

A New Dynamism for Philosophy. Chapter 5. Truth.

Key Questions. *What is truth? Why do correspondence, coherence and pragmatic theories of truth fail? Can we dispense altogether with truth as a concept? How should we appraise the merits of alternative conceptual schemes that claim to be true representations of reality? What distinguishes necessary from contingent truths? How does a definition offer a true and an informative description of a concept?*

What sort of things are numbers? Do the truths of mathematics form a separate class? How can mathematics guide and inform our investigation of reality?

I have already suggested that a linguistic philosophy can offer us only a vacuous theory of truth. The nature of truth is accepted as being about as ineluctable as any philosophical problem gets, not least because, in its various forms, the nature of truth enters into most of the problems already discussed. As is often the case, philosophers concern themselves here with problems that trouble no one at an everyday or practical level. We are able to distinguish different types of truths, know how to recognise and verify true statements and reject their false counterparts. Most of us fancy ourselves astute enough to distinguish the sincere from the duplicitous, fact from hearsay, to discern the accurate and the misleading. Problems only begin to surface, it seems, when we probe truth at a deeper or more general level. Perhaps we simply can't cope with truth in this form. Like a Halloween apple bobbing in a barrel, it evades our efforts to break it into more manageable pieces.

If you are relatively new to philosophy and some of the problems discussed in this chapter appear artificial, then I apologise. My instincts incline in the same direction, but I feel impelled to examine the issues, not just because they have been raised, but also because their appearance is due to the false assumptions that upon which alternative and misleading philosophies rest.

Aristotle's definition is a popular starting point for a discussion of truth, and it might seem foolhardy to take issue with such an axiomatic pronouncement:

“To say of what is that it is not, or of what is not that it is false, while to say of what is that it is, or of what is not that it is not is true.” (Metaphysics 1011b 25/28)

Here truth and falsehood are defined as properties of language, and apply to statements of fact. How we determine what is true and what is false, and how we distinguish different kinds of truth are questions that the definition doesn't help us with, but it can help direct a discussion of these.

The definition leaves me a little uncomfortable, because I would like to allow non language-users access to the truth, and the definition seems to be trying to exclude them. To have knowledge is to be, at the least, in possession of the truth. Babies and animals have a great deal of knowledge without possessing the language necessary to assent to propositions expressing that knowledge, yet I am reluctant to deny they know the truth of them. A small objection perhaps.

Aristotle's definition encapsulates what is known as a correspondence theory of truth, whereby the condition of truth obtains when a statement of fact corresponds to the fact it states. The question of how language relates to facts is similar to that of how concepts relate to reality, and I have discussed this also. If language gives us access to truth, how do the concepts it employs relate to the reality it describes? This is a key question. The objection to linguistic philosophy is that it conceives a fact as a conceptualisation of reality, and so the product of a language. No separation is attempted between a fact and a true statement of fact. A linguistic philosophy trivialises the relationship between concept and reality and leaves philosophy's most fundamental question unanswered. Sadly Aristotle's definition of truth appears equally vacuous. Provision is lacking for the existence of facts beyond the statement that they exist.

The temptation to retain the possession of facts within a society of language users is aggravated by the contribution we make towards producing them. They belong to us in a way that objects do not. Chairs are heavy, wooden and damask covered perhaps. No corresponding fact about a chair ever had these features. Objects exist, but I am not so sure that facts do, so the proposal that they ever correspond with reality is beginning to sound rather puzzling. A fact is not just an object or a state of affairs. It is more than something that is true. For the most part it is something known to

be true, has been verified as true, and is indicative of an interest at some point in determining its truth. If not verified as true, then at least implied by a fact that has been.

Another theory of truth that attempts to bypass the apparent triviality of correspondence is the coherence theory. Here truth belongs to a proposition in virtue of its relations with other propositions, rather than with facts or other components of reality. The truth of one proposition is guaranteed by its place within a system of propositions that form a consistent whole. Mutually incompatible systems pose no threat to each other, because each contains its own version of the truth. Examples of such truth or belief systems can be very diverse. Theologies or astrologies, scientific paradigms, such as quantum mechanics, social theories such as Marxism, and a variety of ideologies and methodologies may all claim a monopoly of truth in their respective spheres, but according to a coherence theory of truth, the claims of each are unassailable. Truth is exclusively generated and determined within a system of truth that consistently and compatibly supplies its own criteria for ascertaining what is the case.

The coherence theory is another concept-based theory of truth that demands only a certain rigour of presentation for a candidate to be adopted. That it tends towards relativism is too cautious a verdict. More accurate would be the contention that it represents a statement of, or manifesto for, relativism in its purest form. I don't need to do more than repeat some objections to relativism. First, no one seriously adheres to the theory and its implications for conduct. Second, for every system in possession of one version of the truth, it must be possible to devise an opposite or contrary system that is its consistent negation in every respect. Since there are times for all of us when we have an interest in promoting the truth, the suggestion that we must simultaneously respect the equal validity of a contrary system, that promotes falsehood, makes our every action hypocritical. Third, no statement that promotes relativism can have any truth or application beyond the system that promotes it, and so it is impossible even to begin its evaluation. Fourth the relativistic assumption, that it is possible to identify a range of perspectives, requires that they converge upon an independent reality before they can be separated.

The degeneration of both correspondence and coherence theories of truth into concept-based theories seems to point to the dissolution of a once important dimension to thinking. Truth is no

longer seen as a primary concern for philosophy. Some “deflationary” responses have sought to retain truth as a much diminished concept that serves to emphasise an assertion or express a consensus. But the upshot is still that this is a notion we could equally well do without.

My hope is that dynamism can rehabilitate truth as a vigorous and central component of our thinking. I see current thinking on truth as having become entangled and confused. This I believe is due to a failure to develop a clear understanding of the relationship between concept and reality. Much of the argument in this book so far has been directed towards showing how we can obtain knowledge of a reality beyond concepts even though we are limited to applying our conceptualised perspectives there. Factual knowledge can result that is expressible in true statements. Confusion arises when the relationship between this knowledge and the statements correlated with it is claimed as a correspondence called truth. Such a correspondence has already been dismissed as trivial. The reason for the triviality is that in obtaining the facts, or in possessing the knowledge, the truth of the corresponding statements has already been ascertained. The important relationship that features truth is not that between the knowledge, belief, understanding, recognition, perception or whatever of a fact and a statement of it. It is the relationship of all of these with a state of reality. Not so much a correspondence, but more of a convergence theory of truth is what I am proposing here.

In perceiving and applying our conceptual faculties to reality we strike a certain attitude there. The possible attitudes are many and various, but important ones include knowledge, belief, perception and judgement. Knowledge as an attitude requires not only the possession of a fact, but is characteristically supported by such things as evidence, an authoritative source or the conclusions of an investigation. Beliefs are weaker attitudes, but include the willingness to promote a putative fact together with the confidence that, for instance, suitable evidence, an authoritative source or investigation will demonstrate its truth and establish it as fact. Perception offers knowledge on the evidence of the senses, whilst a judgement suggests that due deliberation has been given to its object and the support that evidence and authority lend to it. Uncertainty, doubt, suspicion realisation are other attitudes, characterised by different strengths and circumstances, that we can apply to reality. Assertions or statements give a linguistic expression to an attitude. Which one may not always be

immediately clear, for a statement such as "It is raining." may claim knowledge, state a conclusion or cite an authoritative source. The context will usually make this clearer. Those who take a *deflationary* view of truth (e.g. Frege) and maintain that the utterance "It is raining." is equivalent to the statement "It is true that it is raining." make the mistake of ignoring weaker attitudes, such as guessing, that may also produce the utterance. Statements are not pictures that may or may not correspond with reality. They arise from the actions of a subject or author who engage reality with attitudes signifying levels and strengths of presumption and commitment. When they are true the statement and the means of ascertaining it produce *one and the same* conclusion.

Facts are not the exclusive domain of knowledge and related attitudes. Beliefs and doubts may also have facts as their objects, when these have been ascertained independently. Belief and doubt need to be sustained by a degree of ignorance of the facts on the part of the person entertaining them, but others may well have possession of them. Where someone holds a true belief, they have not ascertained then it can be meaningful or useful to say that there is a correspondence between the belief and the fact, and contrast the attitude with the knowledge it falls short of. Once they have ascertained the truth however the correspondence dissolves because knowledge and fact represent one and the same conclusion that a successful investigation will produce. Truth is not trivial because the state of reality at any time may be significant. It can be reached by a number of means such as discovery, investigation, confession, proof or elimination, but is a significant concept for characterising the end or purpose of successful enquiry. So dynamism proposes a convergence theory of truth. Statement and reality are distinct and may correspond, but in ascertaining their correspondence to discover the truth, we bring about their convergence as factual knowledge.

It might sound as if a convergence theory of truth is also vulnerable to the charge of triviality, insofar as the means of determining whether or not an investigation has been successful will be determined by whether or not truth has been reached. Perhaps this investigation has led us full circle again by a more circuitous route! But dynamism is a more comprehensive theory and the pragmatic theory of truth it proposes is underpinned by a dynamic conception of reality in which all knowledge has a practical dimension. Pragmatists traditionally are accused of requiring a corresponding objective arena in which their practical

endeavours take place and against which their success is judged. Dynamism requires no such framework since it is the active nature or reality itself that provides us with the relationships that underpin the stability of that framework.

The issue of whether truth is inconsequential can be considered at two levels. The worrying tendency that emerges from concept-based philosophy is that truth is a dispensable concept because knowledge is so too. This is an inevitable consequence for philosophies that reduce all investigative activity to concept creation and arrangement. It is also a tendency I have tried to counter with a dynamic philosophy in which concepts structure only our engagement with reality. At a less general level however it does appear possible that other concepts such as fact, knowledge and reality can each take over a part of the role that truth performs. When a commission is set up to investigate allegations of misconduct for example, one of its objectives is to satisfy those who demand the truth. But demands to know what really happened, or to bring the facts of the matter to light, amount to pretty much the same thing. It would be pedantic to say that the demand for truth here is not the same; to insist that the truth has to be a verbal or written version, that truth and knowledge must be independent because knowledge merely signifies possession of the truth, or that facts without explanations may fall short of the truth. All the demands converge upon an actual course of events and differ only with respect to the ways in which it might be approached or presented. Other concepts can probably cover for truth, and yet truth could equally return the favour in the absence of either fact or knowledge. Any word that can be defined in terms of others is no less important for that. If truth has the edge over related concepts it can succinctly help to define them. It also represents an ideal towards which all significant investigation should strive. Truth is incorruptible and indifferent to the taint of personal or group interest. With impeccable inferences, and exhaustive researches its findings are unerringly pertinent to the questions it answers. We encounter truth frequently in mathematics and logic, but our understanding of the material world routinely fails to satisfy the rigour of its demands. Whether it is truth, or perfection in some other guise however, an insistence on the highest standards is often the best guarantee of getting closest to obtaining them.

A convergence theory of truth remains compatible with a relationship of correspondence between attitude and reality. The

true belief that it is raining, for example, corresponds to the fact that it is raining. I have rejected only the idea that the knowledge that it is raining could create a similar correspondence with the same fact, because knowledge characteristically presumes its object has been ascertained, so knowledge and fact cannot be separated to make a correspondence possible here. Ascertaining a fact means we have been there and brought about or secured the convergence. Such correspondence as there is between beliefs with their corresponding facts can only be applied independently or retrospectively however. Once we have been out and ascertained that it is raining, for instance, we can then conclude that our belief had been correct or true and corresponded with the facts. The same also holds for other weaker attitudes such as hopes or guesses. But the correspondence no longer holds in the present, for a belief that the believer has ascertained becomes knowledge.

Facts seem to occupy an ambivalent position between our attitudes and reality. They are not of the world, yet neither are they of our own making. They represent information about reality, and yet they form no part of it. Our common perception of facts is that they are true, and have been ascertained, so are known to be true. A dynamic theory reinforces this perception. A fact is a truth, but one that the application of our investigative faculties produces. As a result or conclusion it is neither a state of mind nor slice of reality. Facts require both subjective attitude and objective reality to produce them. The fact of the chair in the corner emerges as a result of applying our faculties there. Each of us can devise a diversity of approaches for determining a fact, but the upshot of any successful efforts will be to establish or confirm one and the same conclusion. The scope of knowledge extends far wider than facts of course, because it embraces explanations, theories and the understanding.

There is perhaps a danger here of assuming that, because a successful search can lead us to facts, recognising success must lend a pragmatic dimension to truth itself. Pragmatism is an established theory of truth that represents an alternative response to the triviality of correspondence and the indeterminacy of coherence. Theories in the pragmatic tradition subordinate truth and falsehood to the achievement of tangible benefits, such as survival or well-being. Whatever is true or false will be so because it serves some interest, or promotes some objective. Paradoxically the well-spun lie can aspire to represent the truth for a pragmatist

provided it is convincing enough and deftly out-manoeuvres efforts at investigating or exposing its claims. The truth will be what we can get away with.

A dynamic theory appears to have pragmatic tendencies too. Earlier chapters have suggested that knowledge of reality depends upon the facility to intervene in the relationships between objects in order to influence them. This requires us to impose our interests there and suggests we seek a desired outcome. Whatever we discover is bound to be closely associated with the success of our explorations and lend it a pragmatic dimension.

Practical interests certainly motivate and guide investigations of reality, but I don't think the fact commits us to a pragmatic conception of truth. There are several immediate difficulties for such a theory to confront. The location and identification of an interest needs a backdrop in reality to define it, and any attempt at its representation will involve some pre-conceived notion of truth. The same is true of success itself, which needs some independent measure to be recognisable. Locating what is expedient is an important ingredient of success, and an independent assessment of the likelihood of success lends substance to calculations of what is expedient. Pragmatism needs to recognise the role of appraisal in promoting success. Pragmatic truth will also be relative, as what is true will also depend upon the interest chosen as its yardstick. What is true to the extent that it promotes one interest will be false in relation to its opposite. So where do we locate the truth in an arena of conflicting interests? Whether a purely pragmatic theory could represent such an arena begins to appear doubtful. And what about a simple interest in the truth? Is this permissible within a pragmatic framework, and how is its objective to be represented?

Dynamism stresses the importance of an interest in reality for discovering it, but it falls short of identifying truth with the realisation of that interest. The theory recognises the pursuit of an interest as a means to discovering reality, whereas Pragmatism sees it as the pursuit of reality itself. Of the two, dynamism is the more pragmatic about how we attain truth! A variety of approaches can result in discoveries about reality, but there is no reason why a connection with our interests there is a necessary condition of yielding truth. What we discover may run counter or bear no relation to our aspirations. It might come as a shock, for instance, to discover how ill-prepared we are for a project, but the discovery

may yield important lessons and knowledge about what we have tackled and why we have failed. Within a dynamic theory, an inquisitive interest serves merely to engage with the world of objects and the influences they exert upon each other.

Discovering possibilities for the promotion of our own interests there gets us involved in manipulating those objects, attempting to exert our own influences over them, and directly making objective discoveries in consequence. For dynamism reality is not separable from the influences that operate there, and a pragmatic approach is necessary as a means to discovering them.

Pragmatism on the other hand merely looks to the success of whatever we aspire to accomplish in reality rather than the underlying influences that contribute to the success or failure of a venture. Understanding these is what is important and the source of true knowledge.

Concept-based theories emphasise the importance and the parity of diverse and mutually incompatible conceptual schemes in defining truth and structuring our knowledge of reality. I have tried to show that this is not a feasible way to represent our entire conceptual network. In order to be separated and compared, some grounding in reality is essential for all conceptual schemes. Nonetheless self-sufficient and often incompatible schemes are abundant and influential within our network, and concept-based philosophy often insists that we apportion undue weight to some of them. Identifying some of these and determining how much credence we should lend them consequently merits discussion.

One of the important characteristics of the type of the “enclosed” conceptual scheme we are getting at here is that it has an inbuilt level of protection against investigation. Up until now I have tried to make the discussion clearer by choosing illustrations and examples that represent rather innocuous and incontrovertible observations on pieces of crockery and furniture. On the whole they do not enjoy the protection of the sort of scheme I am now interested in. My introduction to these was by way of a caricature. Imagine a tribe that regards an active volcano nearby as an oracle. Priests consult it on agricultural, military and other matters and demand sacrifices in return. Sometimes the issuing smoke and flames are interpreted in line with actual events, and good hunting or success in battle ensues. Of course the reading of the oracle often leads to disaster, but this has no effect on the faith of the tribe or the standing of the priests who mediate for them. All retain

the unshakeable belief that any failure can be attributed to evil spirits, an insufficient number of sacrifices, or some other excuse.

An enclosed scheme is not easily overturned by the routine course of events. It commands a deeper allegiance that may be based on tradition, fear or the determination to protect a social order. A deeply flawed scheme such as this example suggests that something more than a run of bad luck will be needed to bring about the downfall of the priesthood and the consultation process. Over a long period a society that routinely gambles so recklessly with its future is likely to go into decline, and become vulnerable to stronger rivals. Failing that, internal forces might bring about change from within and these could represent political or economic interests. Far less likely is the prospect that a tribe in this position will subject its deepest held beliefs to rigorous scrutiny. Too many enjoy the power and prestige it brings.

Were this the only sort of example to represent enclosed schemes, they would hardly merit a mention. Each represents a group that refuses, for economic, political or other reasons, to entertain the possibility that its beliefs may be fallible, and resists attempts to ascertain their validity. But much modern concept-based thinking has extended the idea of enclosed conceptual schemes further into the belief systems of advanced industrialised countries. Parallels with world religions are easily made, but the suggestion that scientific knowledge fits into self-sufficient systems that protect their own versions of knowledge and truth is far more radical. For many of us scientific knowledge still represents a paradigm of truth.

One of the influential books to discuss the standing of science is Thomas Kuhn's "The Structure of Scientific Revolutions." that describes a history of science divided into orthodoxies or "paradigms." Each paradigm is represented by theories and a system of beliefs, that structure and define scientific method and terminology, and whose truth forms the unquestioned assumption of investigation. Newton and Einstein inaugurated two such paradigm shifts with the publication of their laws and theories. Kuhn observes that scientists often persist in working within an orthodoxy, even when it encounters repeated anomalies or difficulties. Abandoning one in favour of another tends not to be the result of conclusive scientific demonstration, but owes more to a resistance recognisable from protected schemes, such as power, prestige or economics. The history of science is therefore rather

more erratic than one might have supposed. Instead of a smooth and continuously extending accumulation of knowledge, it is characterised by periodic turbulence, as one paradigm gives way to another and engenders bitter rivalries that sometimes only a new generation of scientists can resolve.

These observations might not contribute very much that is philosophically significant for an understanding of truth and knowledge. However, concept-based philosophy paints a more extreme picture of the history of knowledge, and sees all investigation as possible only within the confines of a paradigm that defies investigation of its own core beliefs, and shares no common ground with alternatives. Knowledge has no foundation in investigation, on this view, because investigation can only work within a paradigm that guides it.

There is no need to repeat my objections to a concept-based philosophy, but the support it derives from a paradigmatic representation of scientific history is important and well worth examination. The appearance of major figures in the scientific arena has accelerated the advance of knowledge and it is not surprising that a Newton or an Einstein should radically have changed the direction of scientific thinking. Excellence has had a comparable effect in many other fields too, and it is a mark of genius that it has such an impact. However it is sometimes too tempting to focus on periods of rapid change when writing history, and possible to over-emphasise the significance of revolutionary upheaval. In science this can cause the great bulk of pedestrian research work to be overlooked when it contributes so significantly to the gradual accumulation of knowledge, and expands the applications for technology, medicine, astronomy and so on. Much science actually follows the smoother continuous path we might expect it to.

It is also possible to understate the extent to which new paradigms are demonstrable, when they furnish new or more accurate predictions that can be tested. The theoretical revolution that shifted the centre of the Solar System from the Earth to the Sun, for instance, made a far more accurate mapping of the planetary paths possible. The new paradigm not only disposed of the anomalies between prediction and observation generated by the old, but explained them too. This is a conclusion that was reached from a process of rigorous inquiry, and runs counter to the suggestion that paradigms are adopted as unquestioned sets of

beliefs. The incompatibility between paradigms is exaggerated too. The Newtonian view of the Universe does not have to be viewed as fundamentally incompatible with the relativity theories of Einstein. It remains accurate and useful, but only under a limited range of conditions. Einstein's work can be seen as extending or refining, rather than replacing, the Newtonian view, encompassing the broader range of conditions that lead to anomalies for Newtonian physics. That the introduction of radical new theories should promote hostility and entrenchment is an understandable if not laudable response from a profession probably more concerned with personal and institutional reputations than any other. Entire careers are often invested in single projects after all. A radical new proposal needs to be assimilated and scrutinised, so any period during which doubts are voiced, or verdicts suspended is entirely understandable and consistent with good scientific practice. Besides, the anomalies that a new paradigm seeks to explain may be very small and consequently attributable to inaccuracies in measurement. It is no coincidence that proposed paradigm shifts often follow rapidly from the introduction of new and often controversial methods of measurement and investigation. It is interesting to explore the history of science from a personal or social perspective. However, the suggestion that paradigms or research areas such as microbiology or quantum mechanics emerge and achieve sustained recognition for anything other than scientific reasons represents too superficial a view.

A part of my aim here is to show how one could be persuaded by a concept-based version of history, and tempted to go much further than writers like Kuhn. The history of science can be written so that it is easy to extract the conclusion that all knowledge is constrained within paradigms defined by protected and unquestioned assumptions, and that self-interested individual and group pressures direct research within them. In short, objective scientific knowledge is unattainable. For reasons given earlier in the chapter, I believe this to be a seriously flawed view. No matter how history is written, a paradigmatic conception of truth, and a concept-based philosophy are unsustainable. For the reasons given here though, I suggest that the enthusiasm to embrace a concept-based philosophy is fuelled by a history of science flawed by misrepresentation, oversimplification and exaggeration. No doubt adherents to the philosophy dismiss the criticism and vigorously denounce their detractors. But of course that is precisely the sort of response you would expect from a paradigm under threat!

Paradigms, or orthodoxies are important nonetheless. They represent and influence our thinking, and undermine any presentation of the history of ideas as a continuous and progressive process of fact accumulation and generalisation. So if truth is applicable to them, we need to know in what sense, and how it can be determined.

Orthodoxies come in a diversity of guises corresponding to the needs they cater for. Some have endured for centuries, but others can be as ephemeral as a playground fad. They can be rigid and doctrinaire or flexible and responsive to the demands of their adherents. The more ambitious, such as fascism or extreme religious movements, seek to encapsulate a comprehensive world-view and prescribe a role each member must play to fulfil its destiny. Others, like homeopathic medicine, may only structure a narrow or specialised field of enquiry. All seem to offer some theoretical grounding expressed in a system of related concepts for describing and understanding people, events or the objects under scrutiny. These form the unquestioned assumptions of investigation. More than simply schemes of classification, the adherents they attract are likely to regard themselves as part of a membership and to share a common bond. They recognise that a certain exclusivity attaches to their support or allegiance for an orthodoxy.

The exclusivity of orthodoxies is a clue to recognising them, because they often appear and flourish in the face of a certain resistance or opposition. When an orthodoxy does enjoy universal allegiance it is likely to contain sub-orthodoxies of competing factions. Obvious examples of major orthodoxies include religions, political movements, and cults that offer an all-inclusive life package of analysis, prognosis and remedy. Fashions are another important source of orthodoxies that define tastes in ethics, aesthetics and other areas, and may assume the proportion of movements such as the Romantic or the Renaissance. Most academic subjects including both philosophy and science, harbour orthodoxies too, whilst astrology and an array of more eccentric belief systems have a legitimate claim to orthodox status too. The range is enormous, but each claims to hold some version of truth in their possession.

The fact that an orthodoxy schematises reality is not enough to erode its influence. Although concepts signify a pre-disposition

towards reality, they are necessary for any understanding of reality, and their application is perfectly compatible with the acquisition of knowledge or with securing the truth. Nor should the fact that an orthodoxy ministers to individual or social needs incline us against adopting it. The certainty and harmony that may result from belief are independent of its veracity. Faith and belief are attitudes that may correspond with reality but are always perfectly compatible with error or delusion.

The first and most important test for any orthodoxy is whether it withstands scrutiny. If its adherents discourage, obstruct or prevent an investigation of its claims, then we should suspect fraud and turn our investigation to the interests it serves. If its claims have been constructed from or reduced to a systematic series of pronouncements that defy investigation, then we should be equally suspicious. Religions fail to meet this requirement on at least two counts. First they nearly always place great dependence upon uncorroborated testimonies allegedly made by individuals hundreds or even thousands of years ago. Second they defy investigation by placing mystery at the heart of their theologies. Doubting and questioning, normally the signs of a healthy investigative interest, indicate a desire for understanding which, religions often impute, we should not aspire to possess. If a condition for membership is unquestioning faith, then we are being offered a protected scheme, and we should avoid all overtures. Religions make claims for the existence of supernatural powers but produce no evidence for them that would stand a scrutiny in any other field of investigation. Occasionally they have the courage to propose explanations that subsequently collapse under scrutiny, such as Creationism, but the response signals a retreat ever closer towards a core set of beliefs that resist investigation of any kind. Orthodoxies under threat, like wounded animals, can be dangerous things, especially when they control access to information and regulate investigation. Philosophy and science both struggled for a long time to throw off the influence of the Catholic Church for instance.

Even without religions and totalitarian social movements, there remain many orthodoxies that are open to investigation. I hope dynamism will become one of these. More needs to be said about the process of investigation itself however, because what defines a fair investigative procedure may be the product of some pernicious orthodoxy. No doubt the investigation of many alleged witches was scrupulously and impartially conducted in line with the

prevailing codes of seventeenth century good practice, but the codes themselves were indefensible.

The techniques of investigation are familiar from everyday contexts, though more extensive and rigorous, and a dynamic philosophy underscores them. In a dynamic universe phenomena are recognised and defined by the influence they exert, and influences are discovered through intervention. Identification, definition and classification are essential components of scientific and other investigations, necessitating the creation and application of concepts. Analysis and synthesis are principal techniques of intervention that seek to isolate or combine influences in order to identify phenomena or appraise their impact. Isolating the constituents of a chemical compound and reconstituting it from these elements is a typical procedure for identification.

Investigations may be exhaustive and pursue every possibility, or they may seek to establish just one instance in order to eliminate a whole line of enquiry. When successful and exhaustive, they invite generalisations that may be candidates for scientific laws.

Explanations of past events and predictions for future ones can reasonably be inferred from rigorously tested generalisations.

Perhaps the most common model for investigation is to surmise a hypothesis that will form its focus before testing whether it withstands a thorough examination. Much medical research follows this pattern for instance.

Scientific enquiry is not so much a separate sphere of activity, but is a more rigorous and systematic application of techniques applied universally. So it is perhaps best represented as a systematic and pioneering investigation conducted according to the highest standards. So Science itself is not so much a motley collection of paradigms, but **the** paradigm of empirical enquiry. Although mine has been but the briefest examination, it does allow wider scope for scientific enquiry than some other philosophers have allowed. Popper for instance restricted the scope of scientific investigations to those that produce generalisations and furnish predictions. Boyle's Law, which states that the volume of a gas at a constant pressure is inversely proportionate to its pressure, is an example. In a sense it is a general law that is impossible to prove, because no sequence of tests could be exhaustively test every sample of gas. Popper maintained such generalisations to be scientific, not because they can be conclusively proved, but because they stand to be disproved by a single counter-example to the generalisation. This is an important insight, but seems to

offer too narrow a view of science on its own. Identification and classification are important activities for scientists too. Also an exhaustive investigation can conclusively demonstrate the truth of some hypotheses. That the Earth is not flat but roughly spherical has been demonstrated by a wide range of predictions and observations, such as eclipses, culminating in views of the Earth itself from Outer Space. The conclusion is scientific but is also conclusive, since every other possibility has been ruled out by the sort of examples that Popper would accept. That water is H₂O, or that genes are encoded in DNA, are other counter-examples to the Popper hypothesis. Even Boyle's Law admits of proof if pressure, volume and temperature become related through definition. And then we seem to have another orthodoxy. Even so it is not necessary to define science so narrowly as a means of excluding pseudo-scientific orthodoxies. They exclude themselves by not availing themselves to investigation and the standards that true science requires.

That some scientists should remain coy about trumpeting their most celebrated discoveries as proven beyond doubt does seem puzzling. As a profession most remain strongly opposed to a concept-led position on orthodoxies and the relativist conception of scientific knowledge that follows from it. But there is still a reluctance to acknowledge that their discoveries locate any absolute truths, and this can only embolden their concept-led detractors. It is true that any scientific theory must withstand scrutiny and recognise observable conditions under which it would be disproved. This is certainly a necessary and yet it is hardly a sufficient condition for distinguishing the achievements of science. There must also be some scope for accommodating the idea that theories gain degrees of stature and credibility from withstanding constant scrutiny, and systematically fulfilling predictions under a diversity of observable conditions. Otherwise we have no more reason to trust the laws of motion than any theory that happens not to have been tested at all.

Perhaps this surprising lack of commitment is due to its origins in an Empiricism that remains sceptical about inductive reasoning. We have already discussed the problem of induction in an earlier chapter, in which the legitimacy of using any generalisation about the past to infer predictions is questioned. A dynamic response maintains that inductive reasoning is necessary to discover the causal influences that enable us to recognise temporal succession and to separate the present as a component of the process. So it

is impossible even to propose the problem of induction without presuming its validity. Inductive reasoning is therefore perfectly justifiable, and this should not surprise us, since we have always known that it to be so. Circumstances will decide when, but there will be a point in any scientific investigation where the onus of proof shifts from the protagonist to the antagonist. If the sceptic wishes to pursue his line of attack he will reach a point where he will have to find grounds to sustain it. Calculations of probability can certainly be relevant here. These will appraise the degree of success achieved hitherto in relation to the full range of conceivable conditions that investigations could cover. The more resounding the success, the higher the likelihood of truth, and the stronger the claim to possess it. One would have been fully justified in claiming, pre- Einstein, that Newton's Laws had been proven. Discoveries post-Einstein did not make nonsense of the claim, but merely require that it be qualified to take account of the restricted range of conditions under which it remains true. Newton's conception of time and space may have been overthrown by these later discoveries, but I hope I have shown in an earlier chapter that there are alternative ways of conceptualising major discoveries, and the issues raised are not always scientific.

I want now to return briefly to a few orthodoxies and see if a dynamic perspective can help us decide just how much credence we should extend to them. Systems of belief that embrace the likes of evil spirits and witchcraft hardly seem to be worth considering at all. The systematic and consistent application of a complex method of investigation is not enough to make it scientific. Being possessed of evil spirits and in league with the Devil are not the sort of notions that withstand scrutiny of any kind, since they postulate life forces that enjoy a dominion safe from investigation. Some orthodoxies tacitly recognise the limitations of time or place to their jurisdiction and resort to the language of objective description only as shorthand, or as a demonstration of confidence perhaps. Fashionable movements are examples of these and embrace judgements on what is excellent, in good taste, smart, elegant or otherwise generally approved of. Usually there is no suggestion that the judgements they produce have either a universal or timeless application. Other orthodoxies endorse values and pass judgements that represent individual or social aspirations, so any pretensions to objectivity or truth here will need to be examined at greater depth. Political interest groups furnish

examples of these. Orthodoxies continue to flourish, enrich our cultural lives and meet some of our social needs but their contribution to knowledge is more debatable. They reveal much about ourselves, but they must subject themselves to a more thorough scrutiny if they seek to illuminate a reality beyond the social sphere.

Many of the truths that philosophers discuss are necessary truths. They find them interesting because they offer a guarantee of truth and an unassailable foundation for knowledge in the face of a sceptical onslaught. I have already touched on necessary truths when introducing those conceptual truths that are generated by describing the relationships between concepts, the extent to which they overlap and the conditions under which they do so. Such relations might be inclusiveness, exclusiveness, and equivalence. That oranges are fruits, that potatoes are not and that all unmarried men are bachelors are examples, and entitle us to draw conclusions about any orange, potato, bachelor or unmarried man without having to resort to investigations to determine them. Mathematics offers us an infinite number of a different order of necessary truths. The number "4" is not the generalised conclusion of a large number of calculations involving the addition of "2" and "2" for instance. It is a necessary truth that can be determined in advance by anyone with a basic knowledge of mental arithmetic, and any other result obtained from calculating the sum must be a miscalculation or even a trick. A correspondence with, or even a convergence upon, reality does not help us understand necessary truth since it obtains independently of any state that will be found there.

Traditional philosophical theories sometimes have difficulty in reconciling one or other form of truth with a statement of their own assumptions. Theories grounded in empirical generalisations such as Empiricism and Materialism have trouble extracting a significant notion of necessity from individual or generalised descriptions of experiences or material things. On the other side, theories such as Rationalism are systematically built on foundations consisting of necessary truths, so the idea of a contingent reality beyond their embrace can seem like something of a contradiction. These are problems I hope we can now leave behind. Concept and reality are distinct. Facts about concepts yield necessary truths, whilst their applications to reality yield contingent truths. A concept

stands in a necessary relationship with the full scope of its application, and the interest that defines it, and in a contingent relationship with instances that its application locates. Take an example. The concept of food is necessarily bound up with what is edible and sustaining, but only contingently associated with this or that particular product.

Recognising and distinguishing necessary truths from generalisations is another problem area. What distinguishes an empirical generalisation such as “All men are mortal.” from the necessary one “All men are human,” for example? The simple answer is that it depends whether we are talking about men or the concept of man. To decide which will be more difficult, and we have to look at not just the way the concept is used, but also how it has emerged and will develop. The fruitless search for immortality has been a persistent preoccupation throughout history, but when we have believed any of human form to be immortal, we have them raised to the status of gods. Understanding what we are prepared to believe is important to a grasp of a subtle concept. It is one that will change if ever we are able halt the ageing process, or routinely and comprehensively to renew body parts before they fail. Setting concept boundaries involves a decision-making process and a consensus that will take account of the purposes it will serve. This may involve considering hypotheses, such as whether human parentage is a necessary condition for being human. Deciding these and similar issues will determine how we regard the necessity or contingency of the statements we make about mortality. Science fiction delights in describing hypothetical and unexplored scenarios that stimulate discussion and sharpen our conceptual understanding. Many philosophers who conduct “thought experiments”, aim at something similar in the hope of producing conceptual truths that are more clearly delineated.

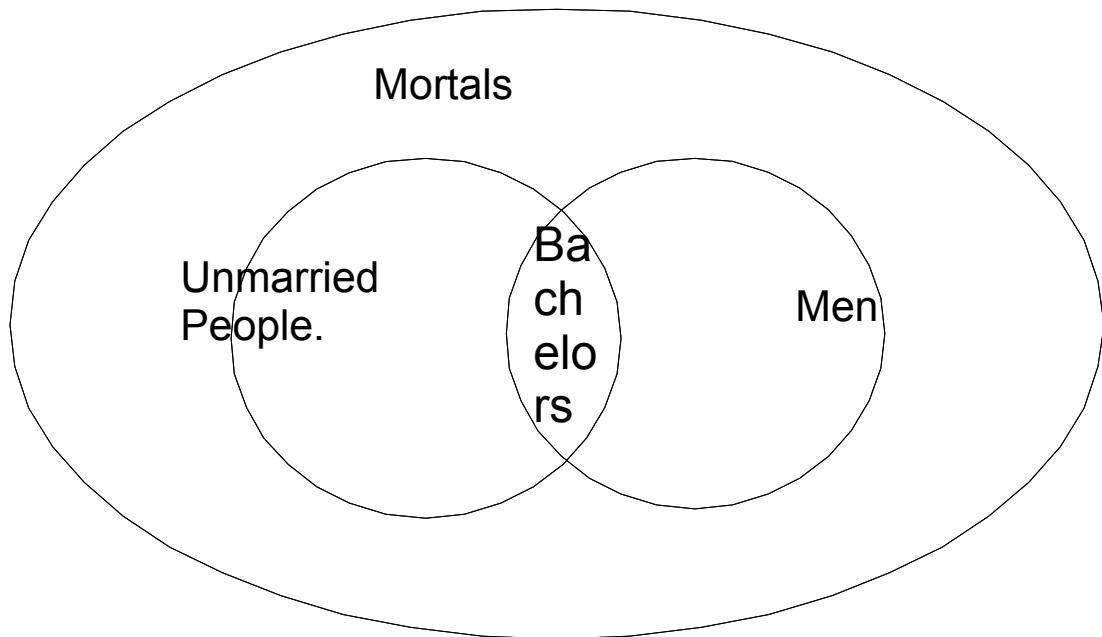
Once the boundaries between concepts are made clear, and the relationships, conditions and so on are made explicit, it then becomes possible to define them. Inclusiveness, exclusiveness and equivalence are common relationships, but generate only a limited range of definitions. That a man is human, for instance, is analytically true, but the truth falls short of a definition. This is because conceptual schemes are not simple hierarchical arrangements in the fashion of, say, botanical classifications. Most definitions bring together concepts in a synthetic association. There is no necessary connection between being a man and being unmarried, for instance. Were there one, then either all men would

have to be unmarried, or all unmarried people would have to be men, and the statement “A bachelor is an unmarried man.” would again become analytic, and not furnish an informative definition. But the statement does offer a useful definition because it asserts an association or an overlap of two concepts. These will generate necessarily true statements about all examples of bachelors or unmarried men, but the association remains a contingent one. Whereas analytic statements equate or classify, other necessarily true statements are not analytic and chart relationships between concepts. The analytic is internal, and its synthetic counterpart external in its scope.

Atomic theories of meaning, such as that endorsed by the Wittgenstein of the *Tractatus*, suggest that language comprises a pyramidal hierarchy of symbols. These analyse and classify reality into concepts linked by relations of equivalence, exclusion or containment. The dynamic perspective is more historical and proposes groupings of concepts arranged like a family tree. Individual family histories generate the relationships and analytic truths found in the atomic theories, but matrimonial links between families and their offspring bequeath new concepts and relationships analogous to the synthetic truths we find in most definitions. If there is any truth in the dynamic theory I propose it is at this conceptual level. I hope it too stimulates discussion of some of our fundamental concepts of experience and existence, finding contingent truths there that will yield necessary truths about actual experiences and reality.

The truths we can reach through the analysis or association of concepts have always been of great interest in philosophy, and the processes of reasoning or inference which we employ in pursuing them is often thought to be a defining characteristic of the subject. The necessity that attaches to correct reasoning or inference is not strictly speaking the truth of the propositions involved, but the validity of the procedures that lead us from one proposition to another. These are procedures that apply equally to true or false propositions, and logic is the branch of philosophy devoted to them. In binary logic propositions are assumed to be either true or false, as having one or other “truth value”, and its scope is restricted to these.

The procedures entitle us to infer, for instance the equivalence of a proposition “p” to its double negative “ $\sim\sim p$ ”, or to draw the conclusion “Socrates is mortal.” from the premises “All men are



Compare "All men are mortal." with "A bachelor is an unmarried man." The first signifies one concept containing another, whilst the second signifies the conjunction of two concepts. Definitions draw on both these as well as other relationships, but it is usually conjunctions that supply the most informative definitions.

mortal.” and “Socrates is a man.” These are examples of two different types of proposition as we have seen. One analyses the single concept of a true proposition, or the concept of truth itself, and the other draws upon an association between two concepts.

An explanation of this sort of necessity needs, amongst other things, to justify the existence of necessary connections between contingently true statements, and to show how vacuity and circularity are not inevitable when we employ valid reasoning. One way in which we do this is to look at logical procedures as expressing operations performed on sets of truth-values, and the results that that they produce. In a dynamic theory, a truth-value is obtainable where fact and statement converge. Both the statement that Socrates is mortal and the fact that he is depend upon the same investigative procedures to produce a truth-value. Once the truth-value has been ascertained, we can change our focus to regard the statement as one about its particular truth-value in order to draw inferences from it. Investigation yields a particular truth-value, but Truth and its companion Falsehood

themselves are concepts representing the common results obtained from the universal search for individual truth-values.

Truth and its companion Falsehood only possess essential qualities. We cannot tinker with them as we can descriptions or evidence. Every statement that is true refers to one and the same truth. In binary logic at least, we cannot alter the truth of a proposition except to make it false. Admittedly our everyday understanding of the concept permits us to recognise half-truths and other fluctuations in the strength of truth claims, but even here we have no other variable in terms of which to characterise these except as degrees of truth or falsehood. Half-truths are due more to the incompleteness or ambiguity in presentation, than to some state of semi truth to which they subscribe. Different facts alter the truth of a proposition, but they leave unaffected the nature of truth and falsehood themselves. Likewise efforts to subvert or misrepresent the truth leave its integrity unscathed.

Anything we say about truth-values has to be necessarily true therefore, and forms a part of the concepts of truth and falsehood. The concepts of truth and falsehood are not the product of a contingent association of other concepts. So any operations we define and perform upon truth-values must be true for any propositions possessing them, and propositions expressing these operations must be analytic. The value of Truth as a concept is as a yardstick for the assessment or comparison of all inferences. Were we to admit different types of truth, as distinct from different sets of conditions under which truth prevails, the concept would lose much of its value.

The sort of operations we perform upon truth-values formalise the analysis, synthesis, inclusion, exclusion, assimilation, the conditional and unconditional that are common features of discourse and argument. The formalisation of an operation provides truth-value outcomes for every possible combination of truth-values for the propositions involved. For instance, the operation of combining the truth of two propositions A and B is only valid where both A is true and B is true. Where either A or B is false, or where both are false, the inference of the truth of both A and B is inadmissible. Operations such as these enable us to make progress with inferences and draw conclusions, by demonstrating the necessity of one proposition, or by eliminating alternatives. Logical operations are often recognisable from everyday inferences, and may help sharpen these. The word "or" is

ambiguous, for instance, as it possesses inclusive and exclusive senses. “The coin will fall either heads or tails.” excludes the possibility of both, whereas “If either of these two coins falls heads then I win my bet.” does not. Formal logic can also define operations and combinations that go beyond the everyday vocabulary of inference, especially those involving several propositions.

Binary logic works with just two possible truth-values, unlike mathematics where an infinite number of numbers may be referred to by the simplest equation. So it is always possible, with arguments of reasonable length, to work out all the possible truth-value permutations, and set about locating operations on propositions that are true whatever the truth-value combinations of the propositions involved. To save the effort of doing this every time, some of the simplest demonstrable operations are consolidated into the rules of inference. So, for example, we can infer from the propositions “Either p or q is true.” and “q is not true.” that p must be true.

Such inferences may seem too obvious to warrant discussion and formalisation, but long and convoluted arguments are often too difficult to assimilate intuitively, and logic can simplify and clarify the procedures.

Inference or reason is therefore not an irrational force that places itself between experience and a direct intuitive understanding of reality. Nor is it a primary constitutive force of the Universe whose laws define and fashion what is real. Reason is a means or a tool. It guides the deployment of our investigative powers and increases our chances of success in the pursuit of knowledge. The fact that so much of our lives consists of the inquisitive deployment of our faculties within reality offers an explanation for just the two truth-values: truth and falsehood. Truth itself emerges from a convergence of fact and statement. Where the convergence obtains we find truth, and where it doesn't we must accept falsehood. Whether or not our understanding of the Universe, and all it contains, corresponds with its real nature is not a single grandiose question concerning Reason or Intuition or Essences. It summarises a large number of simpler questions and simply asks whether they are true or false.

Mathematical equations, theorems and calculations form a class of truths that are normally considered apart from those of science, everyday observation or definition. Sustained scepticism has managed to erode our confidence in an objective body of knowledge with impregnable defences in experience, observation and systematic investigation. Mathematics has perhaps been the only discipline to emerge unscathed from this process of reappraisal. Some philosophers, including Wittgenstein, have entertained the idea that mathematics only generates truths from intuitive foundations and so has a social or subjective basis. For the great majority however, the mathematical still represents a paradigm of necessary truth. That it can be a highly abstract subject helps explain this, but mathematics is also an essential guide to nearly all scientific investigation, and many of its applications are firmly rooted in material reality.

An understanding of the position and importance of mathematics needs to recognise how it consists largely of necessary truths that enjoy immunity from empirical investigation, and yet how it promotes, validates and anticipates the direction and findings of the investigative process. This is a difficult requirement. There is a formalist view that suggests we assimilate the mathematical to the analytic and conceive its propositions as true by definition. But this is insufficient. It is not a constituent part of the classification or definition of numbers, for instance, that the number four is the sum of two and two. We can understand the meaning of a number symbol whilst knowing very few of the number facts that include it, and continue making further discoveries about it indefinitely. Understanding the meaning of a term and identifying its object are normally pre-requisites for exploration and discovery. Nor can an analytic assimilation explain the contribution that mathematics has made to human knowledge. Analytical truths tend to consist of empty tautologies whereas mathematics conspicuously underpins major technological achievements.

More widely received is the view that mathematics deals in a realm consisting of numbers and other objects with an abstract and eternal existence independent of the mind. Placed beyond human consciousness, there is no danger that the eternal truths inhering here will ever be touched by our empirical dabbling. On this “naturalist” view numerals are proper nouns whose objects must remain unknowable, so leaving unanswered the questions of how we in fact do know a lot about numbers, and how numerical relationships impregnate reality at every level. Unfortunately for

Naturalism, it seems to invite more questions than it answers. The number 5 is a different object from the number 4 but presumably neither can be analysed into a different number of ones. This would raise the question of number all over again. Yet if each defies analysis then in what respect do they differ, and how can we rescue number facts from mere contingency? A structuralist variant of this view looks no further than these patterns or relationships to provide the subject matter of mathematics, but it is arguable that pattern recognition and formation depends upon an underlying mathematics to represent it. Besides, such a wholly theoretical structure still stands remote from the reality that exemplifies it, and beyond the wit of the intellect to begin grasping it.

In Kant's is a concept-based version of structuralism, the structures become forms of consciousness that impel us to accept intuitively the numerical relationships that mathematics can express. But this metaphysical concession to consciousness surrenders the necessity that is the hallmark of the subject, and encourages the relativist view that mathematics is grounded in psychology and sustained by social conditioning.

There are other initiatives, but none seems able to reconcile the necessity of mathematical truth with the contingency of its applications. The idea that mathematical objects such as numbers and triangles are "theoretical posits" like electrons might seem promising. Here the existence of numbers would be inferred from observing the manifestations of numerical relationships in reality, but again all necessity disappears with this concession. Conceiving numbers or shapes as properties of material objects, enjoying relationships of necessity denied to the objects they belong to is another contender. But the uniqueness of numbers and the system they form is lost if they are subordinated and dispersed in this fashion. Representing these properties is a source of difficulty too. How does the property of being two objects change when a third is added to the group, for instance? But at least this represents a genuine attempt to reconcile the theory and application of maths.

Dynamism offers a more promising reconciliation that exploits the distinction between concepts and objects. Numbers are produced through applying a counting system to objects. All that is necessary for any set of symbols to become distinct numerals is that no two are the same, and they are applied consistently and in

the same sequence. So the numeral "4" for instance when reached through different counting operations, or on different occasions, produces or refers to the same number. If the result is the same then so is the number. Dynamism goes on results. Once the order of the sequence is established as the principal then reverse counting and other variations can of course be introduced.

Dynamically conceived a number is neither an object nor a property of an object, but simply the result obtained from applying a system of numbers. Applications typically produce calculations of quantity, or measurements of length, time etc.. So what are numbers? Numbers are concepts, and each is the concept of a specific quantity or measurement, or the common result obtained from calculations of equal quantity. So statements about a number and the relationships between numbers are necessarily true. When we apply concepts to reality, as when counting groups of objects for instance, our calculations may be imprecise or in error. So only contingent truths result. The sum $2+2=4$ is a necessarily true statement about the addition of any two objects to two more, but counting two lemons and two oranges into the basket gives us only a contingent assurance that four pieces of fruit have been placed there. We can discuss numbers abstractly as we can any other concepts, such as the Queen Anne chair, and without mentioning any particular application of either concept, and explore the properties they possess.

By subjecting them to operations such as addition or multiplication, we are able to discover new properties of numbers. There is no need to know all a number's properties in order to be familiar with it. I have as good a working relationship with the number four as the next man, for instance, but have only just discovered it to be the cube root of 64. Exploration can expand our knowledge of number as much as any concept, and the discoveries will be necessarily true for calculations of quantity involving them. So at least some facts about numbers are necessarily true for their applications, even if they cannot be analytic. Analytic truths have to be created rather than discovered.

Many axiomatic truths of mathematics are analytic, such as the triangle's possession of three sides. These are matters of classification and definition. But the fact that any triangle with a base that bisects a circle will form a right angle at the circumference is a discovery that is necessarily true for all such circles and triangles. It is a demonstrable fact supported by

mathematical proof. Proofs typically generate higher orders of concepts and locate facts that apply to all numbers or mathematical objects falling within them. In the example of a semicircle and the right-angled triangles, the proof draws upon analytic truths of definition and another proof, that the angles of a triangle total 180° , to make a connection between the concepts of the two shapes. Any examples of the shapes must necessarily exhibit these properties. The truth is not analytical because it belongs to neither shape concept. It has a synthetic quality comparable to the family tree similarity and statements like "A bachelor is an unmarried man." We can of course change these necessary truths into analytical ones by revising or extending a definition, but this is a matter for decision.

Many facts about numbers seem not to be provable however. That there are four prime numbers between 10 and 20 is true and demonstrable, and yet not deducible from any theorem. Similarly that four is the cube root of 64. So are these contingent truths about numbers? These are facts that can be drawn from the numbers system, so must remain true so long as the concepts that sustain them never change. That the concepts should ever change is hardly conceivable. Our classification of chairs might redefine or abolish the "Queen Anne" as a type, but no imaginable circumstance will ever threaten the basic number system. Nonetheless a dynamic perspective does seem to locate a foundation for numbers and thereby mathematics in social conditions where measurement and recording play an important role. But these are not conditions that will limit mathematics to generating empirical generalisations, dependent upon a popular will to sustain their truth. In common with all conceptual systems, mathematics generates necessary truths, some of which are analytic and others with external conceptual links that extend human knowledge. Mathematics stands far apart from other schemes because of the sheer number and complexity of the truths it can produce. The picture might not be more complex, but the explanation of basic mathematical knowledge that dynamism presents is subtler than that of naturalism, formalism, structuralism and other mathematical philosophies. The principal features that each of these theories exclusively locates there are in fact all present in a dynamic presentation, but with differences in arrangement and emphasis.

Summary of Conclusions: Confusion over the concept of truth is due to a failure to understand the relationship between language and reality. Correspondence and coherence theories of truth fail because they

trivialise the relationship to the extent that reality is not allowed to be more than the instantiation of a set of concepts. Unsurprisingly then they play down the significance of truth as a concept. Pragmatic theories presume and rely upon a measure of truth in reality in order for expediency and success there to be recognisable.

A range of attitudes impels our pronouncements on reality depending upon circumstances and motives. Some of the most important attitudes produce statements. Truth typically obtains when a statement from one side, and the conclusion of an inquiry or investigation from the other, converge upon the same fact. Attitudes such as belief may correspond with a factual state of reality, but knowledge cannot presume a correspondence with the fact it expresses. With its truth ascertained, a statement of knowledge forges a non-contingent link with a fact that renders correspondence trivial.

Truth is a significant concept because knowledge is. Other concepts can cover for the roles that truth plays, but its importance is undiminished for that.

The representation of truth as encapsulated in enclosed conceptual schemes or paradigms derives much of its force from a distorted historical narrative. It plays down the characteristically smooth and continuous progress of the bulk of research, and exaggerates the disruption caused by radical new proposals. Concept-based theories need such a narrative to support their philosophical position, but actual events do not supply this and their position is unsustainable in any event.

Paradigms or orthodoxies nonetheless form an important part of our culture and the attitudes that spawn them are not incompatible with truth. To qualify as true representations, they must withstand investigation. Science covers the most formal and rigorous application of investigative techniques and good science is the paradigm for all investigative enquiry.

Statements about concepts produce necessary truths. Practical considerations and decisions may be involved in setting concept boundaries and in determining the necessary truths that result. Statements about concepts in which one includes or is equivalent to another may be termed analytic. Synthetic truths about concepts result from contingent associations between concepts that overlap and can be used to make more informative definitions.

Each instance of truth is a result or conclusion obtainable from investigation, inference or other means. Each is an example of the concept of truth that is unique and indivisible, so Truth itself possesses only essential attributes. Operations upon truth-values are valid where they produce propositions that are either true or false under all combinations of truth-values.

Numbers are concepts obtainable from calculations of equal quantity. Statements about numbers are necessarily true and these may be synthetic and informative in the way that some definitions can be, and so inform our investigation of reality.

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