, present or past; or of the effects, of some present or past cause." 29

However, our reasoned knowledge of the causes of effects, of the way in which anything is produced by that which is prior to it in time, is of a conditional nature. In more modern language, the point which Hobbes wishes to stress is that when we assert "X is the cause of Y" we are entitled to mean only "X is a possible cause of Y" and not "X is the actual cause of Y". Such a view seems to be indicated by the following passage:

"No man can know by Discourse, that this, or that, is, has been, or will be; which is to know absolutely; but onely, that if This be, That is; if This has been, That has been; if This shall be, That shall be; which is to know conditionally...." 30

Hobbes realises that if the aim of Philosophy is to acquire by reason a systematic account of the way in which phenomena are produced and the devising of ways in which phenomena may be generated,
then a doctrine of the general principles of scientific procedure is required. A description of the ways in which the investigation of causal connections is to be conducted is needed so that our knowledge of the world of bodies may be orderly and consistent.

Scientific method has two divisions for Hobbes. The "Synthetical" kind of inquiry consists in reasoning from definitions and deducing their consequences. By a definition Hobbes understands "a proposition whose predicate resolves the subject, when it may; and when it may not, it exemplifies the same." Such definitions are of two sorts. The first type are names of the common properties of matter, such as 'body' and 'motion'. Such terms cannot be reduced to more comprehensive definitions, since they have a greater number of objects as their extension than other kinds of names. These expressions are defined by a linguistic utterance which causes in the hearer an image of the thing which the name denotes.

"...when we define motion to be the leaving of one place, and the acquiring of another continually;... though no thing moved, nor any cause of motion be in that definition, yet, at the hearing of that speech, there will come into the mind of the hearer an idea of motion clear enough."
The second kind of definitions consist of names of those entities whose manner of generation can be described. For example, the term 'circle' denotes a geometric figure which can be constructed by drawing a curved line every part of which is equidistant from the center. Unless the initial definitions of such things as have causes contains a description of the way in which they are produced we shall not be able to deduce any conclusions from premises and arrive at scientific knowledge.

The "Analytical" kind of inquiry consists in reasoning from the name of an individual to its definition in terms of class names. Thus the word 'man' is defined by the words 'body animated' 'sentient' and 'rational'.

While for Hobbes all knowledge has its beginning in the particulars of sensation Philosophy is reasoned knowledge which aims at establishing the causes of things. While "Experience concludeth nothing universally" on the other hand "nothing is produced by reasoning aright but general, eternal, and immutable truth;" and this contrast of Prudence with Reasoning runs through all the thought of Hobbes. The problem
then, is how we are to get beyond the limits of sense experience by sensible means. He finds the means in Language, "consisting of Names or Appellations" which enables us to obtain rational information about our sensations by transmitting sequences of images into verbal expressions.

Hobbes defines a Name as "a word taken at pleasure to serve for a mark which may raise in our minds a thought like to some thought we had before, and which being disposed in speech and pronounced to others, may be to them a sign of what thought the speaker had or had not before in his mind." Depending on the way in which they are used Names can function as "Marks" or "Signs".

A Name serves as a Mark when it is employed by an individual to recall the results of his reasoning which otherwise would be forgotten by him and require new labour for their rediscovery. Marks fix the succession of images, by standing for any one of a number of similar experiences they relieve us of representing all our experiences together at the same time.

"How unconstant and fading men's thoughts are and how much the recovery of them depends on chance, there is none but knows by infallible experience in himself."
It is important to note that while Hobbes says of Names that they may 'serve' as Marks, nevertheless, the two terms are not identical. He seems to indicate a distinction in the following passage where he defines a Mark.

"...for the acquiring of philosophy, some sensible moniments are necessary, by which our past thoughts may be not only reduced but registered every one in its own order. These Moniments I call MARKS, namely sensible things taken at pleasure, that by the sense of them, such thoughts may be recalled to our mind as are like those thoughts for which we took them."35

The word 'sensible' indicates Hobbes is thinking of material entities of some sort and not uttered or written linguistic expressions. An example of a Mark, in the sense Hobbes understands by the term, would be a buoy anchored by sailors to remind them of a dangerous current when they pass by again.

A Name functions as a 'Sign' when it is employed by an individual to communicate his thoughts to others. Without signs an ever increasing stock of information could not be passed on from one generation to another. No contributions could be made to the development of science unless the individual could inform others of his discoveries.
"...though some one man, of how excellent a wit soever, should spend all his time partly in reasoning, and partly in inventing marks for the help of his memory... who sees not that the benefit he reaps to himself will not be much, and to others none at all? For unless he communicates his notes with others, his science will perish with him."36
CHAPTER II

In order to obtain a satisfactory solution to the problem of the relation between propositions and the external world, Hobbes strives to give a precise formulation of the conditions under which such expressions are true in terms of names and their referents. Of the truth concept he says:

"When two names are joyned together into a Consequence, or Affirmation; as thus, A man is a living creature; or thus, if he be a man, he is a living creature, If the later name Living creature, signifie all that the former name Man signifieth, then the affirmation, or consequence is true; otherwise false. For True and False are attributes of Speech, not of Things. And where Speech is not, there is neither Truth nor Falshood."

We must remark that Hobbes uses the word

* It is clear from the above quoted passage that Hobbes was aware of the distinction between using an expression and mentioning it, for he adopts the convention of direct and indirect quotation to show that the word 'True', the phrase 'Living creature', and the sentence 'A man is a living creature' are names for the expressions about which he is speaking and hence may not be replaced by different words.
'signifie' in a special sense, probably derived from the Medieval logical tradition of the thirteenth century. He wishes to draw attention to the fact that a name has meaning in so far as it is an arbitrary sign instituted for the explicit purpose of indicating some single object, particular event, or individual person.

It is to be noted that Hobbes does not in the quoted passage make any reference to judgements or beliefs as being true or false. It may be the case that he realized the concepts of truth and falsity might be regarded as varying with the mental equipment of persons, if they were applied to the names of states of psychology. His own position is in close agreement with that of present day logicians. He anticipates Tarski by insisting that truth and falsity are characteristics of linguistic structures. For Hobbes the basic expressions which have the requisite syntactic form to be capable of being true or false, are propositions, which consist of two names as constants and the copula, or connective term. However, as he employs the word 'affirmations' in the quotation, it is probable that he held truth and falsity to be functions of the statement which a person makes at some specific time and place.

It is clear that Hobbes' treatment of the
concept of truth is very different from that of Wittgenstein, who held that a proposition is true if there is a one to one relation of copying between the constituents of the proposition under consideration and the state of affairs that it denotes. Against this position it may be urged that it is not self contradictory to assert that some true propositions do not provide a picture of what they describe, for instance, "The atom is located at a point but is infinite in extent."

For Hobbes the fundamental relation involved in the truth concept is not that of picturing, but of class inclusion or class membership depending on the type of declarative sentence involved. A universal affirmative proposition, which has the form "All X are Y", where "X" and "Y" are constants, for example, "Every man is a living creature", is true if and only if the extension of the word "man" is subsumed in the extension of the word "living creature." A particular affirmative proposition, which has the form "Some X are Y", for example, "Some man is sick", is true if and only if there is at least one member of the range of objects denoted by the word man which is contained in the extension of the word "sick".
Sometimes, however, Hobbes maintains that a proposition is true in virtue of conjoining two names of the same type which are imposed arbitrarily. Upon this view truth or falsity pertain to definitions which are themselves certain because they are verbal abbreviations substituted for more complex groups of words at the choice of the user. That Hobbes was prepared to advocate this position appears from the following passage.

"For it is true (for example) that man is a living creature, but it is for this reason, that it pleased men to impose both those names on the same thing."3

Hobbes also concerns himself with the relations between "Necessary" and "Contingent" propositions. He seems to be concerned with stating the conditions under which a proposition belongs to one of these subdivisions rather than giving a definition of the terms "Necessary" and "Contingent". This is indicated by the peculiar phraseology he employs; "...a contingent proposition is that...."4 and "A necessary proposition is when...."5 According to Hobbes a proposition is said to be "necessary" if it fulfills both of two conditions, which he probably takes to be conventions of the logicians. A necessary sentence has a predicate which contains at all times the
extension of the subject, and hence it is of what he terms 'sempiternal truth', that is to say, valid regardless of the time element involved. This can be most clearly seen in the case of molecular propositions which contain an implication functor, in which the antecedent 'p' and the consequent 'q' are so related in meaning that 'p' true and 'q' false does not occur in the world, or in other words, the truth of 'q' is logically deducible from the truth of 'p'. The truth of the example Hobbes himself provides for us, "if man, then living creature" is guaranteed by its formal structure and not by the existence of any individual man or living creature, although it would be true if they did exist.

In the second place, Hobbes considers that in a necessary proposition the predicate is, to use his terminology, "equivalent" to the subject or a constituent of a predicate word which is equivalent to the subject. At first sight it is rather difficult to grasp his meaning, since we would today speak of sentences as being equivalent, not words. It may be suggested that Hobbes was attempting to provide a criterion for determining when the inclusion of the extension of the subject of a proposition in that of a predicate depends upon linguistic conventions. He was perhaps trying to define an analytic
sentence in terms of synonymity. We shall quote a relevant passage:

"...in every necessary proposition, the predicate is either equivalent to the subject, as in this, man is a rational living creature; or part of an equivalent name, as in this 'man is a living creature', for the name 'rational-living-creature', or 'man' is compounded of these two, 'rational' and 'living-creature'". 9

This second condition is sufficient as well as necessary. In more modern terminology, Hobbes is maintaining that a proposition of the form "All A are C" is necessary, if and only if there is a term 'B' which is synonymous with the subject 'A' such that:
(1) The predicate term C is identical with B, or
(2) B is composed of the conjoined constituents (D₁ & D₂ & D₃ ...Dₙ) and C is one of the D's.

Suppose, for example, that we take a sentence such as "A bachelor is unmarried." Then, if we let 'A' stand for 'bachelor' and 'C' for 'unmarried', it is clear that 'bachelor' and 'unmarried' are not synonymous, since 'unmarried' refers to spinsters as well. But if we let 'B' represent 'unmarried male' then we may say that 'unmarried male' and 'bachelor' are synonymous, since 'unmarried male' contains 'unmarried'
conjunctively and also provides a set of defining properties for 'bachelor'.

By a "Contingent" proposition Hobbes means one which has the grammatical form of a universal affirmative sentence, but which can be known to be true or false only on empirical grounds and not upon the basis of its logical structure. Whether the subject is contained in the extension of the predicate depends on facts in the external world. We would today characterize such a sentence by saying that its negation was not self contradictory. Indeed, Hobbes asserts that such propositions are capable of being true at one time and false at another. This view is not so paradoxical as it at first sight appears. His point is merely that the inclusion of the subject in the extension of the predicate is liable to exceptions.

"...a contingent proposition is that, which at one time may be true, at another time false; as 'every crow is black'; which may be true now, but false hereafter."

That is to say, the sentence "All crows are black" is true provided no single instance of a white crow occurs. But if we come upon an albino crow then subsequent utterances of the sentence "All crows are
black" are false.

It may be noted that Hobbes does not consider the fact that a proposition is always true to be a sufficient condition for certifying it as necessary. His point is that in a contingent proposition the predicate is never a defining property of the subject.

"...though this were true, 'every man is a liar', yet because the word 'liar' is no part of a compounded name equivalent to the name 'man', that proposition is not to be called 'necessary', but 'contingent', though it should happen to be true always."

Hobbes also discusses the relations between "Hypothetical" and "Categorical" propositions. By a categorical proposition he means one which from the standpoint of grammatical form affirms an actual fact and does not contain any expression of conditions. It merely affirms or denies the predicate of the subject. Examples of categorical propositions are universal 'A' and 'E' propositions such as "every man is a living creature" and "no man is a tree." By a hypothetical proposition Hobbes means one which from the standpoint of grammatical form does not assert the truth or falsity of its antecedent or consequent taken separately but contains a condition and some consequence which follows
upon it, as for example, "if anything be a man, the same is also not-a-stone."

Hobbes maintains that a categorical proposition and its corresponding hypothetical proposition mutually imply one another provided each sentence is analytic or "necessary". The reason why Hobbes introduces this restriction may be due to his realization that the equivalence relation between a sentence of the form "All A are B" and a sentence of the form "If anything is A then it is B" will only hold if "all" or a similar quantifier in the categorical proposition refers not to a finite collection whose number of elements may vary with the time interval, but has the sense of "all possible". With this limitation he would admit that we may validly deduce "If anything be a man, the same is also a living creature" from "Every man is a living creature." Indeed Hobbes adopts the same interpretation of universal affirmative propositions as is found in *Principia*.

"Every man is a living creature
(X)(\text{Man}(X)\rightarrow\text{Living Creature}(X))"

On the other hand, Hobbes denies that a categorical proposition and its corresponding hypothetical proposition mutually imply one another if each is
contingent. In such cases "All A are B" is not equivalent to "If anything is an A, then it is a B". He does not admit that we can validly infer, for instance, from "every crow is black" the sentence "If any thing be a crow the same is black."\(^1\) Hobbes is perhaps concerned here with the question of intension, or those set of attributes which are essential to an object, convention determining the application. The property of being black is not a defining attribute of crows. It is a genetic possibility to have a white crow. Hobbes is thus attempting to bring out the distinction between strong and weak implication, between material truth, and the truth of a subjunctive conditional. By "every crow is black" which is his categorical proposition, he may mean "if anything is a crow, why then, as a matter of fact, it is black." This is a formal implication, that is, a generalized material conditional. In symbols,

\[(X)[\text{Crow}(X) \rightarrow \text{Black}(X)]\]

But by "if any thing be a crow, the same is black", which is his hypothetical proposition, he means perhaps a subjunctive conditional, "If anything were a crow, then it would be black." Thus at some given period all crows
might be black, and then "every crow is black" would be a factual truth. But since the hue of black is not a defining property of a crow, Hobbes is not prepared to infer "if any thing is a crow, then it is black" if this has the force of "if any thing were a crow then it would be black."

The point is, in more modern language, that if a subjunctive implication holds between the subject and predicate of a sentence then both the subjunctive implication and the generalized conditional sentence will both be true together. Thus from "All planets move in ellipses" it follows that "If the moon were a planet, it would move in an ellipse." The subjunctive conditional follows from the categorical when the extension of the former remains constant because 'all' in the categorical sentence is not defined by an enumeration of elements but has the sense of 'all possible'. But if the generalized conditional is true, it does not follow that both it and its corresponding subjunctive conditional are true, nor that what Hobbes would describe as a categorical proposition is necessary. For example, from "All bad tempered persons have red hair" we cannot deduce "If anybody were bad tempered he would have red hair."
Hobbes supplements his account of the truth of propositions by a treatment of Error. Some errors, those of "Form", are of a linguistic nature. In modern terms, they are Formal fallacies. These may be found in the combination of sentences in a syllogism and consist in faulty deductions from the premises. Hobbes notes that a syllogism is frequently invalid due to the middle term being used in an equivocal manner. In such cases four terms occur. This fallacy, as he is aware, violates the rule that a valid syllogism may have only three terms and also the rule that no one of the terms may be used in an ambiguous way. Since the example Hobbes provides is couched in somewhat antiquated language, we shall take the following case to illustrate his meaning.

The end of a thing is its perfection
Death is the end of life

Therefore, Death is the perfection of life

In which case the argument is invalid, as the word end may have the sense either of a goal or a last event.

Other errors Hobbes calls "tacit" and these may occur in silent mental rehearsal without the employment of general names. These errors consist of expectations which the course of experience does not
support. He considers that they are based upon the misinterpretation of natural signs, i.e. those signs which involve a correlation of events according to some causal law.

Failures in induction, or tacit errors, are of two kinds, according to Hobbes. An interpreter may have observed in the past that every event of the kind B is preceded by an event of the kind A. When he observes at present an event B' he entertains a belief, due presumably to habit formation, that it has been preceded by an event A' but A' has not, in fact, preceded B'. For example, when we see a fire we tend to think that it has been caused by a match, but in some particular case a fire may have been started by the rays of the sun focused by a piece of glass.

Alternatively, an interpreter may have observed in the past that every event of the type A is followed by an event of the type B. When he observes at present an event A' he has an expectation that in the future an event B' will follow A' but as a matter of fact, B' does not follow A'. Thus from the sight of a ring around the moon we may be led to anticipate that rain will take place shortly, but this surmise may not be borne out by the course of events due to some further
sudden change in the weather conditions.

"For Error is but a deception, in presuming that somewhat is past, or to come, of which though it were not past, or not to come; yet there was no impossibility discoverable."

We have seen that one of Hobbes' chief claims to philosophic achievement and ability lies in his appreciation of the fact that philosophy is in part at least a discipline which is concerned with the investigation of the logical properties of words. But he also realized acutely the danger that lay in using a peculiar and private idiom for the purpose of philosophizing. He understood that a ready source of expressions that lack factual meaning is to be found in the departure from the untechnical language of everyday speech. It is probably the case that Hobbes did not mean to condemn technical terms as such. Much of his criticism is directed against the specialized terminology that was characteristic of the decayed Aristotelian tradition of his day which still persisted at some of the centers of learning. He argues in effect that the Aristotelians were using an artificial language (the types of terms and expressions of which were sharply restricted) without providing any rules of syntax whereby their technical terms might be defined in
words belonging to a natural language, that is, a language which grows through usage and exhibits a law of development. Both his insights are to be found clearly expressed in Leviathan.

"...the writings of Schoole-Divines are nothing else for the most part, but insignificant trains of strange and barbarous words, or words otherwise used than in the common use of the Latin tongue...which if any man would see proved, let him...see whether he can translate any Schoole-Divine into any of the modern tongues...." 17

In order to appreciate the inquiries Hobbes makes into the relations between falsity and meaning we shall find it helpful to describe his classification of the names of different types of things. To be sure, his survey is by no means completely satisfactory, since Hobbes had no conception of the great variety of logical terms. But his analysis was, as we shall see, adequate to the extent that it enabled him to develop and apply his main principle, which is essentially that type like restrictions be observed between objects, their properties, properties of properties and so on, and between objects, their names, names of names etc. That is, if a subject term of one logical type is combined in a sentence with a predicate term which belongs to a
different logical type, or if similar intermingling of names occurs, the result will be a construction which is either false or meaningless.

Some words, such as 'hot' and 'living' are names of 'Accidents', that is, they ascribe properties to objects. Other names refer to physical objects in the external world, as for example, 'desk' and 'chair' and these are 'names of Matter.' There are also names which classify the auditory, visual, and tactual data or sense impressions we experience, and these are 'Properties of our own bodies' as Hobbes terms them. Examples of such names would be 'sound', 'taste', and 'odour'. Finally there are 'names of second intention' which belong to what we should describe as a metalanguage, and either designate other words, as do 'Singular' and 'Plural', or designate other sentences, as do 'Interrogation' and 'Affirmation'.

If we come upon a type confusion we can certainly classify it as 'Not-True'. But this term is susceptible of two interpretations. We might say that sentences which violate type restrictions were 'false' or we might regard them as 'meaningless'. Hobbes himself shifted between these two alternatives. In Leviathan (1651) he introduced a special term 'Absurdity' to
designate propositions which had the grammatical form of declarative sentences but which he considered to lack any cognitive meaning, due, in most cases, to type violations. In the *Computatio sive Logica* (1655) Hobbes abandons this earlier position. Here we find a less restrictive point of view. He uses the term "incoherency" to apply to propositions in which the subject and predicate are names of logically different kinds. Such sentences are not regarded as senseless. Instead type violations become a specialized form of falsity. There is also to be found in Hobbes' writings a severely over-restricted theory of meaning that every statement is either True or Meaningless; no place is given to false propositions as a distinct group.

Hobbes saw clearly that in certain cases, we can, by examination of the formal structure of the proposition in question, determine whether a type restriction has been violated without having to study the content of the proposition itself. For example, the "walk walketh" or in more modern language, "Walking walks" is a type violation, since walking is a function which persons exhibit and we may not by the rules of our language system predicate a property of itself. By way of comparison, the view contained in *Leviathan* might be said to corres-
pond to Russell's Theory of Types, while the treatment in the *Computatio* corresponds to the development of formal systems of logic subsequent to the work of Russell. In these systems there is a tendency to avoid artificial restrictions of meaning and regard important type violations as false, not meaningless. However, it is to be remembered that Hobbes is concerned with sentences which are found in a natural language, while the mathematicians deal with sentences of formalized systems.

It does not seem correct to accuse Hobbes of failing to distinguish between the categories of 'Falsehood' and 'Meaninglessness'. A factually false though meaningful proposition is for him one whose predicate does not include every member contained in the extension of the subject:

"That proposition which is not true, or that whose predicate does not contain its subject, is called a 'false' proposition, as 'man is a stone'".21

In *Leviathan*, on the other hand, a sentence is classed as cognitively meaningless, or absurd, if its subject and predicate belong to different logical kinds.

"...whereas all bodies enter into account upon divers considerations..."
these considerations being diversely named, divers absurdities proceed from the...unfit connexion of their names into assertions."22

It must be admitted, however, that Hobbes, while quite aware of the fact that 'Falsity' and 'Meaninglessness' differ, often makes statements which tend to blur the distinction. Thus in Leviathan he advances in one place the view that if a proposition contains a constituent which is meaningless, the entire proposition is itself untrue. He maintains that a sentence of the form "X is a round quadrangle" is false, since "round quadrangle" is a self contradictory expression due to the defining properties of each of its constituent names. Hobbes is here speaking of sentences whose falsity is due to their containing a contradiction, not to their violating a type restriction. Such sentences in his opinion have no designatum answering to them, since the extension of the subject and that of the predicate have no members in common.

"...whenever any affirmation is false, the two names of which it is composed, put together and made one, signify nothing at all. For example, if it be a false affirmation to say 'a quadrangle is round', the word 'round quadrangle' signifies nothing, but is a mere sound."23
From the following passage it appears that Hobbes also proposed a criterion of meaning according to which all sentences in the indicative mood either fall into the class of true universal affirmative and true universal negative propositions, or into the class of cognitively meaningless sentences.

"...when we reason in words of general signification, and fall upon a general inference which is false; though it be commonly called 'Error' it is indeed an ABSURDITY, or senseless Speech....But when we make a general assertion, unless it be a true one, the possibility of it is unconceivable. And those words whereby we conceive nothing but the sound, are those we call 'Absurd'....And therefore if a man should talk to me of a 'round quadrangle'; or 'accidents of bread in Cheese'; or 'Immaterial Substances';...I should not say he were in an Error; but that his words were without meaning, that is to say, Absurd."24

The above quotation contains a number of further points which are worthy of attention. In the first place Hobbes regards false general inferences as nonsensical. He perhaps has in mind not merely single propositions taken by themselves, but a system of propositions, more specifically, a syllogistic argument. He may mean that a conclusion which is false is not absurd, but that since a false conclusion is
incompatible with true premises, the conjunction itself in such cases is devoid of literal significance. Or again, Hobbes may have intended to say that the conclusion of any argument is meaningless if there is no logical connection (relation of implication) between the premises and the conclusion.

Secondly, we may note that Hobbes regards false general assertions as "inconceivable". It is probable that this term is not to be taken here in a psychological sense, but in a logical way. Hobbes means that if a universal affirmative sentence or a universal negative sentence is analytically true (in his terminology, a 'Necessary' proposition), that is, the predicate is synonymous with the subject term, or a constituent of a term which is synonymous with the subject term, then the negation of such a sentence contains a subject and a predicate which are analytically incompatible.

Thirdly, Hobbes speaks of constituents of sentences, that is, words and phrases, which call up no mental image, as being absurd. The phrase "accidents of Bread in Cheese" is of especial interest. While Hobbes condemns it as non significant he can scarcely have done so on the basis that a type confusion is
involved. For 'bread' and 'cheese' are in his terminology, both "names of bodies". He here seems to regard propositions such as "Cheese is always baked" as meaningless, because accidents which belong to one class of objects are wrongly ascribed to objects of another class. This is, in the given example, "being baked" is a property which is always an accident of bread, but not an accident at all times of cheese. His position seems to be that if a property is predicated of a subject which the latter possesses, then the proposition is true; but if a sentence predicates an accident of a subject which does not have it, the proposition is meaningless. Moreover, the expression "round quadrangle" does not violate any type restriction. Hobbes appears to condemn it on the ground that the two names designate properties which logically exclude each other.

Hobbes summarizes his findings in a review of the conditions under which type confusions may be generated. Two such lists are found; one in Leviathan and the other, which is in some respects more detailed and comprehensive, in the Computatio. Each summary requires considerable interpretation for the vocabulary is long since antiquated and the examples are not always convincing. Nevertheless, it is possible to understand his objectives. It seems clear that Hobbes regarded
type violations as meaningless at the time he wrote *Leviathan* although it is by no means the case that he regarded every meaningless expression as a type violation. This is indicated by his use of the phrase "Absurd assertion". We may quote one example in support of our interpretation of Hobbes at this stage.

"The second cause of Absurd assertions, I ascribe to the giving of names of bodies, to accidents; or of accidents to bodies...."²⁷

The two lists do not correspond in all respects. This is due to the fact that in *Leviathan* mention is made not only of type mistakes proper but also of sources or sets of circumstances, by which type confusions may arise. We shall deal briefly with these first.

"The first cause of absurd conclusions", writes Hobbes, "I ascribe to the want of method; in that they the Philosophers begin not their ratiocinations from definitions; that is, from settled significations of their words...."²⁶

In the quoted passage above, the word 'Method' indicates to us that Hobbes has in mind that branch of scientific inquiry he calls "Synthetical"
and which consists in reasoning from universal principles, that is, axioms and definitions, to their consequences. The important point to which Hobbes wishes to draw our attention is that without initial stipulations we would not be in a position to deduce any conclusions from our premises and thus arrive at knowledge which was valid for all minds at all times and places.

Hobbes considers that Absurdity may arise sometimes through metaphorical language being interpreted in a literal way. For instance, he would condemn, at the time of his writing *Leviathan*, such an expression as "Even the weariest river winds somewhere safe to sea" as devoid of cognitive meaning, in that a physiological state which only sentients can experience is predicated of something inanimate. This source of senseless propositions Hobbes would ascribe "to the use of Metaphors, Tropes, and other Rhetoricall figures, in stead of words proper."²⁷

Hobbes also warns his reader against words which are used in the context of a sentence but which do not denote any activity, quality, or entity which exists. He directs his criticism against "names that signify nothing; but are taken up and learned by rote from the Schooles, as...eternal-Now, and the like canting of
Schoolemen.\textsuperscript{28}

In the \textit{Computatio} the first kind of type mistake which he distinguishes is that made when a property word is treated as the name of a body, or the name of a body is treated as though it were the name of a property. The significance of this distinction hinges in large part on one of the basal characteristics of Hobbes' metaphysics. He is willing to accept the Aristotelian distinction between a subject, that of which predications are made, but which cannot itself be predicated of anything, and its accidents, or non essential characteristics liable to modification. However, Hobbes tries to combine this theory with the new view that all change is local motion. He identifies substance with that which is independent of our thought and coextended with some finite region of space, that is, with an entity construed in terms of the physics of his day. Hobbes remarks, cryptically, that an accident is that which is "the manner of our conception of body."\textsuperscript{29} He seems to mean that an accident is a causal property akin to what Locke was later to call a "power", which produces images in our sense organs. According to Hobbes, spatial magnitude and shape are the only accidents which belong to all bodies.
Hobbes thinks that previous philosophers had frequently made the mistake of treating the properties of an object as if they were themselves detachable things which could exist either with or without the object of which they were qualities. Hobbes would admit that a sentence such as "The book is red" does not violate a type restriction if "is" be interpreted in the sense of predication, i.e. as 'having a property'. But "Extension is body" or "Whiteness is bread" would be type confusions for him if "is" be taken in the sense of identity. The point he wishes to make may be brought out as follows. Suppose we let the numeral '0' stand for the most basic level of Hobbes' ontology, that of bodies. Then let us represent the properties of those bodies by the numeral '1' to indicate they are abstractions which belong to a type one higher than the entities to which they apply. We can now see that both the examples above violate the type restriction that names of things on either side of the connective belong to the same type level. Again, let us consider his example "Faith is inspired" by which he means "Faith is infused into the mind." Now, in the second sentence, from the point of view of grammatical form, what Hobbes terms a property of a body is being spoken about. There is no entity which the term "Faith" denotes. The proposition refers to any person who exhibits
in his behaviour a certain sort of mental characteristic. The point of his objection is that the word "Faith" is spoken of as though it were a thing which had the nature of a liquid.

Hobbes notes in the *Computatio* as a second kind of type violation the combination in a proposition of the name of a body with the name of an image, where the copula 'is' has the sense of identity. Hobbes insists on the importance of distinguishing between what we would today call a physical occupant or subject of causal powers, and a family of sense data. On the basis of his Causal Theory of Perception, colours, sounds, and smells, do not qualify the material objects of the external world, but are effects of sense stimulation upon the organism. Hence an assertion such as "There is a clump of trees at the end of the rainbow" would be considered false by him at the period 1655, for a datum which he believes exists only during the sentient's perceptual experience is given the status of a physical entity having spatial location in the external world.

Hobbes next proceeds to point out a type violation which is a variant of what Ryle would term a "Category mistake". This mistake which he wishes to expose consists in the reification of a class. He wants
to stress the fact that if a class term is treated as though it were one of the members of its own extension, a false construction will be produced. Class terms are words of 'second intention', that is, they belong to a metalanguage. An example of this confusion would be "The cat is a species". Terms such as 'genus' and 'species' and 'universal' are to be distinguished from the objects which constitute their extension.

A closely related sort of type confusion which Hobbes detects consists in combining in a sentence the names of specific kinds of propositions which belong to a metalanguage with the entities named in an object language. Hobbes wishes to draw attention to the fact that such expressions as 'necessary' and 'contingent' are words which designate the propositions of what we should today term a Modal Logic, and do not designate objects. We may take the following example for purposes of illustration.

(1) "'Socrates is a man' is a necessary proposition" (T)
(2) "It is necessary that water seeks its own level" (F)

Another sort of type confusion of which Hobbes is well aware is the violation of the distinction between using an expression and mentioning it, or in his terminology, copulating in a proposition, "the name of
an accident" with "the name of a Name." Hobbes recognizes that the preservation of this distinction is of help in eliminating what Ryle has termed "Quasi Platonic statements". Let us consider Hobbes' example, "whiteness is the genus" and rewrite it slightly.

(1) "Whiteness is a genus" (F)
(2) "'Whiteness' is a genus" (T)

Hobbes would no doubt admit that there are white houses, white swans, and white flowers but he would hold that it is a misleading way of speaking to assert that they have anything in common. The word 'whiteness' denotes various things which are white houses, swans, and flowers, but 'whiteness' does not refer to any single universal entity. The use of general terms like predicates does not entail, according to Hobbes, that they are names of abstract entities.
FOOTNOTES FOR CHAPTER II

1. Leviathan, Chapter Four
2. Elements of Philosophy, Page 35
3. Human Nature, Page 23
4. Elements of Philosophy, Page 38
5. Elements of Philosophy, Page 37
6. Elements of Philosophy, Page 38
7. Elements of Philosophy, Page 38
8. Elements of Philosophy, Page 38
9. Elements of Philosophy, Page 38
10. Elements of Philosophy, Page 38
11. Elements of Philosophy, Page 38
12. Elements of Philosophy, Page 39
13. Elements of Philosophy, Page 39
14. Elements of Philosophy, Page 57
15. Elements of Philosophy, Page 56
16. Leviathan, Chapter Five
17. Leviathan, Chapter Forty six
18. Leviathan, Chapter Five
19. Elements of Philosophy, Page 57
20. Elements of Philosophy, Page 58
21. Elements of Philosophy, Page 35
22. Leviathan, Chapter Five
23. Leviathan, Chapter Four
24. Leviathan, Chapter Five
25. **Leviathan**, Chapter Five
26. **Leviathan**, Chapter Five
27. **Leviathan**, Chapter Five
28. **Leviathan**, Chapter Five
29. **Elements of Philosophy**, Page 104
30. **Leviathan**, Chapter Five
31. **Leviathan**, Chapter Five
32. **Elements of Philosophy**, Pp 58-9
33. **Elements of Philosophy**, P 59
34. **Elements of Philosophy**, P 60
35. **Elements of Philosophy**, P 60
CHAPTER III

Section I - On the Analysis and Synthesis of Images

We can formulate propositions only when we begin to examine the relations between images or concepts. Hence the status of these conceptual elements of propositions must be determined before the propositions themselves can be considered with respect to the role that they perform in Hobbes' account of scientific methodology. Philosphic reasoning has for him two branches, one of which he terms analytical or resolutive and the other synthetical or compositive. The function of these activities is to enable men to discover what properties the external world possesses for us to have the type of sensations that we undoubtedly do experience. Construed as psychological processes, analysis and synthesis have as their subject matter or content images, or in more modern terminology, concepts.

The analytical method begins at the level of experience and its data are concrete particulars. As the original source of the material of knowledge is sense
experience, any given analysis involves for its starting point some introspected image. According to Hobbes we form an image of some given object and from the phantasm abstract those universals which the object embodies. For an investigation into universal causal connections Hobbes considers that information of what he terms "universal things" is requisite. By the expression "universal" he understands in this context a property which is not restricted to one instance but which may be found to occur in many situations. From a single image we can select general elements which will apply not only wherever the original concept applied but usually to other things as well. Thus analysis gives concepts which are more comprehensive than that with which we started. Hobbes does not interpret abstraction in a material sense. We do not in any literal manner physically separate a quality from its context. He means only that we are performing a mental operation of generalizing from relatively particular accidents or properties to those which have a broader range.

"...by parts, I do not here mean parts of the thing itself, but parts of its nature, as, by parts of man, I do not understand his shoulders, his arms, &c. but his figure, quantity, motion, sense reason, and the like; which...constitute the whole nature of man, but not the man himself."
In analysis we proceed from a single concept to one or more concepts for which it is a sufficient condition. Hobbes requires that the first property "imply" the second in the sense that the attribution of the first predicate to anything entails that the second must also be attributable to that thing. Commencing with a particular property we can derive more general ones from it. For instance, we know that if something has the property of lion-ness it must have the properties of being carnivorous, and being feline, and being loud voiced. In symbols

\[
\begin{align*}
(1) & \quad \text{"X is a lion" implies "X is carnivorous"} \\
(2) & \quad \text{"X is a lion" implies "X is feline"} \\
(3) & \quad \text{"X is a lion" implies "X is loud voiced"}
\end{align*}
\]

However, for Hobbes analysis can be carried on in a ladder of concepts which have an increasingly broader extension. For example, the property of being carnivorous can in its turn be analyzed into being fierce and animate. It applies to many other things besides lions.

\[
\begin{align*}
(2) & \quad \text{"X is carnivorous" implies "X is fierce"} \\
(3) & \quad \text{"X is carnivorous" implies "X is animate"}
\end{align*}
\]

Again, the property being fierce applies
to more things than does the property of being carnivorous because it refers to herbivorous animals such as elephants. In this way we see how analysis proceeds from relatively specific terms to those that are more general.

Hobbes seems to confine his attention to cases where we decompose an image into its essential properties. But it is not, as a matter of fact, the case that analysis of an image results always in a set of defining properties. We may take the following case for purposes of illustration.

"X is a flying fish" X has gills
"X is a flying fish" X has scales
"X has gills" X breathes in water
"X has gills" X is cold blooded

However, the converse relation does not hold:

X has gills and X has scales X is a flying fish.

Many other things besides flying fish have gills and scales, for example, perch and trout.

We may note that while Hobbes does not use the expression Complete Analysis he would probably strongly affirm its possibility. As we shall see,
synthesis for him would be the exact reverse or opposite of such a process.

Synthesis is for Hobbes a mental activity which involves a fusion of elements in the sense that we put together simple images to obtain more complex ones. It is a creative function by which abstract components are amalgamated to construct a new concept of the original sense content or a novel imagined notion. He by no means wishes to assert that when synthesizing we build something in the external world. Nor can we reconstruct the original datum we have previously experienced, which for Hobbes would be an image located in some sense organ of the nervous system. If for example, a person sees a mathematical formula written on the board, the image of which he is aware is an event which is dated and which takes place here and now. But he can form a new image similar to but not identical with that previously experienced, which will reduplicate both the original figures and their order.

Synthesis enables us to extend our knowledge as we have images at our disposal to combine into novel complexes we have not encountered, for though the ingredients may have been previously experienced, their conjunction may not have been. If for example, we
take a green box and a red marble, we can abstract from one object redness and circularity, and from the other rectangularity and greenness. Then by synthesis, Hobbes would presumably say that we can form images of a green marble and a red box even though these may never have entered our experience.

Synthesis proceeds from many images to one unified concept such that the many concepts in conjunction are necessary and sufficient conditions for the one concept. We put enough abstract features together to get a definition, that is, the conjunctive combination applies to all and only those things to which the emerging concept applies. The conjunct of properties connotes the property that is being defined or synthesized, in addition to the requirement that the synthesized property connotes each property with which the synthesis began. Hobbes requires that the concept or term to be defined imply each and every one of the properties we are combining. We may take the following example for purposes of illustration.

\[ X \text{ is rational and animated} \equiv X \text{ is a man} \]

Either side of the equivalence sign is an adequate definition of the other since each is a necessary and sufficient condition of the other.
Modern philosophers distinguish between various types of arguments. By an argument is here understood a group of sentences in which the conclusion would either be certain or merely probable, given the premises. Arguments of the first kind are called Deductive and examples of them may be found in pure mathematics and logic. In these the conclusion is entailed by the premises. Those of the second kind are called Inductive. By an inductive argument is here understood one in which we infer that all the members of a class have a certain characteristic which belongs to all observed members of the class which we know to have this property. In other words, an inductive argument is based on the supposition that a proposition is true of a whole collection which is true of a number of instances of a sample. It is widely assumed that Hobbes is exclusively concerned with deductive reasoning comprising "if-then" sentences. In point of fact he was fully aware of inductive argumentation but he does not assign to it a scientific status.

We would today believe that scientific investigation involves the selection of some specific problem; the formulation of a hypothesis; deduction from it of various consequences; and prediction to determine
whether those consequences were verified by observed facts. Scientists do not today claim certainty for their conclusions. Matters were otherwise in Hobbes' day. Scientific method in the seventeenth century meant the carrying over into different fields of inquiry the method which had proved successful in geometry. Geometry was considered to start from certain self-evident premises, which together with definitions, guaranteed the truth of the propositions which followed. In this way every step is validated by what precedes, back to the truths from which the construction starts. Since the discipline was conceived to proceed from simple propositions to more complicated ones, and since it used only what had been proved previously, rationalists were prone to believe that any possibility of error could thereby be eliminated. It is true that Hobbes follows in part the Cartesian tradition, in that he considers Deduction to be the ideal of science. But he diverges from continental rationalism even here, for he considers Science to consist only of implication relations which are of conditional strength, such as "if the figure shown be a circle, then any straight line drawn through the centre shall divide it into two equal parts." Moreover, Hobbes differs still further from his continental contemporaries in his evaluation of that type of reasoning to which he gives the name of Prudence.
For Hobbes inductive generalizations are based upon experience, but Prudence differs from sense content in that it is a utilization of past experience to anticipate the course of future events or make surmises about past events. We remember the succession of an event of type A upon another event of a different type, B, and this remembrance is called by Hobbes an experiment. Experiments are of two varieties. The first kind is dependent on our volition, or as we might say today, our efficient causality, as when we combine oxygen and hydrogen to produce a certain result. The second kind is independent of our volition and consists of sequences in which whenever one phenomena P takes place, it is always, as a matter of empirical fact, followed by a phenomena P1 but no logical necessity or causal law is involved. An example of such a kind of experiment would be the alternation of day and night.

For Hobbes successful inductive predictions are a function of two variables; the degree of intelligence a person has which will enable him to notice a greater number of associated events or signs, over a given period of time; and the recollection of a greater number of concomitances than others due to age. Experience grows in both of these ways. It is the second factor which explains the wisdom of the prudent man. For this reason
his anticipations of the future tend to be more reliable than those of younger people. However, the significance of both factors lies in the amount of experience that is so acquired, that is, the aggregation of successions of events.

Hobbes distinguishes between two kinds of inductive reasoning which he terms Conjecture and Expectation. In the past we may have observed that all events of the class A are followed by events of the class B. When an event \( A_1 \) is seen we anticipate that it will be followed by an event \( B_1 \). For example, we have always seen in the past smoke to be accompanied by fire. So when I see that the top of a hill is covered with smoke, I infer that there is a forest fire. Such reasoning is called Expectation.

"Thus after a man hath been accustomed to see like antecedents followed by like consequents, whencesoever he seeth the like come to pass to any thing he hath seen before, he looks there should follow it the same that followed then...."11

Again, we may have observed that all events of the class B have been preceded by events of the class A. When we see an event \( B_1 \) we surmise that it was preceded by an event \( A_1 \). For example, in the past we may
have observed that ashes are left when a fire goes out. Thus when we again see ashes at the present time, we infer that there was previously a fire.

"In the same manner, if a man seeth in present that which he hath seen before, he thinks that which was antecedent to that which he saw before, is also antecedent to that he presently seeth..."12

Hobbes sometimes suggests that our propensity to project our expectations into the future is gradually limited by the failure of rash anticipations and becomes restricted to what has been uniformly con­joined in the past, for he describes Prudence as "the taking of signs from experience warily, that is, that the experiments from which we take such signs be all remembered; for else the cases are not alike that seem so."13

According to Hobbes there is no way of knowing with either certainty or probability the truth of a universal contingent proposition, such as All crows are black although we can know the falsity of such a proposition by means of one disconfirming instance, ie when the predicate of the sentence fails to contain in its extension one of the members of the subject term. Current conceptions of inductive logic differ from the Hobbesian
view in that they frame a universal 'A' proposition and ascribe to it a certain degree of probability. We may take the following case for purposes of illustration.

Sample #1 of a ferrous metal is observed to be magnetic
Sample #2 of a ferrous metal is observed to be magnetic

Sample #n of a ferrous metal is observed to be magnetic

... All ferrous metals are magnetic

Hobbes expresses his own position as follows.

"As in conjecture concerning things past and future, it is prudence to conclude from experience, what is like to come to pass, or to have passed already; so it is an error to conclude from it, that it is so called...we cannot from experience conclude...any proposition universal whatsoever, except it be from remembrance of the use of names...."14

From his remarks about Conjecture and Expectation we may infer that he employs his conception of probability to support the relatively modest expectation that the next instance will have a property which past instances have had. Since he holds that only necessary
or analytic sentences are certain he is not concerned with inducing 'A' propositions. He avoids the inductive leap of generalizing from observed cases to all cases whether observed or unobserved. His view has the merit that with a small amount of experience at our disposal, we would be more secure in confining ourselves to making a prediction about a single event, than in making a universal generalization.

The question arises as to whether the restriction of predictions to the extrapolation of a single event at a time is adequate in all respects. It might meet our personal needs. Our use of prudence would be more applicable to single case conjecture about the result of an action, as when a person reflects that "If I rob the bank, then I will be put into jail." But Hobbes' view will probably not be satisfactory so far as our statistical requirements are concerned, as when for instance, we conduct a Gallup Poll. His position may be illustrated as follows.

(1) "The sky is red tonight"

The above sentence intimates that we are directly acquainted with a presently existing state of affairs. Such specific apprehension of particulars is one of the two sources of what Hobbes terms "Knowledge
of Fact"\textsuperscript{,15} that is, awareness of sense content which is indubitable.

(2) "In the past, red evenings have always been followed by fair mornings."

The above sentence intimates that we are appealing to memory which is the second source of "Knowledge of Fact." Reliance is being placed upon our recollection of concomitances previously observed.

(3) "There will be a fair morning tomorrow."

The above sentence is a particular affirmative proposition which Hobbes classifies as a conjecture and denies the rank of scientific knowledge. It has only the status of 'Opinion',\textsuperscript{16} that is, a sentence which we take for granted as being true or false, but for which conclusive testimony is not available. Such propositions are not known to be true or false.

While Hobbes consistently applies his probability ratings to states of psychology, \textit{i.e} attitudes designated by terms such as 'expectation' and 'conjecture' he does not advocate a theory which defines probability in terms of measure of belief. On the latter view a sentence such as "X has the probability of $\frac{1}{2}$" would be
translated by "I anticipate one event just as much as the other." The position that Hobbes takes is rather that the frequency with which one type of event has been associated with another kind of event should be taken as the measure of the inductive reliability of our predictions. Prudence enables us to govern our plans by the computation of the number of observed associations.

"When a man hath so often observed like antecedents to be followed by like consequents, that whenever he seeth the antecedent he looketh again for the consequent; or when he seeth the consequent, maketh account there hath been the like antecedent; then he calleth both the antecedent and the consequent, signs of one another...."17

On this frequency interpretation of Hobbes, we may regard him as holding that the probability of the proposition "The next crow will be black" can be estimated by means of the following formula:

\[
\text{Probability} = \frac{\text{Number of observed crows which have the property of being black}}{\text{Number of observed crows which have the property of being black} \neq \text{Number of observed crows which are not-black}}
\]

An important point we may note is that Hobbes has realized that we never strictly see the same successor or predecessor twice. A day and a night are
dated concrete events which do not happen again. Thus if we experience the following succession:

Red sunset_1 followed by fair morning_1
Red sunset_2 followed by fair morning_2
Red sunset_3 followed by fair morning_3

Hobbes would agree that we attend, so far as induction is concerned, to the common properties denoted by 'red' and 'fair' which do repeat themselves but that the events involved are unique and irrepeatable. This interpretation seems to be indicated by his use of the expressions like antecedents\textsuperscript{18} and like consequents\textsuperscript{19}.\"
FOOTNOTES FOR CHAPTER III

1. Elements of Philosophy, Chapter Six, Page 66
2. Elements of Philosophy, Chapter Six, Page 66
3. Elements of Philosophy, Chapter Six, Page 68
4. Elements of Philosophy, Chapter Six, Page 67
5. Leviathan, Chapter Nine
6. Tripos, Chapter Four, Page 16
7. Tripos, Chapter Four, Page 18
8. Tripos, Chapter Four, Page 18
9. Tripos, Chapter Four, Page 17
10. Tripos, Chapter Four, Page 16
11. Tripos, Chapter Four, Page 16
12. Tripos, Chapter Four, Page 17
13. Tripos, Chapter Four, Page 18
14. Tripos, Chapter Four, Page 18
15. Leviathan, Chapter Nine
16. Tripos, Chapter Six, Page Twenty Nine
17. Tripos, Chapter Four, Page Seventeen
18. Tripos, Chapter Four, Page Seventeen
19. Tripos, Chapter Four, Page Seventeen

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