THE
INFLUENCE OF C I LEWIS ON
SHEWHART AND DEMING

G T PETERSON

EXCELSIS BUSINESS ADVISERS

OCTOBER 1998

INTRODUCTION

In their writings, both Shewhart and Deming quote the work of the philosopher C I Lewis. Statisticians or management advisers do not normally refer to philosophers. So what was it in C I Lewis that attracted Shewhart and Deming, and how can we see its influence in their teachings?

This paper picks out the main themes in Lewis's best-known book, *Mind and the World Order*[1], and demonstrates how these themes relate to the core teachings of Shewhart and Deming. However, this should not be taken to imply that Shewhart or Deming based their ideas on this philosophy; rather it should be taken that they saw parallels in *Mind and the World Order* that enabled them to put their ideas in a rational, philosophical context.

This is backed up by two appendices;

APPENDIX 1 sets out a the basic philosophy of C I Lewis through a concise summary of *Mind and the World Order,* in which Lewis attempts to address two age-old philosophical questions;

- **what is the nature of human knowledge?**

- **how is it possible?**

Starting from a position based on Kant's *Critique of Pure Reason,* he develops a point of view which he calls *CONCEPTUAL PRAGMATISM,* that aims to take on board;

- **The way that knowledge, especially science and technology have developed over the last 300 years.**

- **Modern scientific developments in abstract areas, such as relativity, quantum mechanics.**

- **Statistical methods and probability theories.**

To repeat, *Mind and the World Order* is a work of serious philosophy. Even in this highly summarised format, there are a lot of philosophical concepts to be grappled with. There is no 'instant pudding' way to present Lewis' ideas. The five page summary sets out a framework of the ideas, that occupy 400 dense pages in Mind and the World Order !!

APPENDIX 2 sets out the basic elements of two strands in the epistemology of western philosophy:-

DEDUCTIVE RATIONALISM, which we could think of as mainstream philosophy , runs from Socrates to the Enlightenment - and beyond, it emphasises the reflective method and rational modes of thinking in metaphysics. In particular, it places greater emphasis on certainty and deductive proof.

INDUCTIVE PRAGMATISM has its origins with the *sophists* in Athens in the Fifth Century BC, appears with Francis Bacon in the Sixteenth Century and the later empiricism of Locke, Hume and Berkeley, to emerges as utilitarianism and pragmatism in nineteenth century Britain and America. It tends to be empirical, practical, accepts relativity and probability, and places greater emphasis on inductive reasoning.

This is not intended as a comprehensive guide to philosophy; the separation of western philosophy proposed above would probably be disputed by most philosophers. Indeed, Kant's stated objective was to reconcile these two strands; and the Age of Enlightenment was influenced by both sets of ideas.

It represents a convenient way of pulling together the elements of epistemology in western philosophy that were current at the end of the nineteenth century, and which would have been influenced Lewis in developing his framework of conceptual pragmatism. It is clear that he has taken both strands in developing a philosophy that explains the development of modern science.

A GLOSSARY of philosophical terms used in the paper is also included.

These sections stand alone, to some extent. They may be taken in the order that suits the reader.

---

[1] C I Lewis *Mind and the World Order - Outline of a Theory of Knowledge,* , 1929, Dover Publications Inc, 0-486-26564-1

LINKS TO THE PHILOSOPHY OF C. I. LEWIS IN THE WRITINGS OF SHEWHART AND DEMING

Many readers will be familiar with the ideas promoted by Shewhart and Deming. This section looks at the key concepts that they used;

- operational meaning / definition,

- co-operation,

- understanding data / information,

- how knowledge is increased,

- mathematical models,

and shows how they are related to the philosophy of C I Lewis.

The inductive, pragmatic part of Lewis's philosophy emphasises the vital function of empirical knowledge in guiding the growth of human knowledge and of controlling the world around us. In particular this takes the form of justifiable expectations which we might expect to result from such activity, and testing whether the expected results occur. Knowledge is successful and useful knowledge; thought of this way, knowing as correct anticipation, does everything knowledge could conceivable do.

This fits with Deming and Shewharts' views on operational definitions, co-operation, standards and the growth of knowledge using the inductive / deductive elements of the scientific method.

The rationalistic part of Lewis' philosophy emphasises that mathematics is *'a priori',* deductive, it provides models of the natural world that help us understand it better and predict future eventualities. The application of any particular mathematical model to any situation is empirical and, probable, it must account for current empirical data and provide predictions of future experience that are testable.

This is the philosophical basis of the Shewharts' control charts that also meet the pragmatic test of *usefulness"*, by providing a practical, economic way to achieve a state of control in the quality of the output from manufacturing and service industries.

The following section looks at these concepts in more detail.

(**The text in blue represent direct quotes from Mind and the World Order in the relevant area**).

COMMON CONCEPT

Lewis starts from the basic premise that all human knowledge is founded on <u>individual</u> experience, which consists of two elements; - an initial sense perception, followed by the mind's response to the presentation. Human knowledge is possible because individuals can communicate and can reach agreement, if each mind discovers, within its experience, patterns that fit a common concept. (What they can agree on). Building on the work of Pierce, James and Royce about 'meaning' in language and concepts, Lewis introduces the term "common concept".

> **"COMMON CONCEPT** *may be defined as the meaning / interpretation that must be common to two minds when they understand each other by use of a substantive or equivalent. Individual differences in perception do not impede our common knowledge, nor our ability to convey ideas; as long as we can find agreement in something like wave length or frequency. The practical and applicable criteria of our common knowledge are that we share common definition of terms, and that we apply the same substantives / adjectives to the same object.*

Shewhart and Deming both make use of this idea, although they use different terms.

Shewhart uses the term '*operational meaning*', and explores operationally definite meanings of statements about accuracy and precision[2].

Deming uses the term '*operational definition*', which puts meaning into a concept, and is one that reasonable men can agree on[3],[4].

However, achieving agreement on 'meaning' between two people is not as easy as it sounds. As human beings we use other forms of communication than the spoken, or written, word. However, even when we use the same words, phrases or concepts, we may have different meanings in mind, leading to confusion, or worse[5].

As a means of overcoming the limitation of achieving agreement on meaning, Covey suggests, "*Understand, then be understood*", he proposes a technique for reaching better agreement[6] – 'we will not proceed until you have my expressed <u>my</u> argument to me in a way that I can agree with' – easy to say, but tough to do !

---

[2] Statistical Method from the Viewpoint of Quality Control, Shewhart, pages 129 – 137
[3] Out of the Crisis, Deming, Ch 9 & 10
[4] The New Economics, Deming, pages 108 – 109
[5] Wittgenstein, *Philosophical Investigations,* 1953, Blackwell
[6] Covey & Merrill, *First things First, Ch. 12,* 1994, Simon & Schuster

CO-OPERATION

Standards

> *The objectivity of meaning is fundamental to science and to other intellectual exercises. We must have meanings that are common to minds when they co-operate, otherwise the co-operation is illusory.*

We all recognise that science and technology depend on agreed standards. The International Standards Organisation provides us with a common base to work on, and is an achievement of our common human world[7].

Deming was keen that there should be a minimum of Government regulation of agreed standards in a given industry. He called for co-operation between organisations in industry and commerce to achieve agreed standards by voluntary agreement, relieving government of the detailed bureaucracy and enabling the needed changes to take place efficiently, over time[8].

Organisations

As we have seen earlier, Lewis places great emphasis on the idea that knowledge results from human co-operation.

> *The significance of concepts is that they lead to knowledge; the significance of knowledge is that it leads to action, community of knowledge leads to community of action. Our common world is social achievement, … fostered by our need to co-operate. The eventual aim of communication is co-ordination of behaviour - it is essential that we should have purpose / aim in common.*

He does not specifically refer to 'system', however, it does not require a large leap of imagination to see systems / organisations as human achievements, based on co-operation.

This theme is taken up by Deming[9], who describes a *system* as a network of interdependent components, (processes), which work together to achieve the aim of the system;

- **Without an aim there is no system,**

- **Co-operation, (not competition), is required between the parts of the system,**

- **Effectiveness of connections and communications between processes can be, at least, as important as the performance of the individual processes,**

- **Customer and suppliers are part of the system.**

Competition between the components of a system can lead to failure to achieve the overall aims of the system. A sub-component of a system may optimise its performance, to the detriment of the performance of the system as a whole, Deming termed this 'sub-optimisation.

Is unbridled competition the optimum system? Deming strongly emphasises that competition works best inside a system of co-operation. No one could accuse American Football of lacking aggression or competition. However, all thirty teams that make up the National Football League recognise that most teams need to achieve a similar level of performance, to ensure that the sport, as a whole, remains attractive to its audience. If one team were to dominate all the time, spectators would lose interest. So, the teams co-operate, through the NFL, in a system which includes a draft-pick and salary capping, and ensures that under-performing teams have a chance to improve. Demonstrably, this works - over time - to maintain the interest of fans in the sport, and is a clear example of competition flourishing inside a system of co-operation.

---

[7]   The New Economics, Deming, pp. 90 - 93
[8]   Out of the Crisis, Deming, Ch 10,   The New Economics, Deming, pp. 56 - 57
[9]   The New Economics, Deming, Ch 3.

UNDERSTANDING DATA   INFORMATION

A correct understanding of data / information is key to the teachings of Shewhart and Deming. In this case we can take it that they were directly influenced by the philosophy of Lewis, since *Out of the Crisis*, Ch. 9 and *Statistical Method from the Viewpoint of Quality Control*, Ch 3 are littered with references to *Mind and the World Order*.

Deming often said, "there is no true value of any measurement"[10]. At first this may seem strange to us, since we are accustomed to the perceived 'certainty' of mathematics. Much of philosophy is concerned with the idea of certainty. Lewis proposes that mathematics - as an <u>abstract</u>, human construct - can be taken as certain. In philosophical terminology, it is *'a priori'*, analytic; the truths of mathematics follow from a set of basic definitions that exhibit the meaning of its concepts by logical deduction. However, the application of any mathematical construct in any given situation is a matter of <u>probability</u>, determined by pragmatic considerations.

Put simply, the fact that a particular measurement system produces some numbers does not mean that we are generating values that meet the philosophical criteria of truth or certainty.

The logical extension of this is that in order to understand data / information we must have an operational definition of the context in which they were obtained, that includes the following;

> **METHOD / TECHNIQUE / EQUIPMENT, How is data arrived at?   100% checking vs. sampling?**

> **AGREED STANDARDS In the physical sciences there are clear definitions, such as "metre", an agreed International Standard; however, in the behavioural sciences this is not so clear, for example, how to achieve an operational definition of "unemployment"?**

> **ACCURACY, What reliance can we put on the data?**

> **VARIATION there will always be, in output, in service, in product; what is the variation trying to tell us - about the activity - about the people who work in it?**

Lewis argues strongly that knowledge, can only be valid, if we are able to express clearly the grounds on which it is based.

Another consideration is the relation between probable judgement and the facts that constitute its grounds, this must rest on the data on which the probable judgement is based. Thus, probable knowledge is relative to him that has it; depending on what other relevant knowledge he may have. … The character of empirical knowledge is that of probability judgements that are sound if they use a 'just' logic. Further experience may destroy the judgement, but it was forever true that it was probable - on the grounds used to make it.

All activities generate data, what does the data tell us? Information is not knowledge; modern communication and information technologies have provided us with more with data, information than we can cope with, what we need is a rational way to establish what data is relevant. Deming advised us to 'be shrewd in use of figures' and warned that the old saying, 'if you can't measure it - you can't manage it' is a costly myth[11].

Managers need to make decisions in uncertain situations; where they face the paradox that they have too much information in some areas, while in other areas they have insufficient information, and the consequential gains or losses from an action are unknown and unknowable. The understandable response of most managers is to rely on the available, easily-collected data, Deming warns that this can lead to trouble, we need to much more rational in the way we handle data[12]. For example, customer loyalty or the benefits of training are impossible to quantify - this does not mean that they cannot be managed, nor does it mean that they cannot be improved[13].

---

[10]   Out of the Crisis, Deming, p. 279
[11]   The New Economics, Deming, p.36 - a better adage is 'what gets measured gets done'
[12]   Out of the Crisis, Deming, pp 121 - 127
[13]   The New Economics, Deming, p.65

HOW KNOWLEDGE IS INCREASED

Lewis says knowledge is temporal, (in other words, has past to future continuity), and that it enables us to make predictions.

The application of concept must be verifiable over time, ...   We develop an <u>hypothesis</u> based on momentarily presented experience, which involves a prediction that can be proved / disproved by further experience, … Empirical truth, (knowledge of objects), comes from <u>conceptual interpretation of the given</u>. To ascribe objective qualities to a thing means that I can make predictions about further activity,
"if I do this . . . , then that . . . .";
this is the whole content of our knowledge of reality The truth of such propositions is independent of the observer. The "if" depends on the active mind, the "then" is totally determined by outside reality.
However I start with "if", the "then" is independent of my attitude / purposes.

Shewhart expanded "*if….then…*" to a three step process; "*make an hypothesis, carry out an experiment, test the hypothesis*", (with a parallel in the 'state of control' as a <u>cycle</u> of specification, production, inspection)[14].

This was further refined by Deming. In his work with the Japanese in 1950, he proposed a cycle of;
1. plan a change,
2. carry out the change, preferable on a small scale,
3. Observe the effects of the change,
4. Study the results - what did we learn?, what can we predict?
5. Repeat 1. with accumulated knowledge,
6. Repeat 2.[15]

Initially he termed this the Shewhart Cycle.

In later work[16], he further modified this cycle to;
P plan a change,
D carry out the change, preferable on a small scale,
S. Study the results - what did we learn?, what went wrong?
A. Adopt the change, or abandon it, or run through the cycle again

This he termed 'the Shewhart Cycle for Learning and Improvement - the P-D-S-A Cycle'.

He says that knowledge is built on 'theory', without 'theory' there is no way to use all this data, information. He makes the point that knowledge is built through systematic proposing, testing and extending / revising 'theories'.

Nolan, Provost, et al of API[17], have extended this even further to demonstrate that PDSA brings the power of the scientific method into all our work activities.

---

[14]   Economic Control of Quality of Manufactured Product, Shewhart, pp. 55, 121,
[14]   Statistical Method from the Viewpoint of Quality Control, Shewhart, pages 44 - 45
[15] Out of the Crisis, Deming, p. 88
[16] The New Economics, Deming, pp. 134 - 136
[17]   The Foundation of Improvement, Langley, Nolan & Nolan – API,
       Bringing the PDSA Cycle to Life, Provost – API,
       Understanding Variation, Nolan & Provost, *Quality Progress, May 1990*

However, Deming warned that the effect of this view of how knowledge is increased means that empirical evidence is never complete[18]. We are always at the mercy of newly discovered facts. He also advises us to be sure that our hypothesis is clearly based on linked cause and effect, and not on co-incidence[19]. He makes specific reference to p.195 of *Mind and the World Order*, where Lewis writes, *"There is no knowledge of external reality without anticipation of future experience, ...there is no knowledge without interpretation, the fact that it reflects the character of past experience will not save its validity".*

This is the basis of Deming's - often misunderstood - sayings that experience and/or examples alone teach nothing without 'theory'. Experience can only be put to rational use by the application of analysis, mathematical / statistical techniques leading to understanding / knowledge[20].

In other words, management requires prediction which must be based on a hypothesis, 'theory', about the way the organisation - as a system - works. Rational management planning involves a simple thought pattern; "*If* our organisation, as a system in a known environment, works in the following way......., *then* if we do......., the following results will accrue". This prediction can be tested with appropriate metrics and statistical techniques. Analysis of the results should lead to action to improve the system.

The fact that another organisation achieved a given set of results in a similar situation will not help you unless you understand how they did it and how that might be of help in your procedures. Deming warns that "to copy an example of success, without understanding it with the aid of a 'theory', may lead to disaster", (benchmarking)[21].

Scientific Knowledge

Lewis expanded his ideas on the role of hypothecation in conceptual interpretation to explain how scientific knowledge has developed.

Today we recognise that science is not wholly deductive or inductive; it involves the process of hypothesis and verification. But the terms in which the hypothesis / law are framed represent a scientific achievement. The world does not consist of fixed categories on one side and fixed things on the other. Scientific classification / categorisation are subject to alteration / abrupt changes that affect other aspects of science. But the process does not take place by deduction from first principles or directly from experience. It involves a process of hazarding something in mind which is then retained or otherwise, depending on its success.

So, how do new concepts, paradigms get to replace the older well-established concepts?

....the test is intellectual consistency, comprehension and simplicity of interpretation. New truth represents the creative power of human thought, but is always pragmatic. When old methods of interpretation are discarded in favour of newer ones, this is driven by new empirical data which are difficult to interpret in the old method. The advantage of the change must be great enough to overcome human inertia and prestige. The factors that we need to examine and that drive pragmatic change are; the old concept versus the new concept, expanded experience with novel data, how concepts are applied to this expanded experience.

Lewis is presaging Thomas S. Kuhn by half a century!

18 Out of the Crisis, Deming, pp 133, 317
19 The New Economics, Deming, p. 105
20 Out of the Crisis, Deming, pp 19, 128, 317, 404
21 The New Economics, Deming, p. 37

MATHEMATICAL STATISTICAL MODELS

Lewis says that mathematics, (including statistics), is human construct, it does not depend upon a world of 'things' for its validity. On the other hand, a reasonably ordered world does exist that is independent of such a human construct.

What is required is a practical attitude that says that action in accordance with probability is more likely to be successful. If probabilities as general predictions are justified by the future, then the world must be orderly, and an attitude based on past co-incidences is the safest one. The essence of the validity of empirical knowledge is its ability to predict the future".

The pragmatic element in knowledge concerns our choice of conceptual modes of application, between the absolutes of mathematics on the one hand and the given experience on the other. The fact that mathematics works, in application, is nothing to do with its logical integrity. The choice of 'a priori', abstract, concept and the application of it to any particular is a matter of <u>probability</u>, determined by pragmatic considerations, and is an interpretation that is predictive; the degree of assurance reflects generalisation from experience.

Despite what many scientists tacitly accept, the natural world is not a world of mathematics; nature happily went about its business for millions of years before humans developed the differential calculus.

What mathematics provides is a way of modelling / representing the natural world so that we can understand it better and predict future eventualities. The validity of the application any particular mathematical model is continually tested through the past-to-future scrutiny of the P-D-S-A cycle, it encompasses current empirical data and enables us to make testable predictions.

Mathematics is *'a priori',* deductive; application of it to any situation is empirical, probable and inductive.

Shewhart was well aware of this, in developing his concept of statistical control he was careful to draw a distinction between the 'mathematical state of statistical control' and its application to quality control of manufactured product[22].. In the final paragraph of the Epilogue to *Statistical Method from the Viewpoint of Quality Control,* he writes, "*..care has been taken to distinguish between the distribution theory of formal mathematics and the use of such theory in statistical techniques designed to serve some practical end. Distribution theory rests upon the framework of mathematics, whereas the validity of statistical techniques can only be determined empirically. Because of the repetitive character of the mass production process, it is admirably suited as a proving ground….. The technique involved in the operation of statistical control has been thoroughly tested and not found wanting,".*

This is the basic philosophy that underpins the Control Chart, which Shewhart bases on a statistical model[23]. He starts with a definition of a distribution function - a mathematical model of the equation of control, but notes that real processes are not stable and we can never be certain of the distribution function. So, using the distribution function as a model, Shewhart says we can use empirical methods to detect limits for establishing when there is *trouble -* using the *arithmetic mean* and *3s limits*, since experience indicates that "3" gives an economic value. This is strictly empirical and inductive.

[22] Statistical Method from the Viewpoint of Quality Control, Shewhart, pp. 11 – 22, 43, 141

[23] Henry R. Neave & Donald J Wheeler, *Shewhart's Charts and the Probability Approach,* Ninth Annual Conference of the British Deming Association, May15, 1996

Deming warns against extending this approach by attaching probabilities and tests of significance to the chosen control limits[24]. He says that teaching of pure statistical theory is generally good, and its application to *enumerative* studies is mainly correct. However, he says that statistical methods are incorrectly applied to many *analytical* problems; those involving inference and prediction. Tests of significance, confidence levels, t-test, chi-square are useless as inference or as aids to prediction because they lose the information contained in the order of production. We need to understand context[25];[26].

Shewhart also makes it clear that the definition of exact nature of the distribution function is unnecessary, and that the real role for the statistician is in defining the appropriate sampling techniques and sub-groupings. He says, "...*the design of an efficient criterion for the important job of indicating the presence of assignable causes depends more upon the method of breaking the sequence into subgroups of a given size taken in a given order than it does upon the use of an exact mathematical distribution theory*."[27]

[24] Out of the Crisis, Deming, pages 334 - 335
[25] Out of the Crisis, Deming, pages 131 - 133
[26] The New Economics, Deming, pages 102 - 103
[27]   Statistical Method from the Viewpoint of Quality Control, Shewhart, pp. 35 - 36

PROFOUND KNOWLEDGE

We can therefore see the pragmatic and rationalist themes in Lewis - that influenced Deming and Shewhart.

We can also see parallels to three elements of Deming's System of Profound Knowledge;**

- An understanding of systems / organisations through community of knowledge leading to community of action. These are social achievements, fostered by our need to co-operate.

- An understanding of data / information through operational definitions of what the data means and what the variation means.

- An understanding of how the scientific method provides the growth of knowledge using testable predictions, and provides the philosophical basis for the pragmatic use of control charts.

Our analysis of the influence of C.I. Lewis on Deming and Shewhart suggests that it helped them to structure their thinking and to develop an understanding of human knowledge and human organisations, based on a sound, pragmatic philosophy. This contrasts with most current Western management thinking which is based vaguely on agency theory, contract theory, shareholder value maximisation and transaction cost theory.

Their understanding is soundly philosophically based AND is pragmatic - it works and it works to everyone's advantage. This helps in developing a sound case which can explain to leaders and managers the advantages of this understanding as a basis for action.

It also shows that a transformation in thinking is what is required.

[** The fourth part of the System of Profound Knowledge is specific to Deming's teachings. His emphasis that we need to understand what motivates people, and how to maximise their value to the organisation and themselves, is an important addition to his teachings in the "harder" areas of systems, scientific knowledge and the use of data.

While outside the scope of this paper, it does suggest a further line of investigation into the people who influenced Demings thoughts in this area. There is no demonstrable link to between Deming's teachings on "people" and Lewis' work. There is, however, a faint echo of 'intrinsic motivation' in Lewis' biography[28]. He acknowledges the influence of Mill's Utilitarianism on his own philosophy; but doesn't want to be labelled a utilitarian or a hedonist, *"because 'pleasure' and 'pain', as synonyms for what makes human life good or bad, represent a gross caricature. 'Achievement' and 'frustration' would come equally near the mark and, 'self-realisation' would come nearer"*. Given their similar backgrounds, we could suppose that Lewis would have concurred with Deming's personal philosophy of *"never stop learning, and always value people as individuals".*]

---

[28] P A Schlipp, *The Philosophy of C I Lewis*, 1968

APPENDIX 1   THE BASIC ELEMENTS OF CONCEPTUAL PRAGMATISM

In M W O, Lewis tries to answer the age-old question, how is human knowledge possible?   This is the problem in epistemology;

> *how is it possible for a conscious individual, confined to the data comprised within his own experience as a means of knowing, have any true knowledge of what lies beyond his experience, and exists independently of his knowing it[29]?*

Lewis contends that knowledge must be based on a philosophy that is *empirical, pragmatic* and *rational*.

> *A pragmatist takes empirical knowledge to exercise the vital function in offering guidance for our governable ways of doing things, in the form of justifiable expectations of the results of such activity, if, or when, these results occur.   Knowledge is successful knowledge; knowing, conceived this way, as correct anticipation, does everything knowledge could conceivable do.[30]*

So, he establishes his position as an empirical pragmatist; however, he seeks to define certain *rational* principles that we can use in advance of any experience to evaluate any experience and to structure our knowledge. Philosophy aims to analyse our common experience and, by reflection, define those implicit, *'a priori'*, principles that our minds use to make sense of experience.

This is Lewis' starting point, how does he develop his philosophy?

He starts from the basic premise that all human knowledge is founded on individual experience. To examine how knowledge develops from individual experience, we must consider two elements:-

1. Any individual experience involves an initial sense perception, the *given*, ineffable presentation - *the material content.*. We can take this to be the first 'signals' received by the brain from seeing, hearing, touching, tasting and touching sensors - without our being aware of such a state of intuition - unqualified by thought. Lewis uses the term "*presentation*" as the given element in a single experience of an object, and the content of any presentation as "*qualia*" - which are described as the immediacy of redness, loudness, etc.

2. The second element is the *concept*, the mind's response to the presentation - the *formal element.*

    At an individual level; the mind establishes a pattern of relationships in that involves some sense data together with some idea of its application in experience. Meaning / idea for an individual mind combines concept with the corresponding sensory data.

    Between minds; agreement between individuals can be established if each mind discovers, within its experience, patterns that fit a common concept. (What they can agree on). We learn to name objects / things by using terms, and applying the same substantives / adjectives to the same object.

    Our Common concepts are a structure of meanings that verify completely agreement between two minds through the use of language. This requires co-incidence of a pattern of inter-related meanings necessary to co-operate. If this common concept leads to similar behaviour, then we have reality in common. This is a social achievement fostered by our need to co-operate.

    Therefore, our reality reflects criteria that are social in nature

How do we go beyond simple naming to develop deeper knowledge of our common world? Lewis says that we need to able to show that the application of concept(s) is justified - over time. In other words, we develop an *hypothesis* about present experience, which can be proved / disproved by further experience.

The whole content of our knowledge of reality means that I can make predictions about further activity,

<div align="center">

"*if I do this . . . , then that . . . .*".

</div>

Knowledge does not consist of direct experiences; we take the given and assign to it further connections with the content of future experience. This is conceptual interpretation, and represents our knowledge of the outside world. We must interpret and predict - any number of data points cannot totally "prove" a concept, all empirical knowledge is, therefore, probable.

---

[29] Paul A Schlipp, *the Philosophy of C I Lewis,* Open Court, 1968
[30] - ibid -

If knowledge is based on individual, subjective experience, can we have any knowledge that does not depend on experience? Lewis says the only things we can know, in advance, are the principles of true experience - these are, *'a priori'*, valid. They can be known, in advance, by self reflection because they are simply the criteria we use to classify experience - one way or another. He proposes a limited, *'a priori'* consisting of;

- The *principles* of *pure mathematics*,

- The *principles of logic*, the basic rules of interpretation and the general mode of classification,

- The *particular criteria we use to categorise reality* before the investigation of nature.

Such principles, criteria and categories the mind applies to make experience intelligible. However, newer, wider experience may bring some gradual alteration to these attitudes, even though they are independent from experience.

The 'a priori' in natural science involves a high level of abstraction, and represents an ordering by the mind leading to fundamental laws that are 'a priori'. Without principles to guide our investigation of experience data, our knowledge of it would remain chaotic and changing. All definitions and concepts lead to the formulation of fundamental laws that represent the uniform behaviour of the natural world.

Today we recognise that science is not wholly deductive or inductive; it involves the process of hypothesis and verification, hazarding something in mind which is then retained or otherwise, depending on its success. But, the test is intellectual consistency, comprehension and simplicity of interpretation. New truth represents the creative power of human thought, but is always pragmatic. When old methods of interpretation are discarded in favour of newer ones, this is driven by new empirical data which are difficult to interpret in the old method. *The advantage of the change must be great enough to overcome human inertia and prestige.* The factors that we need to examine and that drive pragmatic change are;

- the old concept versus the new concept,

- expanded experience with novel data,

- how concepts are applied to this expanded experience.

(Lewis is presaging Thomas S. Kuhn by half a century!)

The pragmatic element in knowledge concerns our choice of which sort of concept to apply. , Between the absolutes of mathematics and logic and the given experience is the pragmatic element in truth / knowledge; a middle ground of trial and error.

We interpret, and control, the world by expanding experience and modifying our concepts.

{This covers the general principles of conceptual pragmatism, as set out in the first eight chapters of Mind and the World Order. The final three chapters re-examine some aspects - in detail.

In Chapters 9/10, he examines, the relationship between the 'a priori', the empirical and the probable, and in Chapter 11 he considers whether a uniform world, needed for probable judgements, must be deterministic.

These are the most difficult chapters in the book; involving condensed philosophical arguments. I hope that the short summary of these chapters presents the essence of Lewis' thinking.}

In previous chapters, Lewis has defined his own limited 'a priori' as the principles of mathematics, logic and the categorisation of experience. In Chapter IX considers the latter in detail.

So, how do we categorise experience? The recognised qualitative character of the given leads to concepts that give rise to a formal truth that cannot be invalidated by experience. In order to define the criteria of empirical knowledge and its valid probability we need to look at 'a priori' elaboration of concepts - how the meaning of concepts is extended / elaborated.

Lewis starts by looking at the simple concept "round". When we say "this penny is round", both subject and predicate imply 'a priori' criteria, the definitions of meaning that two people can agree on. These meanings imply various sequences in further possible experience. We need to set up definitions, measurements, etc., in order to properly focus them. This may be expressed in the form of propositions such as;

"If this is round, then condition A being provided, empirical eventuality M will happen".
"If this is round, then condition B being provided, empirical eventuality N will happen".

The complex set of "then" conditions express the complete 'a priori' meaning of the concept 'round'

Lewis goes on to demonstrate that all 'a priori' propositions, such as "Swans are birds", are analytic; any non-bird is a non-swan. 'a priori' propositions are forever certain and do not limit experience; whatever lacks some essential property, X, is not classified under some concept, A. "All swans are birds", does not rule out the possible existence of any creature.

However, when we apply these formal 'a priori' proposition to presentation, this is only probable, and is an interpretation that is predictive; the degree of assurance reflects generalisation from experience. In order to interpret a given presentation as a round object, what we need to know is;

(a) The 'a priori' proposition, "if this is round, then......."
(b) "The present given is such that further probable experience will be......."

We can only know (b) as a generalisation from experience; *Things that look like this, under the present conditions, usually meet the criteria of........, in future experience.* We have to rely on past experience, and interpretation of the given requires generalisations from the empirical. *The complex set of "then" conditions will express the complete 'a priori' meaning of the concept 'round' in denotation.* Some are explicit, while some are implicit / figurative. Some are not in mind at all and leave us unprepared to understand experience!

What shall be accepted as the physical criteria of roundness, straightness, etc? What kind of sequences of experience can be regarded as the basis for attribution of mistake to previous identification? What abstract system shall we chose to apply to experience in general? The chosen system becomes the criterion of true experience and defines the criteria of "reality". It is a pragmatic choice, which may be deliberate, or unconscious - without recognition of real grounds.

Empirical generalisations are universal propositions, the subject of which denotes a class of objects, and may be distinguished from 'a priori' propositions because subject / predicate connection is "*contingent*", (rather than "necessary"). "Swans are white" an is an empirical generalisation; any 'white' may/may not be a 'swan'. A 'black' may be discovered meeting all criteria for 'swan'. An empirical generalisation requires for its truth a limitation of conceivable existence.

The 'a priori' is FOREVER CERTAIN, but empirical generalisations are at the mercy of future experience and are probable only. In neither case do we have greater assurance about the content of future experience.

No substantive conception 'a priori' can confine experience; all identification / material truths are probable only. This is re-inforced by two things; experience includes dreams, illusion, mistake as much as the physical, no theory can attribute 'a priori' certainty that is not hypothetical to predictions about a particular presented thing. The body of conceptual interpretation is a pyramid; comprehensive at the top, least general at the bottom. We approach experience and attempt to fit it to preformed patterns, persistent failure leads to readjustment; the higher up the pyramid we are , the less willing we are to change.

Every concept gives rise to a formal truth that cannot be invalidated by experience, but no concept is guaranteed to bring clearness / understanding. We have the idea of clear / fixed concepts on the one hand, and the chaos of experience on the other; bringing them together is a matter of trial and error that is never more than probable and subject to revision in the process of learning. This gradual, continual revision of our knowledge is a deep lying process in the march of understanding. The truth of the 'a priori' is formal only, it defines truth itself ;but is a net to catch the truth of experience.

In Ch. X Lewis looks at probability. The problem of knowledge is the truth of probability judgement. If there are no necessary connections in matters of fact then there is no valid knowledge.

The only knowledge 'a priori' is analytic; empirical knowledge is probable only. This leaves us with a problem; probable empirical knowledge has always seemed to lead to scepticism. If general, conceptual propositions only are absolutely certain, and empirical truth is probable only, then there can be no genuine knowledge of nature - even genuine probability is lacking because this must rest on some underlying certainty. Surely knowledge of nature must rest on some <u>order</u> in reality, or in the content of experience, that assures its correspondence with the way the mind thinks; in other words, some *synthetic*, 'a priori' that links ideas and the reality of experience. Lacking this, knowledge of nature - that must include an element of prediction - will be lacking in truth.

Knowledge of nature is knowledge of probabilities, an *analytic,* 'a priori' is the only requirement for the validity of empirical generalisations. Obviously, when 'a priori' concepts are applied to the particular this is no more than hypothetical / probable. If all knowledge were probable and rested on principles that are generalisations from experience, then these principles would be probable, and the knowledge that depends on them would be *probable*. So, we need to distinguish between types of universal propositions;

Empirical generalisations that are synthetic, such as the law of gravity, that are only probable.

Analytic principles, such as the theory of geometry that are the consequence of our concepts. These are 'a priori' and certain when applied as abstract conceptual systems, but are hypothetical / probable when applied to particulars. For a given plot of land, we could say either;

"If this is triangular, in a Euclidean space, then the sum of the internal angles is 180^0".   *'a priori' and certain*.

"The sum of the internal angles is 180^0".   *probable judgement* only.

Every presentation is an absolute fact; but we cannot make classification of it without possible mistake - it is an interpretation involving prediction and potential falsification by future experience. Including the given under a concept is contingent on future experience; and 'a priori' knowledge of universal propositions does not secure 'a priori' knowledge of empirical particulars. The connection between universal particulars and empirical particulars is often left vague; because a particular follows from a *certain* universal is taken to imply that a particular is *certain,* for example, "All triangles.........". is taken to imply that "<u>This</u> triangle is ......". This in <u>not</u> necessarily so. *Empirical knowledge means that knowledge of objects is determined in extension.*

Empirical knowledge is a probability judgement based on individual experience. This does not mean that we have to be able to unscramble all of its logical complexity. Empirical judgements are sound if they use a 'just' logic. Further experience may destroy the judgement, but *it was forever true that it was probable - on the grounds used to make it.* Given this, and the fact that any knowledge, other than empirical knowledge, is 'a priori', *then so long as we are rational, what we believe in is absolutely / eternally true.* This may change over time, with new evidence. However, we need believe nothing false - as long as it was based on valid grounds, and we are rational. This does not condemn us to sheer ignorance;

  - we have a large body of generalisations that, correctly assessed, are a guide to useful action,

  - this is the only way that prevents us from regarding scientific knowledge as a chimera.

Two points should be noted;

  a) Further experience may show that a law is not universally applicable, yet it may remain as a statistical generalisation / rule of thumb that applies in most cases, and is still valid probability in a particular case. The practical use of ancient laws as guide to action is valid - if we have no better.

  b) We need to ask what is necessary to justify probability judgement as basis for action. 'What is probable must always be true', is no answer, nor that it be true in the majority of cases. A probability may be genuinely valid, in some circumstances, even if no verification is currently available.

What is required is a practical attitude that says that action in accordance with probability is *more likely to be successful*. If probabilities as general predictions are justified by the future, then the world must be orderly, and an attitude based on past co-incidences is the safest one.

In summary, interpretation of presentation is application of concept to it, application of the concept requires, 'a priori', a predictable sequence in experience, the application is hypothetical; the applicability of any concept is probable only. This may be supported by statistical generalisations, (appearances like the present may be applied in some proportion of cases). Probable knowledge of particulars becomes the basis for universal generalisations of the type asserting a connection between what is denoted by concept and further character / property implied by the concept.

This again raises the question of order in nature, cause and effect, and the basis of induction, this is covered in Chapter XI.

Since empirical knowledge is knowledge of probabilities, its validity is based on induction and probability judgement. Is generalisation possible? Does the occurrence of sequences in the past constitute a ground for valid prediction in the future? Prediction need not be certain, only that the prediction is <u>genuinely</u> probable.

There must be the possibility of arguing from past to future with genuine probability.

Are there any valid principles of inference which can be used in drawing empirical judgement?" If probability judgement is valid, then empirical judgements which are rational and based on known grounds are true.

The ideas presented so far, imply the presence of some uniformity in experience, in other words a deterministic world in which cause and effect applies. Lewis does not take a hard deterministic position, he takes a compatibilist line that the foundation of conceptual pragmatism is that there must be a certain amount of order in the world, there must be real things / objective facts. There is no alternative save the non-existence of everything. However, no <u>absolute</u> uniformities in experience are required for the existence of things or for the objective character of laws. This provides us with a rational attitude of acting on the basis of probable judgement. We only require probability of future experience.

Any other sort of world order in which experience did not present statistical stabilities, allowing valid probable prediction, would make knowledge impossible. Hence we can conclude there is ordered world that consists of real things. This can be the only basis for human knowledge, that has enabled us to develop the common world we live in.

The basis of Conceptual Pragmatism is that the human mind is always capable of finding the order needed for knowledge.

- it elicits significance by abstraction, analysis and organisation.

- it introduces order by conceptual classification and categorisation of the real.

- through learning from accumulated experience, it anticipates the future to satisfy our practical needs.

APPENDIX   PHILOSOPHICAL BASIS

DEDUCTIVE RATIONALISM - Greek origins - "the gang of three".

Socrates (c. 470-c. 399 BC), believed in the superiority of argument over writing and therefore spent the greater part of his mature life in the Agora and other public places of ancient Athens, engaging in dialogue and argument with anyone who would listen or who would submit to interrogation. He wrote no books and established no regular school of philosophy. He taught that every person has full knowledge of ultimate truth contained within the soul and needs only to be spurred to conscious reflection in order to become aware of it. The philosopher's task, Socrates believed, was to provoke people into thinking for themselves, rather than to teach them anything they did not already know. His logic placed particular emphasis on rational argument and the quest for general definitions[31].

Plato (c. 428-c. 347 BC), influenced by Socrates developed a theory of forms and a theory of knowledge. He was convinced that knowledge is attainable, and that it had two essential characteristics; first, it must be certain and infallible and second, it must have as its object that which is genuinely real as contrasted with that which is an appearance only. He believed that the 'fully real' must be fixed, permanent, and unchanging, it must rest in an ideal realm of *being* as opposed to the physical world of *becoming*. He rejected empiricism, claiming that propositions derived from sense experience have, at most, a degree of probability - they are not certain. Furthermore, the objects of sense experience are changeable phenomena of the physical world - not proper objects of knowledge. Plato distinguishes between two levels of awareness: opinion and knowledge. Claims or assertions about the physical or visible world, including both common sense observations and the propositions of science, are opinions only. Some of these opinions are well founded; some are not; but none of them counts as genuine knowledge The higher level of awareness is knowledge, because there reason, rather than sense experience, is involved. Reason, properly used, results in intellectual insights that are certain, and the objects of these rational insights are the abiding universals, the eternal forms or substances that constitute the real world.

The theory of forms may best be understood in terms of mathematical entities. A circle, for instance, is defined as a plane figure composed of a series of points, all of which are equidistant from a given point. No one has ever actually seen such a figure, what we draw is an approximation to an ideal circle. In fact, when mathematicians define a circle, the points referred to are not spatial points at all; they are logical points. The form "circularity" exists, but not in the physical world of space and time. It exists as a changeless object in the world of forms or ideas, which can be known only by reason. Forms have greater reality than objects in the physical world both because of their perfection and stability and because they are models, resemblance to which gives ordinary physical objects whatever reality they have. Circularity, squareness, and triangularity are excellent examples, then, of what Plato meant by forms. An object existing in the physical world may be called a circle or a square or a triangle only to the extent that it resembles ("participates in" is Plato's phrase) the form "circularity" or "squareness" or "triangularity".

Plato conceived the forms as arranged hierarchically; the supreme form is the form of the Good, which, like the sun in the myth of the cave, illuminates all the other ideas. There is a sense in which the form of the Good represents Plato's movement in the direction of an ultimate principle of explanation. Ultimately, the theory of forms is intended to explain how one comes to know and also how things have come to be as they are.

Aristotle (384-322 BC), thought that every thing or event has more than one "reason" that helps to explain what, why, and where it is. Aristotle proposed four causes; the *material cause,* the matter out of which a thing is made; the *efficient cause,* the source of motion, generation, or change; the *formal cause,* which is the species, kind, or type; and the *final cause,* the goal, or full development, of an individual, or the intended function of a construction or invention. Thus, the material cause of a statue is the marble from which it was carved; the efficient cause is the sculptor; the formal cause is the shape the sculptor realised, and the final cause is its function, to be a work of fine art. In each context, Aristotle insists that something can be better understood when its causes can be stated in specific terms rather than in general terms. Aristotle thought his causal pattern was the ideal key for organising knowledge.

---

[31]   Those who worked with Dr. Deming will recognise that he taught in a Socratic mode.

He also developed rules for chains of reasoning that would, if followed, never lead from true premises to false conclusions (*validity rules*). In reasoning, the basic links are <u>syllogisms</u>: pairs of propositions that, taken together, provide a new conclusion. In the most famous example, "All humans are mortal" and "All Greeks are humans" yield the valid conclusion "All Greeks are mortal". Science results from constructing more complex systems of reasoning. In his logic, Aristotle distinguished between dialectic and analytic. Dialectic, he held, only tests opinions for their logical consistency; analytic works deductively from principles resting on experience and precise observation. This is clearly an intended break with Plato's Academy, where dialectic was supposed to be the only proper method for science and philosophy alike.

Between them, "*the gang of three*" - Socrates, Plato and Aristotle - laid the basis of philosophy that was to dominate western thinking for two and a half millennia. They emphasised rational, analytical thinking together with mathematical, logical deductive proof. The 're-discovery' of their writing during the Renaissance had a major impact on western philosophy.

By the early seventeenth century, Descartes made mathematics the model for all science, applying its deductive and analytical methods to all fields. He resolved to reconstruct all human knowledge on an <u>absolutely certain</u> foundation by refusing to accept any belief, until he could prove it to be necessarily true. He postulated that the one thing he could be certain of was that thinking was going on - and that he was doing the thinking, hence his famous maxim, "Cogito, ergo sum" ("I think, therefore I am"). This provided him with the one certain fact or axiom from which he could deduce the existence of God and the basic laws of nature. Despite his mechanistic outlook, Descartes accepted the traditional religious doctrine of the immortality of the soul and maintained that mind and body are two distinct substances, thus exempting mind from the mechanistic laws of nature and providing for freedom of the will.

The English philosopher Thomas Hobbes constructed a comprehensive system of materialistic metaphysics that provided a solution to the mind-body problem by reducing mind to the internal motions of the body. Applying the principles of mechanics to all areas of knowledge, he defined the concepts basic to each area, such as life, sensation, reason, value, and justice, in terms of matter and motion, thus reducing all phenomena to physical relations and all science to mechanics.

Driven to its logical conclusion, Descartes' quest for certainty leads to scepticism, as demonstrated by Hume, (see later). In answer to this, Immanuel Kant in the *Critique of Pure Reason* (1781) combined the empiricist principle that all knowledge has its source in experience with the rationalist belief in knowledge obtained by deduction. Kant differentiated modes of thinking into analytic and synthetic propositions, and postulated that it is possible to make *synthetic 'a priori'* judgements. This transcendental position regards the objects of the material world as fundamentally unknowable; from the point of view of reason, they serve merely as the raw material from which sensations are formed. Objects, in themselves, have no existence, and space and time exist only as part of the mind, as "*intuitions*" by which perceptions are measured and judged. In addition to these intuitions, Kant stated that a number of 'a priori' concepts, which he called *categories*, also exist, in four groups: those concerning quantity, which are unity, plurality, and totality; those concerning quality, which are reality, negation, and limitation; those concerning relation, which are substance-and-accident, cause-and-effect, and reciprocity; and those concerning modality, which are possibility, existence, and necessity.

He suggested that although the content of experience must be discovered through experience itself, the mind imposes form and order on all its experiences, and this form and order can be discovered 'a priori',—that is, by reflection alone. He claimed that causality, substance, space, and time are forms imposed by the mind, but he made his view a more critical form of idealism by granting the empiricist claim that *things-in-themselves* — things as they exist outside human experience — are unknowable, limiting knowledge to the "*phenomenal* world" of experience, maintaining that metaphysical beliefs about the soul, the cosmos, and God (the "noumenal world" transcending human experience) are matters of faith rather than of scientific knowledge.

In Germany, through the influence of Kant, idealism and voluntarism became the dominant tendencies. Fichte transformed Kant's critical idealism into absolute idealism by eliminating Kant's "things-in-themselves" and making the will the ultimate reality. Von Schelling went still further in reducing all things to the self-realising activity of an absolute spirit, which he identified with the creative impulse in nature. The emphasis of Romanticism on feeling and on the divinity of nature found philosophical expression in the thought of Schelling. Hegel, whose system of absolute idealism, although influenced greatly by Kant and Schelling, was based on a new conception of logic in which conflict and contradiction are regarded as necessary elements of truth, and truth is regarded as a process rather than a fixed state of things. The source of all reality, for Hegel, is an absolute spirit, or cosmic reason, which develops from abstract, undifferentiated being into more and more concrete reality by a dialectical process consisting of triadic stages, each triad involving firstly, an initial state (or thesis), secondly, its opposite state (or antithesis), and, thirdly, a higher state, or synthesis, that unites the two opposites.

From Kant onwards, this strand of western philosophy placed less emphasis on empiricism.

INDUCTIVE PRAGMATISM

Origins in the sophists - the Greek word ***sofisthV*** went through a variety of meanings in the 5th century BC. Originally it meant 'expert, master craftsman, man of wisdom', and was applied to learned men, such as the Seven Wise Men of Greece. Later it was applied to itinerant teachers, including Protagoras, Gorgias, Hippias, and Prodicus, who provided instruction in several higher branches of learning for a fee. They tended to emphasise forms of persuasive expression, such as the art of rhetoric, which provided pupils with skills useful for achieving success in life, particularly public life. By the end of the century, the word *sophist* had acquired a derogatory meaning, as in the modern term *sophistry,* which can be defined as subtle and deceptive or false argumentation or reasoning.

Protagoras of Abdera, (490 – 420 BC), was a famous early *sophist* who taught in Athens and was influential on the ruling class, especially Pericles. Since nothing of Protagoras' own work survives, we have to rely on Diogenes and Plato as sources. The two best known ideas attributed to Protagoras are;

> ***anqrôpoVmetron***, "man is the measure of all things: of those things that are, that they are; and of those things that are not, that they are not". This is often literally taken to mean that whatever I see is private, but always true for me. Judgements are relative to the person who holds them, we interpret the world in human terms, there are no objective criteria, contradiction is impossible.

> ***dissoi logoi***, in every situation it is possible to create at least two explanations for the events.[32] Nothing is absolute, it all depends on the circumstances, if everything is true, nothing is false; if we never make mistakes, we can never chose badly.

In his book on Protagoras, Plato has him defend this relativistic position as being useful to the *polis,* all citizens have something useful to contribute to the assembly, they have a right to speak and be heard. However, not all are good *rhetores*, but education in political skills, is available to all, enables everyone to take part in effective deliberation.

Socrates, Plato and Aristotle firmly rejected this relativistic view of human knowledge. They felt that if each individual was the measure of things, then this relativism eventually leads us to a cheerful form of scepticism in which knowledge is impossible, but all we should do is learn the skills needed to get by in the world as it is. As an alternative, Plato and Socrates aim for a complete and comprehensive understanding; they believed that knowledge is possible, and that we can achieve clear definitions, even if these may be difficult to achieve; leading to a conclusion that truth and definition are less important than philosophical enquiry; doing philosophy is better than sophistry.

During the Renaissance, the major influences on western philosophy were Socrates, Plato and Aristotle, the sophists were of minor importance in the development of Western philosophical thought at that time.

Francis Bacon denounced reliance on authority and verbal argument, and criticised Aristotelian logic as useless for the discovery of new laws. In *Novum Organum* in 1620, he drew attention to the two strands in philosophical thinking "*Let there exist then (and may it be of advantage to both) two sources, and two distributions of learning.... one method of cultivating the sciences, and another of discovering them. And as for those who prefer and more readily receive the former, on account of their haste, or from motives arising from their ordinary life, or because they are unable from weakness of mind to comprehend and embrace the other, (which must necessarily be the case with by far the greater number,) let us wish that they may prosper as they desire in their undertaking, and attain what they pursue. But if any individual desire and is anxious not merely to adhere to, and make use of, present discoveries to overcome his adversaries in disputes and to give elegant and specious opinions, but to penetrate still further nature by labour, to know **to a certainty and demonstration**, let him, as a true son of science, (if such be his wish,) join with us".* He called for a new scientific method based on inductive generalisation from careful observation and experiment. He was the first to formulate rules of inductive inference.

---

[32] The ancient Greeks placed emphasis on binary views of the world; as an example, they contrasted ***erga***, events and ***logoi***, the explanations or arguments for these events. Protagoras adds another layer of paradox by suggesting that there could by two opposing explanations for any given set of events.

In 1687, Newton established the modern science of dynamics by formulating his three laws of motion, and derived the law of universal gravitation. Published in *Philosophiae Naturalis Principia Mathematica*, it marked a turning point in the history of science; if humanity could unlock the laws of the universe, it could also to discover the laws underlying all of nature and society. This was influential during the Age of Enlightenment when people came to assume that through a judicious use of reason, an unending progress would be possible—progress in knowledge, in technical achievement, and even in moral values. Through proper education, humanity itself could be altered, its nature changed for the better.

John Locke, in *Essay Concerning Human Understanding*, 1690, gave empiricism a systematic framework. He attacked the prevalent rationalistic belief in knowledge independent of experience. He redirected philosophy from study of the physical world to study of the mind, making epistemology the principal concern of modern philosophy. He attempted to reduce all ideas to simple elements of experience, but distinguished sensation and reflection as sources of experience, sensation providing the material for knowledge of the external world, and reflection the material for knowledge of the mind. Although not a sceptic, Locke greatly influenced the scepticism of later British thought by recognising the vagueness of the concepts of metaphysics and by pointing out that inferences about the world outside the mind cannot be proved with certainty.

Bishop George Berkeley made idealism a powerful school of thought by combining it with the scepticism and empiricism that had become influential in British philosophy. Extending Locke's doubts about knowledge of the world outside the mind, Berkeley argued that no evidence exists for the existence of such a world, because the only things that one can observe are one's own sensations, and these are in the mind. To exist, he claimed, means to be perceived (esse est percipi), and in order to exist when one is not observing them, things must continue to be perceived by God. By claiming that sensory phenomena are the only objects of knowledge, Berkeley established the epistemological view of phenomenalism

David Hume argued that no observable evidence is available for the existence of a mind substance, spirit, or God. In a *Treatise of Human Nature*, 1739, he says, "All metaphysical assertions about things that cannot be directly perceived are equally meaningless, and should be committed to the flames". In his analyses of causality and induction, Hume revealed that no logical justification exists for believing that any two events are causally connected or for making any inference from past to future, thus raising problems that have never been solved.

At the start of the 19th century, Bentham in Britain claimed that it was possible to ascertain scientifically what was morally justifiable by applying the principle of *utility*. According to this, actions were right if they tended to produce the greatest happiness for the greatest number of people, or, alternatively, if they minimised the harm to the most number of people. John Stuart Mill systematised the utilitarian doctrines of Bentham in *Utilitarianism* (1836), basing knowledge upon human experience and emphasising human reason. He stands as a bridge between the 18th century concern for liberty, reason, and science and the 19th century trend towards empiricism and collectivism.

There are few philosophers who have openly followed Utilitarianism in the 20th century. However, it has had significant influence on other philosophies, placing J. S. Mill as the key British philosopher of the 19th century. Spencer and Stephen, sought to synthesise the utilitarian theory with the principles of biological evolution as *Social Darwinism*.

It also had a strong influence on the establishment of *pragmatism* in America - James dedicated *Pragmatism: A New Name for Old Ways of Thinking* to J S Mill - to acknowledge his early influence.

Lewis also acknowledged Mill's contribution; he writes, "*Certainly my views follow more closely those of Mill's Utilitarianism than any other historic model*". He declines to be labelled a hedonist or utilitarian because, "*I think that 'pleasure' and 'pain', as synonyms for what makes human life good or bad, represent a gross caricature. 'Achievement' and 'frustration' would come equally near the mark and 'self-realisation' would come nearer*"[33].

---

[33] P A Schlipp, *The Philosophy of C I Lewis*, 1968

As we have already indicated, *Pragmatism* was developed towards the end of the 19th century and became the dominant the dominant philosophy of America in the first quarter of the 20th century, and still influences many current thinkers. It continued the empiricist tradition of grounding knowledge on experience and stressing the inductive procedures of experimental science.

C. S. Peirce, formulated a pragmatic theory of knowledge, which defined the meaning of a concept as the predictions that can be made by using the concept and that can be verified by future experience.

William James developed the pragmatic theory of truth from a critique of the logical basis of the sciences into a basis for the evaluation of all experience. He maintained that the meaning of ideas is found only in terms of their possible consequences, if these are lacking, the ideas are meaningless. He contended that this is the method used by scientists to define their terms and to test their hypotheses / predictions. The hypotheses is valid if the predicted events take place. He found most metaphysical theories are meaningless, because they entail no testable predictions. According to James's pragmatism, then, truth is that which *works,* it is useful and has a *cash value.* One determines what works by testing propositions in experience. In so doing, one finds that certain propositions become true. For him, the truth is the capacity of an idea or of a belief to guide successful action and he proposed that all beliefs be evaluated in terms of their usefulness in solving problems. One cannot believe whatever one wants to believe, because such self-centred beliefs would not work out.

John Dewey, building on pragmatism, proposed that thinking is a method of meeting difficulties, particularly the difficulties that arise when immediate, unreflective experience is interrupted by the failure of habitual or instinctive modes of reaction to cope with a new situation. Thinking consists of the formulation of plans or patterns of both overt action and unexpressed responses or ideas; leading to wider experience and successful resolution of problems. This became known as *instrumentalism* - ideas and knowledge are exclusively functional processes; they are of significance only if they are instrumental in the development of experience. Dewey developed educational principles which emphasised learning through varied activities rather than formal curricula, education is not just preparation for future life but should be a full life in itself.

Josiah Royce combined idealism with elements of pragmatism, interpreting human life as the effort of the finite self to expand into the absolute self through science, religion, and loyalty to wider communities.

During this period, (first decade of 20th century), F. C. S. Schiller made the clearest connection between pragmatism and sophist rhetoric. He saw the relativist position of Protagoras as the fore-runner of Utilitarianism and the Pragmatism of Pierce, James and Dewey[34]; "*Fairly interpreted, this is the truest and most important thing that any thinker has ever propounded*".

He re-interpreted '*anthropos metron'*, as being capable of application to individual human beings and, more generally, to mankind in the collective sense. What this means is that culture and civilisation can become the measure of truth, and are a safeguard against barbarism. From this, it is easy to see that 'the maximisation of happiness', or 'usefulness / cash value' can be translated as the measure.

---

[34] Schiller, *From Plato to Protagoras; Studies in Humanism,* 1907 pp22-70

C I LEWIS - A BRIEF BIOGRAPHY

Lewis was born in Stoneham, Massachusetts in 1883. His father worked in the shoe industry and seems to have lost his employment through involvement in the labour movement, (not an uncommon story in New England at that time). Lewis' childhood was, therefore spent in relative poverty, although his education was encouraged by his parents. Typically for the time, he worked in his spare time to finance his way through school and college. He developed a strong belief in courage, self-reliance and hard work.

He passed the, very stringent, entrance requirements, and entered Harvard in 1902. He completed his first degree in 1905 and spent some time teaching in Massachusetts and Colorado, before returning to Harvard in 1908 to complete his PhD by 1910. This was the Harvard of James, Royce, Santayana and Perry, so Lewis was exposed to, and took part in, the debates around pragmatism, idealism and realism with the leading thinkers of the time.

In 1911, he joined the University of California at Berkeley and became involved in symbolic logic, publishing the first American book on this subject. In 1920, he was invited to return to Harvard as Lecturer in Philosophy for one year, and after that, as Assistant Professor and eventually as Professor; he remained there until his retirement in 1953. He established himself as the leading Kant scholar in America. There is much evidence of the influence of Kant in his thinking, but he remained a critic of Kant; he is reported to have said*, "I am a Kantian, who disagrees with every sentence of the Critique of Pure Reason"*.

Soon after his return to Harvard, he took responsibility for the manuscript remains of C S Peirce that had been brought to the Harvard Library. This material was not collated, so Lewis spent much time going through it page by page. No doubt he found Peirce's ideas resonated with his own; he writes "*It finally dawned on me, with some surprise, that as nearly as my own conceptions could be classified, they were pragmatic; somewhere between James and the absolute pragmatism of Royce; a little to one side of Dewey's naturalism and what he speaks of as logic*".

So, Lewis saw himself as positioned between the extremes of the philosophical debate. By 1924 had established most his ideas, and ventured to label his general point of view as 'conceptual pragmatism'. This was published in 1929 as *Mind and the World Order.*

With his reputation established, Lewis turned his studies to ethics, publishing *An Analysis of Knowledge and Valuation* in 1945. He retired in 1953 to California, where he died in the early 1960's.

Lewis stands as a pivotal figure between the founding fathers of American Pragmatism and later American philosophers, such as Quine, who attended Lewis' classes; Thomas Kuhn, who would have known of Lewis' work as a Faculty member at Harvard, and current neo-pragmatists such as Richard Rorty and Steven Mailloux.

GLOSSARY

'a priori'	Something that is known with certainty on some basis other than sense perception. Mathematics and logic are accepted as 'a priori' in most philosophies.
Analytic	Term used by Kant; analytic truth is one whose truth is guaranteed by meaning, and discovered through the analysis, of the terms used to express it. For example "all bachelors are unmarried".
Categories	Order, class or division. Aristotle proposed ten classes / predicaments into which objects of thought could be divided. Kant proposed twelve primitive forms of thought contributed by thought alone apart from experience.
Causation	The action of making a thing have some property or go through some change.
Certainty	Without doubt. Some philosophies hold that absolute certainty is required for knowledge.
Compatibilism	Holds that we are responsible for our actions / decisions even if they are caused by previous psychological conditions - freedom is compatible with determinism.
Contingent	That which is not necessary and could have been otherwise.
Deduction	A type of argument in which the conclusion must be true if all the premises are true. An argument from the general to the particular.
Determinism	The idea that all events are completely determined by antecedent conditions. Hard determinism says that we cannot be responsible for our actions.
Empirical	Based on sense perception or the observable results of an experiment.
Empiricism	The idea that all knowledge comes from sense perception and from inner observation of the mind itself. (Locke, Hume and Berkeley).
Free will	Idea that people have power to detach themselves from inner motivation and chose between alternatives. Denies that decisions are causally determined.
Hypothesis	An account of a situation that goes beyond the observed facts. Explains the observed facts by fitting them into a larger picture.
Induction	Type of argument in which true premises provide support for the conclusion, but do not guarantee the truth of the conclusion. Argument from the particular to the general.
Pragmatism	Claims that truth is a matter of the *usefulness* of beliefs in practical action.
Rationalism	Idea that we can only attain knowledge by a process of reasoning from self-evident principles. (Descartes, Leibnitz and Spinoza).
Synthetic	A synthetic truth is one that affirms something in the predicate not already contained in the subject. For example "all bachelors are unfulfilled". All the common propositions that result from experience of the world are synthetic.
Theory	Scientific theory is a generalisation that refers to entities that are deemed to exist. Theoretical entities cannot be observed by the unaided senses. For example theories of gravitation, atoms, quanta, etc.