

Does Science Transcend Culture?

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Science is distinctly a cultural pattern, and the methods and techniques of Science are elements of that cultural pattern.

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INTRODUCTION

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The Title of this Thesis is carefully chosen. It is a study of whether Science DOES naturally transcend Culture -- not a study of whether it CAN do so.

That Science can be transplanted into, and adopted by, any Culture which did not previously have it, is clear from history. But it is not at all certain that Science is a natural outgrowth of a certain level of technical competence in the sense that, once that level has been reached, Science automatically develops to extend it. If this were the case, it should have arisen several times in the past in certain non-Indo-European Cultures -- where, in fact, it did not arise. Four or five such Cultures had reached a very high level of technical sophistication and intellectual achievement but for reasons, which will be examined carefully, Science did not develop. Evidently Science and Technology are not the same thing, though they are related. The former is rare; the latter is found in every Culture from the most primitive to the most complex.

On the other hand Science CAN transcend Culture. In comparatively recent times China has adopted the Scientific Method and is now applying it in the solution of many basic problems. It does not appear, however, that she would have developed it on her own, in spite of the genius of her engineers and craftsmen in the past centuries. Having reached a certain level, Chinese civilization remained static for a long time, and then gradually decayed so that her Golden Age passed away and her Culture settled down at a somewhat lower level. There it remained for centuries. The phenomenal change which may come to a Culture with the introduction of Science is beautifully illustrated in a recent report by James Muir, Chairman and President of the Royal Bank of

Canada, who visited China during the summer of 1958. In one place he describes his reactions as follows:'

The growth of industry, the change in living standards, the modernization of everything and anything, the feats of human effort and the colossal impact of human labour are not within our power to describe and still give a worthwhile

picture of the scene. All I can say is that it must be seen to be believed. It is truly stupendous.

The effect is almost to bewilder one when he sees what has been accomplished in less than 10 years but, if he is a thinking person, to appall him and dumbfound him when he realizes what had not been done in the previous 4000 years or even 100 years.

What is true of China has been true of all high civilizations which were not of Indo-European origin. None of them succeeded in crossing the threshold into an Industrial Revolution such as resulted from the introduction and development of the Scientific Method in Europe. It is therefore a remarkable fact that although a number of such high Cultures have arisen, Science -- as a method of vastly extending control over the forces of Nature did not appear in any of them: yet it did appear in Europe where Technology was not particularly remarkable.

Cultures seem to enjoy a certain 'specificity' and some types of human activity apparently do not develop automatically unless the Culture happens to be of the right kind. Such activities may be introduced by outside pressure, or by influential newcomers, or as result of a kind of cross-fertilization in times of emergency. But they are not natural outgrowths. By borrowing an illustration from biology, we may point up the difference between the word DOES and CAN, in this context. Adolph Schultz has stated that: ²

All the distinct forms within an anthropoid genus *can* readily hybridize [as] has been proved for Gibbon, Orangutan, and Chimpanzee [emphasis his].

But although these animals can be persuaded to interbreed they do not do so naturally. Their characteristics are sufficiently marked that each species does not, by nature, transcend its appointed niche in the economy of things. They only transcend these boundaries under considerable pressure applied from outside.

Cultures, like species, also tend to preserve their integrity, encouraging certain activities but not others, and

1. Muir, James, "The Challenge of China", a report published by the *Royal Bank of Canada*, Montreal, June 26, 1958, p.1.

2. Schultz, Adolph, "Man and the Catarrhine Primates," in *Symposia on Quantitative Biology*, Biological Laboratory, Cold Spring Harbor, New York, 1950, vol.15, p.49.

by no means following the same pattern of development in each case.

To give a reverse illustration: while no non-Indo-European Culture has ever initiated the development of Science, Indo-European Cultures have apparently never favoured Totemism, ³ though it is common enough elsewhere and seems to have arisen quite spontaneously in widely separated areas evidently in response to a social need. Totemism arises because of a certain feeling which a Society has towards Nature. This feeling is evidently largely lacking among Indo-Europeans. The lack is related, as will be shown, to the same attitude of mind which opened the way for the development of Science.

It seems, therefore, that Cultures have a certain 'individualism' which is

preserved intact so long as the situation which permitted their growth and development is not seriously challenged. The stability is in fact a social necessity in many cases, and rapid cultural change usually generates sufficient tension and anxiety in the community to lead to the rejection of innovations -- especially in certain circumstances which will be discussed subsequently.

But it does not arise within any species of Culture merely because a certain level of Technology has been achieved.

In one area which witnessed the rise and development of Science, it can be shown that there was little inventiveness or ingenuity displayed by the Culture -- in marked contrast to those areas in which it did *not* arise, where inventiveness and ingenuity are strongly in evidence.

A number of authoritative works have been published in recent years dealing with the Technology of both Indo-European and non-Indo-European Cultures, and these speak freely of the 'Science' that such Cultures have developed. However, it is all too easy to confuse Science and Technology, in the same way that it is easy to confuse Philosophy and purely practical wisdom. Both these confusions of thought are related, I think, and both seriously hamper our understanding of historical processes.

Dr. George Sarton makes the following observation in this connection: ⁴

3. Andrews, Alfred C., "The Bean and the Indo-European Totemism," *The American Anthropologist*, vol.51, Apr-June, 1949, p.274-290. It may be noted that Heraldry is not considered to be a form of Totemism [Lord Raglan, "Totemism and Heraldry," *Man*, vol.60, Aug., 1955, p.128].

4. Sarton, George, quoted by Benjamin Farrington, as a prologue in his *Science in Antiquity*, Oxford, UK, Home University Library of Modern Knowledge, 1947.

The great intellectual division of mankind is not along geographical or racial lines, but between those who understand and practice the experimental method and those who do not understand and do not practice it.

Yet in his book, *A History of Science*, ⁵ the same writer seems to confuse the technical achievements of the Middle East Cultures of antiquity with Science! He credits the Sumerians and Babylonians and the Egyptians with Science of a kind, where we might feel that the ascription is not due, since the achievements were purely practical and should therefore rather be called Technology. As James Conant has put it: ⁶

The distinction between improvements in the practical arts and advances in the Sciences would be one of the recurring topics in a course on the Tactics and Strategy of Science. The difference between *invention* and *Scientific discovery* may in a few instances seem slight but a confusion between the history of the practical arts and the development of Science is a fruitful source of misunderstanding about Science. . . .

There can be no doubt that knowledge has been accumulated, classified, and *directed to some practical ends* ever since the dawn of civilization. Yet very little is to be learned about the Tactics and Strategy of Science by studying the history of these advances. *For they do not form a part of Science.* [my emphasis throughout]

I think they *do* form a part of Science, and this Conant would be the first to admit. What he means rather is that Technology is not the 'father' of Science -- its source of inspiration does not lie here, through a direct generative process. Yet, a relation exists.

That these Cultures and others in the New World and the Far East developed a remarkably high degree of skill and knowledge is not questioned: that they developed any Science at all is not so certain. And there were many among them with great practical wisdom: but it is not at all clear that they were the least bit concerned with Philosophy as we understand it. Ptah-hotep in Egypt, Confucius in China, Pachacuti in Peru: these men were very wise, in a canny way. But they were not Philosophers. In ancient India the situation is more complex.

An examination of the reasons for this circumstance constitutes the subject of this Thesis. To the question, *Can* Science transcend Culture, the answer would be unquestionably, Yes. To the question, *Does* Science transcend Culture, the answer is apparently, No. Science *can* transcend Culture because it may be transmitted

5. Sarton, George, *A History of Science*, Harvard, 1952, p.16. He expresses the opinion that pre-Greek Technology was Science, though admittedly "very poor science."

6. Conant, James B., *On Understanding Science: an Historical Approach*, New York, Mentor Books, 1951, p.35, 36.

from one Culture to another -- although this transmission usually brings some modifications to the Grammar of the language of the recipient. It apparently *does not by nature* transcend Culture, however, because only one particular type of Culture ever witnessed its initiation. It thus appears to be an activity that is culturally conditioned in some way. Not until Philosophy was applied to Technology did Science develop. Where there were no philosophers, there was no Science, no matter how well developed the Technology was. But conversely, without this 'pabulum' of Technology, Philosophy has not given birth to Science even where genuine Philosophers were to be found.

My proposal is to show in Part One that non-Indo-Europeans have been highly inventive and ingenious, and that there is scarcely any single basic element of Western Technology in which they did not anticipate us, and which in fact we did not borrow from them. There are cases where the necessary links to demonstrate this borrowing are lacking, but in such cases the non-Indo-European has at least anticipated us and often by many centuries.

In Part Two, an attempt is made to demonstrate two negatives. This is always difficult. Research seems to show that while non-Indo-Europeans have been so inventive, they have never produced Philosophers. And conversely, while Indo-Europeans have not been particularly inventive, they have a genius for philosophical speculation.

In Part Three, the interrelationships between language and thought are explored and some evidence is presented which shows, I think, that the non-Indo-European languages do not permit or encourage speculation of a philosophical nature, whereas the Indo-European languages do.

In Part Four, a number of relevant issues in this study are considered, and some general conclusions drawn. These issues include, among others, some thoughts on the basic question as to how the ultimate bifurcation of mankind along these lines came about historically, and what factors tended to preserve it. Did the language predetermine the thought pattern, or has some mental characteristic, possibly genetically determined, been responsible for the language structure? The findings of research in prefrontal lobotomy seem to throw some light on this point. The possible relevance of all this, in a practical and applied way from the point of view of modern educational methods and goals, is given consideration.

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A few clear definitions of the basic terms as used by the author are essential and the following is an attempt made to satisfy this requirement.

PRIMITIVE PEOPLE:

An unfortunate term which will in time perhaps be replaced by the more appropriate term "pre-literates" which is really the most comprehensive definition of what is meant.⁷

INDO-EUROPEANS:

A very inexact term which is most meaningful when viewed from the point of view of Language Families.

In India it refers to those who could be traced back to the Aryan element in the population, if such an undertaking were historically possible.

In Europe, it means essentially all those who have shared in Western Traditions, excluding only a very small group such as the Basques, who are racially distinct.

As a language designation it is composed of the Romance group (the French, Spanish, Italian, Portuguese), the Teutonic (German, Dutch, English, Danish, Swedish, Icelandic, Norwegian, Flemish and the now extinct Gothic and Norse), the Latin, Greek, Sanskrit, Hindi, Armenian, Lithuanian, the Celtic group (Erse, Gaelic, Breton, and Welsh), and the Slavonic group (Polish, Russian, Czech, Serbo-Croat). All are considered as descended from a common tongue once spoken somewhere in Central Asia.

7. Claude Levi-Strauss said, "A primitive people is not a backward or retarded people: indeed it may possess a genius for invention or action that leaves the achievements of civilized peoples far behind" [as quoted in a Time Essay: "Man's New Dialogue with Man", *Time*, June 30, 1967, p.36, 37].

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SOME PROVISIONAL DEFINITIONS

	CULTURE	CIVILIZATION
Culture.	The spirit of a Civilization	The mechanics of a
Emphasis on:	Man's control of his social environment	Man's control of his physical environment
Progress lies in:	fuller realization of the potentialities of the individual for himself	increasing conversion of luxuries into necessities. The individual important
only himself.	and society	for his functions, not for
Defined as:	Learned behaviour patterns and solutions as shared by a community as a system of values	Learned behaviour in the form of skills and techniques, to deal with things.

An attempt to summarize and contrast some of the essential distinctions between: Technology, Science, Philosophy, Religion and Magic

	TECHNOLOGY	SCIENCE	PHILOSOPHY	Attitudes to Nature in:
Context:	is Trans-Cultural	is Culture-Specific	Strictly rational speculation	RELIGION Looks upon the object of worship as superior, hence the capitalized pronoun 'Thou:' I Thou (an unequal, personal partnership)
Modus Operandi:	Knows how Invents Must be Useful	Asks why Discovers Ought to be Useless	Concerning the ultimate nature and meaning of reality	
Purpose:	Answers	Questions	Apart from Revelation	
Problems:	are practical	are intellectual		
Deals with:	Things (facts)	Ideas (theories)	To satisfy purely intellectual needs.	
Seeks:	Control by Search	Understanding by Research		
Answers are:	Specific Practical Temporary	Universal Theoretical Enduring		MAGIC Looks upon

Advantages are:	Deliberate Purposeful Foreseen	Incidental Accidental By-products	Nature more as an equal, but still as a 'person:' I thou (an equal, personal partnership)
Creates:	Devices Practices Greater Control	Hypotheses Principles Greater Knowledge	SCIENCE Looks on nature as impersonal, and man superior: Me it (not partners, no equality factor, impersonal)
	Science is concerned with physics.	Philosophy is concerned with metaphysics.	
	Needs only the help of Technology for its instrumentation.	Requires only a healthy, mature mind.	
	Its problems change.	Its problems remain unchanged.	
	Science is Philosophy applied only to the laws of nature.	Philosophy asks why in the ultimate sense.	

A Note on Source Materials

The source materials for this Thesis extend over a very wide range of literature, and in a very small number of cases these might not be considered the best. The fact is that few authors have been altogether aware of the total picture which seems to emerge from this Study. Consequently one frequently finds a single item of value that clearly contributes to the overall picture in a text which for one reason or another might not always be considered suitable.

Much of the data is derived from Technical and Scientific journals and periodicals in the fields of Architecture, Anthropology, Physics, Mathematics, Human Genetics, Science in general, Metallurgy, Linguistics, and Science History. Some of it is derived from philosophical treatments of these subjects. The majority of the references to Technical literature or periodicals are completely up to date [in 1958 -- editor].

In certain areas, notably Aegean Prehistory, and Primitive and Early Metallurgy, as well as the Archaeology and Ancient History of the Middle East, extended studies were first made, preparatory to this Thesis. In these areas in particular, some of the background of certain generalized statements is omitted from the text in the interests of brevity.

In some cases it may be wondered *why* any documentation was necessary at all for observations which are commonplace. However, in all such cases the sources of reference have been given because:

- (1) the original article contains further relevant data which the reader may find of interest (e.g., the origin of Coffee),
- (2) the original author has employed a number of apt phrases which the present writer did not wish to appropriate without acknowledgement (e.g., Clive Bell on the Athenian view of 'the good life', or 'exceptional native personalities'),
- (3) the reader may wish to see the context in which such a statement is made (e.g., 'spray painting' in Palaeolithic times).