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**THE TOWER OF BABEL: SOME SPECULATIONS ON THE ROLE OF TECHNOLOGY,
LANGUAGE AND TRADE ON THE EVOLUTION OF RELIGION, PHILOSOPHY AND
SCIENCE**

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Abstract

The paper explores the relationship between three features which, it is often claimed, distinguish human beings from other species of living organism:

- (1) the ability to colonize a new environment by developing an appropriate technology,
- (2) the ability to communicate with one another by means of a learned language, and
- (3) the propensity to develop a system of magico-religious beliefs and practices.

The Tower of Babel legend is seen as reflecting the way in which a new environment and the development of a new set of technologies designed to deal with that environment leads to changes in linguistic practice within the community involved. The dependence of human beings on the possession of integrated systems of causal theory and technological practice for their survival, is proposed as the motive for the creation of a system of magico-religious beliefs and practices in those areas of human life where understanding of the causal relations and consequent technological control is lacking. Because they are not constrained in the way that technological beliefs and practices are constrained, by the need for precise control over the technological process, magico-religious belief systems tend to proliferate in much the same way that languages proliferate as a consequence of the Tower of Babel phenomenon. The consequent multiplicity of magico-religious belief systems creates a barrier to trade and other forms of social co-operation between communities which differ in this respect which, to judge by the lengths to which human beings have gone to iron out such differences, is more serious than that presented by differences in language. The development of philosophy, the supra-national religions and science are interpreted as successive responses to this problem.

1. Technology and Language as the Two Instruments of Human Adaptation

Although human beings have never been able to overlook their own obvious biological affinity to other species of living organism on this planet, they have always insisted as far back as our records go on the uniqueness and superiority of their own species relative to other varieties of living things. This belief in the biological superiority of man has persisted despite the setback it received when it was first suggested by Darwin that man is nothing more than a variety of ape sharing a common ancestor not only with all existing species of ape, but further back in time, a common ancestor with all existing species of primate, mammal, vertebrate and ultimately with all forms of life on this planet whether animal or plant. Has this belief in the biological uniqueness and superiority of the human species any intellectually defensible foundation? Or is

it just a manifestation of what some contemporary thinkers (e.g. Singer 1979) have called "speciesism" - (on the analogy of racism) - a manifestation at the level of the species of the human propensity to extol the virtues of one's own family, town, firm, football team, county, nation or race, while denigrating those of other families, towns, firms, football teams, counties, nations or races?² It can hardly be denied that there is an element of speciesism behind such claims as that of Aristotle when he maintains¹ that man, unlike other animals, has a rational soul in addition to a sensitive and vegetative soul,² the doctrine which reappears in Descartes' contention³ that animals are reflex automata and that the *res cogitans* or thinking soul is an exclusively human possession, and in Locke's arrogant and demonstrably false claim⁴ that brutes "have not the faculty of abstracting." Other manifestations of the same chauvinistic attitude are to be found in the humanist conception of man as the lord of creation and in the biblical doctrine that man was created in the image of God and that everything else in the universe was created for his benefit, the sun to give light by day and the moon by night.

But while such exaggerated claims are difficult to sustain in the light of our present scientific understanding of such matters, there is, I shall argue, a grain of truth running through them. The claim that man is lord of creation and that the universe was created to supply his needs reflects the unquestionable biological fact that whereas all other species of living organism on this planet are adapted by their genetic constitution for survival in a single narrowly defined ecological niche, the human species has developed an ability to occupy a wide variety of ecological niches far removed from that of the tropical savannah in which the species is thought to have evolved in the first place and to which it is physiologically adapted. It has done this not by developing new genetically programmed anatomical and physiological characteristics appropriate to these new environments, but by developing an appropriate technology which is organized and transmitted from one generation to the next by the process of linguistic communication. In order to bring out this point

¹ *De Anima*, Book II, Chapter 3.

² My colleague Roger White argues that this 'speciesist' interpretation is unfair to Aristotle. He points out

- (a) that the Greek adjective which was rendered in the Latin of the Schoolmen by *rationalis* is in fact λογικός the basic meaning of which is 'able to use words,' and
- (b) that the noun ψυχή 'soul' is used in Aristotle's biological writings to mean the set of functions or capacities which distinguish one species of living organism from others.

It follows from this that [to] say that the human species has a rational soul which is lacking in the case of other species is to say no more than that the human species is the only one that has the ability to communicate by natural language. It is a straightforward matter of empirical fact no more remarkable than the fact that there are plants such as the sensitive plant and the Venus flytrap which have sensitive souls.

³ *Discours de la Méthode*, Part V.

⁴ *Essay concerning the Human Understanding*, Book II, Chapter XI, Paragraph 10. For an experimental demonstration of the rat's ability to abstract a common visually presented pattern from instances presented in a variety of different contexts, see Lashley (1930; 1938).

one has only to consider the present distribution of man's closest relatives, the anthropoid apes, gibbons, orang-utangs, chimpanzees and gorillas, all of which despite a brain development and a consequent intelligence which is little short of that of the human species, are confined to a narrow ecological niche within the tropical rain forest. Contrast this with the distribution of the human species, not just today, but in the days when the only technology available was the hunting and gathering technology of the Old Stone Age. Armed only with tools and weapons of wood, bone and stone and the ability to make and use fire for warmth and for cooking food, human beings were able to exploit a far wider variety of food resources than any other comparable creature, protect their naked bodies from cold by making clothing and shelter, and cross rivers, seas, and oceans with boats hollowed out from the trunks of trees and thereby colonize almost every habitat that the land surface of the planet has to offer from the fringes of the Arctic and the Antarctic, through the woods, hills and plains of the temperate regions to the deserts and rain forests of the tropics and, with the sole exception of Antarctica, on every continent and major land mass on the face of the earth. Compared with that achievement the minor extensions to the areas available to human habitation made possible by subsequent technological innovations pale into insignificance.

2. The Role of Means-End Beliefs in Mediating Technological Innovation

Just as the conception of man as the lord of creation and of creation as designed to provide for human needs reflects the way in which technology and technological innovation has freed the human species from dependence for its survival on genetic adaptation to a particular ecological niche, so, I would suggest, the gulf that is seen by Aristotle, Descartes and Locke between the rationality of man and the irrationality of animals reflects the importance of language and linguistically formulated theory both in the organization of technological enterprise and in the transmission of technological innovation from one generation to another.

The practice of formulating statements and rules describing the causal relations which underpin the technologies on which the group depends for its survival and continued prosperity is clearly very ancient. When embedded in the folklore of the social group it has an obvious utility in ensuring the transmission of those technologies from one generation to the next. Although at the end of the day technological skills can only be properly learned by trial and error on the part [of] the individual practitioner, rules and precepts

have an important role, particularly in the early stages, in guiding the apprentice in the direction he or she needs to go and in how to avoid some at least of the many pitfalls. Moreover, such "common sense" causal beliefs, when combined with those formulated by the individual on the basis of his or her own experience, are [an] invaluable resource for decision-making on the part of an individual or group, particularly in those cases where the individual's own past experience by itself does not provide an answer.

For these and perhaps other reasons it is clear that from an early stage in the development of human culture human beings became dependent on having available to them, embedded in their cultural traditions, an integrated stock of such verbally formulated "common sense" beliefs about the causal relations operating in the environment and in the technological processes involved in the group's adaptation to it.

3. Evidence for the Early Cultural Embedding of "Common Sense" Causal Beliefs: 1. Belief-Desire Explanations of Behaviour

Two pieces of evidence support this view. One of these is the existence in every human culture, it would seem, of the practice of explaining and predicting the behaviour of others in terms of what the individual believes about the consequences of what he or she has done or is proposing to do together with his or her motivational attitude, desire for or repugnance towards those consequences. In recent years some philosophers, notably Dan Dennett (1987), have tried to persuade us that the principle embodied in belief-desire explanations of behaviour not only has application to the behaviour [of] pre-linguistic organisms (animals and human infants), but is built into the genetic constitution of the brain down to the level of the individual synaptic connection. What is certainly true is that a very similar principle, the principle that behaviour is selected on the basis of learned anticipation of the consequences of behaving in one way rather than another together with the motivational attitude of the organism to those consequences, applies in the case of all those species of living organism who can learn to anticipate the future consequences of their own behaviour on the basis of past experience. But what the likes of Dennett fail to appreciate is the difference between anticipating the consequences of doing one thing rather than another on the basis of one's own experience of those consequences in the past and believing that performing the action in question will have those consequences. For it is part of the concept of a belief that it either is or is capable of being formulated

in language. That this is so is shown by the use of *oratio obliqua* or indirect reported speech in specifying its content. The function of *oratio obliqua* is to allow the speaker to quote what Geach (1957) calls the "gist or upshot" of what someone has said or, as in this case, would be inclined to say without giving their exact words.

By specifying the content of a belief or other propositional attitude in this way and by using it to explain and predict the individual's decisions as to what to do, we presuppose a situation in which behaviour is controlled, not simply by anticipations of the consequences of doing one thing rather than another, but by verbal formulations of the consequences of doing one thing rather than another. Such verbal formulations may be constructed on the basis of the agent's own past experience; but they may equally well have been derived by linguistic communication from the past experience of another individual or from the collective past experience of the social group. It is clear from this that the practice of explaining and predicting behaviour in terms of the agent's beliefs about its consequences could only have arisen in a society where not only are decisions reached on the basis of verbal formulations of the causal relations between behaviour and its consequences, but where most of such beliefs can be inferred from a knowledge of the body of such beliefs embedded in the folklore of the social group to which the agent belongs.

Another condition which must be satisfied if explanations and predictions of behaviour in terms of the beliefs and desires of the agent are to succeed is that the agent maintains a consistent and rational connection between what he or she does on the one hand and the reasons he or she gives for doing so on the other. Evidence that this consistent and rational connection between what a person says on the one hand and does on the other is not part of the natural order of things is provided by the observation that in most human societies severe sanctions are imposed not just on those who lie but on those who fail to conform to the requirement that the reasons they give for what they do should make rational sense. Those who fail to conform in this respect are stigmatised as mad and, if the offence persists, have often in the past, if not at present, found themselves locked away from the wider society in conditions little better than those provided in prison for the common criminal. The justification usually proposed for such sequestration of the insane is that without a rational connection between thought and action "you never know what he might do."

4. Evidence for the Early Cultural Embedding of "Common Sense" Causal Beliefs: 2. Magic and Religion

The second piece of evidence for an early and universal embedding of an integrated stock of causal beliefs in the folklore of human societies and for the reliance placed on those beliefs comes from the development in every society that we know of, both in the present and, thanks to the archaeological record, in the past, of a system of magico-religious beliefs.

Given the particular set of technologies on which a human social group depends for its survival in the environment in which it finds itself, the set of causal beliefs embodied in the folklore of the social group which underpin those technologies and explain their success will always be incomplete in the sense that there will always be processes, events and states of affairs where understanding of the causal relationships involved is lacking and where, consequently, there can be no genuine prediction and technological control of the relevant environmental contingencies.

These gaps in theoretical understanding and consequent technological control will tend to occur where the causes of events are obscured from ordinary observation either, as in the case of the weather or the economic forces that operate within a modern industrial society, by their sheer size, multiplicity and complexity in relation to the narrow view of them available to any one observer, or, as in the case of the causes of disease, by their microscopic nature, or again, as in the causes of earthquakes and volcanic eruptions, by their being hidden deep beneath the earth.

The awareness of such a gap in the theoretical understanding of the causes of events and of a consequent lack of technological control over them, I take to be the source of the emotion of religious awe - analyzed by Rudolf Otto (1917/1923) as the *mysterium tremendum et fascinans*, a mixture of terror and fascination in the face of the inexplicable, the unpredictable and the uncontrollable. This ambivalent reaction, part terror, part fascination, in response to the unfamiliar, the unknown, the unpredictable and hence potentially uncontrollable, is to be found in the behaviour of other species of mammal besides man. The white rat, for example, when placed in a strange environment shows the same mixture of terror and the desire to escape, followed gradually by at first tentative, but later more confident, exploratory or curiosity behaviour whose function, presumably, is to reduce the aversiveness of the unfamiliar, the unknown, the

unpredictable (and hence uncontrollable) by gradually assimilating its various features to the known, the familiar, the predictable and the controllable.

An animal may be every bit as terrified by an unpredictable event, such as an earthquake, as any human being. But without language an animal's fear is not connected, as is human fear, to the lack of a verbally formulated causal explanation of what is happening and a consequent inability to bring it under effective technological control. An animal's reaction to the strange, mysterious and unpredictable is restricted to an immediate response to the event as it occurs. Its effect in the case of a human being is to draw attention to a gap in the linguistically formulated theoretical underpinning of the technology on which human survival depends, an intolerable running sore, the kind of thing which, in the popular imagination at least, drives men mad.

Fortunately, the very conceptual flexibility of human language which allows it to make the conceptual innovation required to communicate the principles of a new technology, also permits the development of a system of magical and religious beliefs with their associated rituals and taboos whose primary function is simply to fill these important gaps in theoretical understanding and consequent technological control, thus making some kind of sense of the unintelligible and mysterious and providing the believer with the comforting sense of being able to influence forces over which, in reality, he or she has no control.

It follows that whereas the theoretical understanding of the causal principles underlying the technology available to a given community will be narrowly constrained by success or failure in predicting the outcome of the different strategies employed within the technology, the magical and religious beliefs which fill the important gaps where a genuine theoretical understanding of causal relationships is lacking will, as Popper (1963) has pointed out, be constrained only by the need to avoid any kind of falsification by the evidence of observation and experience, however things turn out.

The reason why the causal agencies postulated in religious and magical belief tend to be thought of in personal terms is due, I am inclined to think, not to any lack of the ability on the part of the so-called "primitive mind" to grasp the principles of mechanical causation. It is due, I suggest, to the fact that explanations of human behaviour in terms of the beliefs and desires of the agent yield precise and accurate

predictions of outcome only so long as the assumptions we make about what someone believes or wants can be checked against what he or she actually says. But once that check is removed, they become immune to any kind of falsification. This is what happens when agency is attributed to some god or spirit whose desires, whims and purposes can only be guessed at. "As flies to wanton boys, are we to the gods, - They kill us for their sport", as Shakespeare⁵ so aptly puts it.

This is not to deny that many of the taboos and rituals of magic and religion have genuine and powerful effects on the welfare of those who believe in them or abide by them. The taboo on eating pork, for example, makes sense as a protection against trichinosis; sexual taboos and the practice of consigning a substantial portion of the population to a life of monastic celibacy make sense as population control devices in a society that lacks the technology of contraception; many of the techniques of the witch doctor and the faith healer are becoming intelligible the more we come to know about the psychology of such phenomena as hypnosis, *placebo* reactions and altered states of consciousness. Much the same is true of the important functions, emphasized by Durkheim (1912/1915) and his followers, of religious beliefs and rituals in maintaining the social fabric of society. In all such cases, however, the relation between the ritual practice and its theoretical justification in religious and magical belief is always arbitrary in the sense that the same practices could equally well be, and often are, justified on entirely different grounds in other societies.

I should point out in this connection that I understand the distinction between magic and religion as the distinction between those magical beliefs and rituals whose function is to fill gaps in causal knowledge and consequent technological control in relation to the private needs, desires and fears of the individual, and religious beliefs and rituals which perform the same function with respect to gaps in causal knowledge and technological control, as they relate to the needs of the community as a whole. It is this, I believe, which explains the close connection, which has no counterpart in the case of purely self-interested magic, between religion and ethics. Moral conduct, I take it, is the behaviour required from or to be encouraged in the individual in order to ensure social co-operation and the welfare of society; such behaviour is normally sustained within families and between friends by the mechanics of social approval and disapproval (Place

⁵ *King Lear*, Act IV, Scene i.

1986), but in societies without police and a formal legal system, standards of moral conduct between unrelated strangers are invariably maintained by the fear of some kind of supernatural retribution.

5. The Sources of Cultural Diversity and the Tower of Babel Legend

If we examine those few remaining parts of the world such as Central Africa, the Amazon region in South America or New Guinea and the neighbouring islands of Melanesia which until comparatively recently remained unaffected both by modern European technology and by the influence of one of the major world religions, such as Buddhism, Christianity or Islam, in other words the happy hunting grounds of the ethnologist and the anthropologist, we invariably find, I suggest, a remarkable correlation between four things which distinguish the different tribes or peoples to be found in such areas:

- (1) differences in the technology employed to wrest a living from a particular environment,
- (2) differences in social organization,
- (3) differences in the language spoken, and
- (4) differences in magical and religious belief.

Moreover, wherever the historical and archaeological record allows us to assess the state of affairs as it existed before it was obscured, either by the introduction of European technology or by the impact of a major world religion, we invariably find the same association between technology, social organization, language and religion as the basis on which distinctions are drawn between one tribe or people and another.

The key to understanding the association between differences in the technology used to extract a living from a particular environment with differences in language, social organisation and magico-religious belief and ritual practice is to be found in the Tower of Babel legend from which this paper takes its title. As can readily be observed whenever specialists in a particular technology are gathered together, they begin amongst themselves to speak in a technical jargon which is unintelligible to the non-specialist. It was this phenomenon, I take it that [led] the author of the Tower of Babel legend to associate the development of different mutually unintelligible natural languages from a single parent stock with a massive technological project in the distant past.

On the present version of what we may call the Tower of Babel hypothesis, as a human social group moves into a new environment, it must either invent a new technology or adapt an old one to suit the changed circumstances. Each such change brings with it a new technical vocabulary which, when unconstrained by the need to communicate with groups who still retain the original language and technology, will over time lead to the evolution of a distinctive dialect and eventually to a split into two mutually unintelligible languages.

That the adoption of a new technology in response to changed environmental conditions would also require changes in the way the social organisation is arranged is difficult to gainsay. It has in any case been the subject of intensive investigation by sociologists and social anthropologists both within and outside the Marxist tradition. If evidence is needed of the intimate connection between environment, technology and social organisation, one cannot do better than cite E. E. Evans-Pritchard's (1940) classic study, *The Nuer*.

Less obvious, perhaps, but equally well explored by sociologists and social anthropologists in the tradition of Durkheim (1912/1915), is the relation between religion and social organization. What is less well explored is the relationship which interests me between the technology and the body of linguistically formulated theory required for its communication on the one hand and the magical and religious beliefs and their associated rituals which are associated with that technology on the other. What we can now see is how changes in the technology required to wrest a living from a new environment will change the significant gaps in the technology and its theoretical underpinning and, hence, the way in which those gaps are filled by the shared magico-religious beliefs of the social group and their associated rituals.

6. Cultural Differences in Religion as a Barrier to Trade

It is a consequence of this view of the nature of religious belief and practice that the relative importance of particular gaps in theoretical understanding and technological control will vary from one social group to another depending upon the nature of the environment and the technologies available to extract a living from that environment. Social groups deploying similar technologies and confronting similar environments will be constrained by the need for precise and effective control of those technologies to develop similar, if not identical, beliefs concerning the causal relationships involved in the technology. Beliefs of this kind will

not differ significantly as we move from one community to another. In the case of magico-religious belief systems, on the other hand, there is room for much greater variation from one community to the next. In a situation in which there is little need for trade or political co-operation between different communities, the systems of magical and religious belief within the community will be constrained only by

- (a) the physical and psychological needs of the individual and the community;
- (b) the absence in certain important areas of life of the causal knowledge and the technology based on that knowledge which would be required in order to ensure the reliable and effective satisfaction of those needs (the gaps);
- (c) the need to avoid the falsification of beliefs designed to fill these theoretical and technological gaps by the empirical evidence;
- (d) the need to maintain patterns of co-operative social behaviour and the established institutions of society;
- (e) the need to appeal to the authority of tradition in cases where beliefs are not constrained by the demands of accurate prediction and successful technological control.

Without the need for economic and political co-operation with other communities, these constraints tend to produce almost as many different systems of religious belief as there are mutually unintelligible natural languages. This multiplicity of different systems of magico-religious belief creates serious barriers to trade and other forms of social co-operation between neighbouring communities. We have already seen that in societies which lack a formalised system of law and law enforcement social cooperation is secured by the threat of social ostracism. But the threat of social ostracism is effective only within close knit social groups such as a village community or a kinship group. Social co-operation between strangers such as that required inter-communal trade requires the threat of supernatural sanctions to ensure that once a bargain is struck its terms are adhered to by both parties.⁶ Where the parties concerned share a common set of religious beliefs,

⁶ As Graham Webster has pointed out in lectures, the widespread practice of invoking supernatural sanctions to ensure compliance with bargains struck between strangers is illustrated by such phenomena as the market cross in Medieval English towns, by the co-occurrence of markets and temples in otherwise rural sites at the point where a road crosses the boundary between two tribes which is a characteristic feature of the Romano-Celtic world as revealed by archaeology, and the siting of markets in the shadow of an important mosque which is a characteristic feature of the world of Islam.

this is readily achieved; but where they do not, cooperation becomes exceedingly difficult to achieve in the face of deep-rooted inter-communal suspicion and hatred.

It follows from this that differences in religious belief must always constitute a serious barrier to any kind of economic or political co-operation between groups which differ in their religion. Examples of conflicts between communities of different religious affiliation both in the past and in the present are too numerous and too well known to require enumeration. Similarly throughout history every imperial power that has attempted to achieve political control over peoples of different religious affiliations has felt the need to establish some kind of uniformity of religious belief throughout its dominions and to persecute obstinate recalcitrant religious cults like the Druids and the Jews; and, if political ideologies can be regarded as a variety of religious cult, the same pattern continues in our own time.

7. Religious Differences and the Origin of Greek Philosophy

This, it would seem, is the problem which confronted the Greek colonies on the mainland of Asia Minor in the 7th century B.C. They lived in isolated city-states amongst neighbours with a different language, religion and moral code on whom, unlike a conqueror, they were powerless to impose their own system of magico-religious belief. They earned a living by trading, on land with those same neighbours and through them with other alien peoples of the interior of Asia Minor, and by sea with yet other peoples of the East Mediterranean littoral. They must have been acutely aware not only of the barrier to social co-operation and trade created by these differences in moral code and magico-religious belief, but also of the intellectual and moral superiority of many of these other magico-religious belief systems in comparison with their own, as evidenced by the propensity of their successors throughout the classical period to import Oriental religious cults and integrate them into their own culture. In this situation, it made sense to do, as some of them did, namely to sit down and debate the relative merits of the different doctrines that go to make up the various systems of magico-religious belief which they encountered around them in the hope of discovering the right answer to the questions to which the different religions gave different answers. In other words, they began to do philosophy in its original and broadest sense.

8. Philosophy and the Religion of the Book as the Twin Sources of Christianity and Islam

Philosophy implying, as it inevitably does, the possibility that none of the existing systems of religious and magical belief have yet got the right answer, when combined with Judaism, a self-confident monotheistic tribal religion with its own sacred scripture, gave birth to Christianity, the first effective supra-national inter-tribal religion of the Mediterranean world. Christianity in turn eventually replaced the classical pantheon and the *interpretatio Romana*, whereby local tribal religions were assimilated into the classical pantheon by the process of identifying the local god or goddess with one or other of the classical deities. Although the triumph of Christianity was quickly followed by the collapse of the Western part of the Roman Empire in the face of barbarian invasions, the importance of a supra-national religious cult both in preserving the Empire in the East, and in laying the foundations for the ultimate re-emergence of a "common market" in the West is plain to see. Equally apparent is the way in which Islam, the second supra-national religion to emerge from the ashes of the Graeco-Roman world, spread along the trade routes running along North Africa from the eastern to the western end of the Mediterranean, from North to West Africa, through Central Asia to China, and along the coasts of the Indian Ocean from East Africa to the Spice Islands of Indonesia. Doubtless a similar story could be told in relation to the history of that other supra-national religion, Buddhism.⁷

9. Philosophy and Science

In addition to its contribution to the emergence of supra-national religions, philosophy in its original broad sense has, when combined with the techniques of mathematical calculation, measurement and the experimental method, given birth to the formal, experimental and empirical sciences. These techniques, taken over from technology and used as a method of resolving interminable philosophical debates, together with the new technologies based upon their use, have in the course of the past four hundred years very substantially reduced the gaps in our understanding of the causal relations operating in the environment and

⁷ Hinduism is a rather different case. Here peoples with different religious traditions have been incorporated into a common framework, partly as distinct castes in the all-embracing caste system and partly by a process of spontaneous syncretism, notably more successful than the enforced syncretism of the *interpretatio Romana*. One wonders how far this process of syncretism was helped on its way by the philosophical thinking which appears in the *Upanishads* and which seems to have led to the emergence of Buddhism as a supra-national religion in much the same way that Greek philosophy prepared the ground for Christianity and Islam.

our technological control over it. The result has been that many of the traditional magical and religious beliefs and rituals have been superseded and the hold of traditional religion has been progressively weakened.

10. The New Religions - Marxism and Psycho-Analysis

At the same time, the industrial society made possible by the technological innovations based on the new scientific knowledge has created new areas where men find themselves at the mercy of forces they cannot understand, predict or control, for which the traditional religions provide no answer. One is the area of the economic forces which control the fate, in particular, of the working classes in an industrial society. Another is that of the psychological tensions which arise within the nuclear family, when cut off by the needs of mobility within an industrial society from its roots in the old extended family and the village community. In response to these two new areas of mystery and impotence we have the two new religions of the 20th century, Marxism and Psycho-Analysis. These new religions have all the marks of the older ones: systematic immunity of theory from falsification, appeal to the authority of the sacred writings of the founding fathers, the condemnation of heretics, etc., etc. The significant disanalogy is in the case of Marxism where, in place of the rituals of the traditional religions whose effects by and large are those of a harmless *placebo*, we have revolutionary social action designed to actively undermine the existing capitalist social order and a specific prediction that the inevitable consequence of so doing will be to usher in the universal freedom, welfare and happiness of the socialist millennium. In the face of the conspicuous falsification both of the prediction of the inevitable collapse of capitalism and of the predicted benefits of the socialist revolution, when combined with the failure of Marxist theologians to provide adequate casuistical protection against such falsification, the recent collapse of societies organized on the basis of this religious belief system seems hardly surprising, at least with hindsight. Psycho-Analysis, despite having been rumbled by the likes of Popper (1963) and Eysenck (1953), is in rather better shape.

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ADDITIONAL NOTES

Summary

My object in this paper is to explore the inter-relationship between these three basic features of human culture, technology, language and magico-religious beliefs and practices. In particular I try to show

- (1) how the need to construct and communicate technological innovation gives to human language some of its most distinctive characteristics, and
- (2) how the dependence of human beings on a linguistically explicable and communicable technology for their survival can be used to explain the development of unsubstantiated beliefs and apparently functionless rituals based upon them in those areas of human concern where no substantiated body of practical knowledge and no practical technology based upon it is available.

It goes without saying that divisions between communities based on differences of language, culture, social organization and magico-religious belief are a potent source of conflict and a serious barrier to trade and other forms of social co-operation between communities which differ in these ways. Not surprisingly, therefore, it is the facilitation of trade and other forms of co-operation between otherwise alien communities which it makes possible which provides the principal inducement for the adoption by those communities of a common supra-national religion, such as Buddhism, Christianity and Islam. The development and spread of a supra-national religious faith and the consequent facilitation of trade and co-operation amongst its adherents depends on

- (a) the acceptance of a common system of religious beliefs which transcends differences of language and culture and provides the supernatural sanctions required to ensure that bargains are kept when they are struck between people who are not bound by ties of family and locality⁸,
- (b) the invention of writing which enables the teachings of the supra-national religion to preserve some kind of integrity and identity when passed from one language and culture to another,
- (c) the adoption of a *lingua franca*, such as Sanskrit, Pali, Greek, Latin or Arabic to provide a medium for trade negotiation and litigation between peoples of different language and culture, as well as a language in which scriptures, doctrine and ritual can be written down, and thus passed on intact both from one generation to the next and from one people to another.

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What happens at this stage is that a new environment or a new technology or some combination of the two requires a new set of concepts in order to pick out the distinctive features of the new environment or the features of the equipment and procedures of the new technology. In order to provide for these new concepts a new vocabulary has to be devised. Old words come to be used in new senses; new words are devised by putting old words together in new ways, as in Peter Geach's example of "wrangle-law"⁹, the newly invented Icelandic word for "logic"; or words are borrowed from some neighbouring language which already possesses the relevant concept as in the case of the Anglo-Saxon words *ceaster* and *straet* borrowed from Latin *castra* and *stratum* and used to denote the stone-walled forts or fortified towns and the paved roads which the Anglo-Saxons had not previously encountered in their North German homelands, but which dominated the landscape of the Roman Britain which they conquered and colonised.

Not only does a new environment and a new technology require a new vocabulary, it also requires the construction of new kinds of sentence using the old vocabulary in order to represent states of affairs which there was previously no need to represent either because such states of affairs were not encountered or because it is only in relation to a new technology or the social institutions created by that technology that the need to talk about them arises. Take, for example, the sentence *The men won't stand for it, sir.* which has no

⁸ See also footnote 6.

⁹ Personal communication.

place outside the mills, factories, mines and quarries of the first industrial revolution. The cumulative effect of these changes both in vocabulary and in patterns of sentence construction is to alter the relative frequency of occurrence within a linguistic community of the different phonemes of which the words of the language are constructed; and this I suggest goes a long way towards explaining the progressive sequence of sound changes which, as the philologists have shown us, invariably occur as a function of time within any linguistic community and which proceed in different directions and at different speeds within different geographically isolated sub-groups of what was originally a single linguistic community until ultimately they end up speaking two different and mutually unintelligible languages. The effect of geographical separation giving rise to divergent dialects of the same language is well illustrated by the different varieties of English that have evolved in North America, South Africa and Australia, each of which is different, both from any of the dialects to be found in different parts of England at the present time, and, where they can be reconstructed, from any of those used by the original English speaking settlers in that part of the world. What is perhaps less obvious is the effect of differences in technology and the consequent differences in vocabulary in giving rise to differences in phonology. However, there is some evidence for this I suggest in the differences that can be observed within the United Kingdom between the dialects spoken in the old urban and industrial areas and that spoken in the neighbouring rural areas. The most striking example of this kind, because it is the oldest, is that between the so-called "cockney" spoken in London and the rural speech of the neighbouring Home Counties typified by that of the actor Bernard, now Lord Miles. Similar differences, though less marked and complicated by other linguistic boundaries which go much further back into history, can, I suggest, be detected in the case of the speech of all the major conurbations and industrial areas in the United Kingdom as compared with that of the surrounding rural communities.

Likewise the doctrine that man is made by God in the image of God, when turned on its head, as it often has been, becomes the doctrine that God is made by man in the image of man and thus reminds us of another important feature that distinguishes human beings from other animals, namely their propensity to develop, alongside their practical and functional technologies and the theories which explain their *modus operandi*, another body of beliefs and practices which complement the practical beliefs and the technology based on them, but which themselves have no obvious practical utility and which constitute the domain of magic and religion.

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[A]ny effective human technology depends, both for its exploitation and for its communication by means of language from one generation to another, on an understanding of the causal relationships involved in that technology which is formulated in language, and which, when so formulated, provides an essential theoretical underpinning for the technology, and can properly be said to constitute a body of genuine, though informal scientific knowledge.

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It is my contention that the Biblical story of the Tower of Babel¹⁰ which gives this paper its title contains an important insight into the link between technological innovation and linguistic change. As I argue in a recent paper (Place 1992), in the light of recent developments in artificial intelligence, it is becoming increasingly possible to maintain once again that language is learned by the child on the proverbial 'mother's knee' by the same processes as govern[ing] the acquisition of other complex skills. This dependence of natural language on learned customary usage contrasts with the predominantly innate forms of communication which have been studied by the ethologists in the case of animals. It would seem, moreover, that only a system of communication which is learned *ab initio* by each member of the linguistic community from childhood onwards and which consists of words and sentence patterns whose meaning or function is fixed only by customary usage, has the kind of flexibility which enables it to develop the new concepts required to accommodate the features of new environments and the new technologies required to cope with them.

But this flexibility, which only a language whose meanings are fixed by customary usage can provide,

¹⁰ Genesis, xi.

incurs the penalty, so dramatically represented in the Tower of Babel story, whereby what was originally a single linguistic community sharing a common language gradually develops into distinct linguistic communities whose languages are mutually unintelligible. One can see the beginnings of this process, as the unknown author of the Tower of Babel story must have seen it, in the private idiolects which any group of practitioners of a new technology rapidly develops and which sound like unintelligible gibberish to the uninitiated listener.

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So much for what I take to be the central theme of the Tower of Babel story - the influence of differences in environment and the technology used to support human life within that environment as an explanation of linguistic differences. I now want to turn to my second question concerning the relationship between technology and language, on the one hand, and magic and religion, on the other.

As the history of Christianity shows, a supra-national religious faith has a remarkable ability to incorporate the traditions of the local tribal religions which it absorbs. As is made clear by Pope Gregory's explicit instruction to Abbot Mellitus on his departure for Britain in A.D. 601¹¹, this was sometimes a matter of deliberate policy by the ecclesiastical authorities in much the same way that the religious policy of the pre-Christian Roman Empire, the *interpretatio Romana* had tried, less successfully, to assimilate the local tribal Gods to those of the classical pantheon. At the same time, the history of Christianity also illustrates [the] opposite tendency, the tendency which had already manifested itself by the 5th century A.D. if not earlier, for the seamless robe of Christ to split up into sects and factions along the pre-existing boundaries of language and culture. The process begins with the splitting off of the Syrian, Armenian, Coptic and Ethiopian Churches from the main body of the Graeco-Roman Church. By the in turn split into two along the divide between the Greek-speaking and Latin-speaking parts of the Roman Empire, there are also at this early period heresies like the Arian heresy which was in effect the tribal religion of the Germanic-speaking Goths who overturned the Empire in the West and the Pelagian heresy in sub-Roman Britain. The Pelagian heresy is associated in Constantius' Life of St. Germanus with the tyrant Vortigern whose Celtic title clearly identifies him as the leader of a revival of Celtic language and culture¹² in Britain in the late 4th and early 5th centuries for which there is some independent archaeological evidence¹³.

How far these correlations between sectarian divisions and linguistic groupings can also be shown to correspond to differences in the technology used to exploit the environment is a matter to the elucidation of which neither documentary nor archaeological research has been addressed hitherto; but the importance of the introduction of the new technology of printing and the development of a capitalist economic system as factors behind the Protestant Reformation is well attested (Weber 1904-5/1930/1958; Tawney 1926), as is the subsequent division into national churches based on the use of the local vernacular for ritual purposes. Other examples are the association between the technological and consequent social changes involved in the Industrial Revolution and the rise of Methodism, and the close association between social class and religious affiliation in England down to the present day. All of which, as I see it, goes to show that the age-old divisions based on language and technology are always breaking through the patterns of religious conformity demanded by the supra-national religious faiths.

¹¹ As recorded by Bede (Colgrave and Mynors 1969)

¹² See Frere (1967:368-9)

¹³ The evidence comes from the construction in the late 4th century of two pagan temples both of which appear to be dedicated to a local Celtic deity. One is the temple and healing centre at Lydney in Gloucestershire which is known from an inscription to have been dedicated to the god Nodens. The other is a temple of the Romano-Celtic type, constructed at this period within the defences of Maiden Castle, Dorchester, Dorset, which had remained virtually unoccupied since it was sacked at the beginning of the Roman occupation. See Frere (1967: 333)

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