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THE FIDELITY OF ORAL
TRADITION AND THE ORIGINS
OF SCIENCE

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‘Revere Memory’
Chāndogya Upaniṣad 7.13.1

I. CONCEPTS

Foremost among the features that distinguish humans from the other animals is the apparently explicit transmission of knowledge from generation to generation. Adopting a distinction introduced by Gilbert Ryle (1949, Ch.II), we can say that much of this knowledge is ‘knowledge *how*’ – e.g., knowledge how to perform activities – while some of it is ‘knowledge *that*’ – e.g., knowledge that such-and-such is the case. Some of this knowledge, especially of the former kind, is shared by other animals, and many of the related activities are also found among them; but among animals, knowledge and activities are often not transmitted explicitly because they are innate. Among humans, the process of transmission is largely explicit and oral and takes places during the first years of the individual’s life, which is, characteristically, sheltered. More advanced forms of oral transmission among adults have produced oral traditions that can almost be said to lead a life of their own. During recent millennia, portions of the transmitted knowledge have been committed to writing and oral traditions have turned into written traditions. This had led to further growth in the form of spectacular increases of our knowledge-how and especially of our knowledge-that.

Oral transmissions over large stretches of time and space comprise first of all language, which is at the same time the most complex system that is being transmitted, and the medium through which many other traditions are orally transmitted – including folklore, jokes, stories, laws, myths and epics. Many, but not all: for other features of human knowledge and activity, including music, art, design, ritual, technology and science, are transmitted not only without writing but also without language. Examples include not only cutting, digging, aiming or planting, but also at least some of the features of musical scales and melodies, visual patterns, motifs and shapes, dances, stellar constellations, cooking, the construction of ploughs, weapons and altars, and the elements of arithmetic and geometry.

The distinction between oral and written, then, is not exhaustive, because transmission generally involves features that are neither. But it is also not exhaustive in another sense: for the transmission of knowledge and activities need not be explicit at all. This is demonstrated by language itself: for although its transmission has been oral and not written throughout most of the development of the human species, and is still largely oral at the present day, much of it is not done by explicit teaching.

Rather, children pick up language by hearing it used by their elders and in a variety of situations that are part of their human environment, interiorizing its rules without being aware of them – let alone of their precise form. These rules that underlie the uses of language, the rules of grammar, are interiorized in accordance and through interaction with innate principles – sometimes called ‘universal grammar’ – that are still largely unknown and that are part of the characterization of the human species, at least in its present form. Although language is generally transmitted without the help of writing, it does not therefore follow that it is in its entirety transmitted orally: for much of its structure is not explicitly transmitted because it is innate. This may come as a surprise to most users of language, but that is only to be expected: humans are not aware of these innate structures which linguistics has brought to light.

What holds for language is to some extent also applicable to other activities, e.g., rites and rituals. These are different from language in several respects, including their scope and extension: for what is and what is not a ritual in general is not clear (see, e.g., Goody 1977). This uncertainty, however, does not imply that we cannot find specific cases of which the identity is uncontroversial. For example, the Vedic and apparently Indo-European custom of making an oblation of solids or liquids into a fire by throwing or pouring them into it, to the accompaniment of recitations generally referred to by their Indian name as *mantras*, is a rite if anything is. The ritual acts that are part of this rite are not transmitted through writing, and generally not through language at all. As for the accompanying *mantras*, these are recited and transmitted orally, but not in the manner of language – a fact to which I shall return.

How, then, are ritual acts transmitted? Such acts as pouring, throwing, etc., are *demonstrated*. If these demonstrations are accompanied by language at all, the language does not describe but merely points – e.g., the ritual preceptor may say: ‘It is done thus,’ and, at the same time, show it. But he may also say something else or not speak at all while he is engaged in the act of demonstrating. Moreover, ritual need not be taught explicitly, for children attend ritual performances from the time they can walk and even earlier; that is, they also learn at least some of its features, like the features of language, by ‘picking them up.’ The same applies to features of ritual that are indistinguishable from non-ritual activities, e.g., cooking: for cooking oblations is not different from cooking the same substances when used for eating, although the former is generally surrounded by additional, ‘ritual,’ features. Cooking, too, is not entirely taught, and to the extent it is explicitly taught, it is not entirely done through language; it is also partly demonstrated, and partly picked up. This does not imply that cooking is innate, though some features of its constituent movements may be innate. For example, the posture of a cook, like the posture of a priest, is a human posture which is, in many cases, innate.

The same holds for some gestures although it does not hold for others (e.g., the *mudras* that are found in Indian rituals and dances as well as in iconography are not innate).

Like many of the other activities I have referred to, building and construction involve the application of general principles or *rules*. At the beginning of the *Philosophical Investigations*, Wittgenstein discussed the teaching of 'construction rules' by means of language. Logically and conceptually prior and even more puzzling are the innate features that are involved in construction and in the process of following rules in general. This has been known since Plato's famous account in the *Meno*, where Socrates makes a slave boy discover, on the evidence of his eye-sight and without being taught, the principles that underlie the construction of a square with twice the area of a given square. Here the demonstration that features of geometry are *innate* (which Plato, in later dialogues, explains by the theory of 'remembering') is closely related to problems of construction – of buildings as well as altars. A large part of Greek mathematics developed in fact from attempts to solve ritual problems such as the duplication of the cube, epitomized by the oracle-ordained task of doubling the altar of Delos.

The discovery of innate principles is one of the tasks of science. Science in general gathers data and invents hypotheses to account for these data. If the hypotheses are successful and widely accepted, they are referred to as theories. If the data are *activities*, they may be accounted for by a type of hypothesis that assumes that activities are performed in accordance with (a system of) underlying *rules*. Such rules are invisible like other explanatory hypotheses: they are postulated as part of a hypothesis which accounts for activities that are themselves visible. I shall regard as a branch of *human science* any largely successful attempt to provide a consistent and exhaustive description of rules that underlie a domain of human activities, accompanied by a rational discussion of the empirical adequacy of these rules, their scope, interdependence, and possible generalizations.

During the first millennium B.C., both Greeks and Indians developed geometry, which had probably originated with their common ancestors (see Seidenberg in *AGNI* II:122-125). At first, this science dealt with the rules that underlie the activity of altar construction, but later it widened its scope and with Euclid it was developed as an axiomatic system. At roughly the same time or a little later, the ancient Indians invented two related sciences that are *human* in the sense I just set forth: the science of ritual and the science of language. In the following pages we shall study these two sciences in the context of their oral transmission. Western civilization, with its gradually increasing emphasis on *non-human science*, never produced a science of the first type, and produced a science of the second type, viz., linguistics, only belatedly and after having been influenced by

the Indian grammarians and in particular by the Sanskrit grammar of Pāṇini.

The Indians who produced the two sister sciences of ritual and language, like the members of many other human and animal communities, were in the habit of regularly performing complex rituals, which incorporate the oblations already referred to, according to specific rules. They also produced, like all other humans, linguistic utterances equally in accordance with specific rules. In both cases, the rules constitute complex systems that have to be learned, but they also include, as we have seen, elements and structures that are innate, and of which the actors are unaware. Some of the rules and rule structures that underlie ritual are similar or identical with those that underlie language. Others resemble mathematical rules, and still others are different from both. The difference between the two rule-governed activities employed in ritual and in language is not so much their character or medium of execution – motional, gestural and vocal in the former domain, and exclusively vocal in the second – but the extent to which the actors are aware of the underlying rules and rule structures, as well as the variability that characterizes the occasions of their performance: humans are more aware of the rules that underlie their rituals than of the rules that underlie their language, and their applications of the rules of ritual are more fixed and less subject to individual vagary than their uses of language. Even so, both domains are subject to the observation Plato made with regard to geometry: there are more innate principles inherent in either than the users realize.

The vocal dimension of ancient Indian ritual – and many of the rituals of Asia that directly or indirectly derive from it – is characterised by the recitation or chanting of the linguistic or apparently linguistic utterances called mantras. Originally, most of these were verses or prose fragments from the Vedas, or bits and pieces extracted from these, that were put to ritual use. The Rigveda, which is the earliest of the Vedas, describes itself as composed or ‘fashioned’ by sages or seers; it also refers to its compositions as ‘old’ or ‘new’ (Ghate 1926:115). Soon after the codification of the Vedas, however, these compositions were regarded as largely consisting of mantras, accessories to the rites to which they often run parallel, eternal and of non-human origin. Since language, though also generally regarded as eternal, was always recognized as human, the partial similarity between mantras and language became a source of perplexity.

It is important to clearly distinguish between the activities that characterize the three domains that we shall study in the sequel: language which is *spoken*, ritual which is *performed*, and mantras which are *recited*. In the case of the Sāmaveda, which consists very largely of Rigvedic verses set to music, we also say that mantras are *chanted*. The Vedic Indians recognized early that recitation and speech are different, and that mantras were in some respects like, and in others unlike the utterances of their

common speech. The extent of this similarity played an important role in the argument about the meaningfulness of mantras that was carried on for several centuries (see e.g. Thieme 1931). According to the Nirukta, an early work on etymology, mantras must be meaningful because they resemble ordinary speech utterances that are meaningful. According to Kautsa, an ancient ritualist, perhaps identical with a Vedic phonologist of the same name, mantras are without meaning because their use is confined to ritual. Moreover, if they were regarded as meaningful it would have to be admitted that they would be frequently contradictory and in some cases simply absurd. Since this is not readily admitted, we must conclude, by *reductio ad absurdum*, that mantras are not meaningful.

Although regarded as unlimited in terms of time, language was recognized as limited in terms of space. At first, the only language that was studied was the language of Northwest India that had been the object of Pāṇini's grammar. Later, the *saṃskṛta* or 'well-formed' speech described in this grammar came to be regarded as the defining characteristic of the speech of the inhabitants of Āryāvarta, the area that corresponds approximately to the Western part of the Ganges plain or the land between the Ganges and its main tributary river, the Yamuna. The fact that language was regarded as eternal and not subject to change, but different in different parts of the world, is consistent with the subsequent study of other languages along similar lines and within the same framework (including more distant languages such as Tamil or Tibetan). It emphasized as a matter of course those synchronistic features of linguistic description that inspired Western linguistics two-and-a-half millennia later when it looked beyond diachronistic approaches and also began to feel the need for synchronistic description and analysis – albeit for different reasons.

The utterances of the spoken language, nowadays referred to as classical Sanskrit, were not learnt by studying grammar. They were learned in the manner in which language is always interiorized – not by children being explicitly taught, but by children picking up their native language in accordance and through interaction with the innate principles I have referred to. The transmission of mantras was a different matter: for despite the fact that they were considered to be of non-human origin, it was believed that it was the duty of the ritualists and of brahmins in general to safeguard their transmission so that they could be ritually used. The eternity of mantras was not a transcendental or disembodied affair, but had to be realized by human means and depended for its continued realization on human instruments. These instruments had to be kept exceptionally pure and in good working condition. Extraordinary care was therefore taken to teach mantras and transmit them faithfully to the next generation. The Sanskrit term for this transmission is *adhyāya*, which means 'studying' or 'recitation.' The use of the mantras in ritual by means of recitation or chanting was called *prayoga*, 'application' or 'em-

ployment,' a term also used of drugs or magic. This art was also carefully transmitted but only within the more restricted sub-caste of brahmins that was exclusively concerned with ritual. Among contemporary brahmins such specialist subcastes are still occasionally found. Among the Nambudiri brahmins of Kerala, for example, they are called *vaidikan*, which simply means 'Vedic.' They are ritually, but not necessarily socially, superior to other subcastes.

It is likely that the structure of mantras also involves elements that are innate. The similarity between mantras and bird songs, which is in some respects more striking than that between mantras and language utterances (see Staal 1985a), is suggestive in this respect. But almost nothing is known of these innate structures which contemporary research has left untouched.

The entire enterprise that I have described – the faithful transmission of the mantras, their description, analysis, and ritual application, as well as the concomitant description and analysis of ritual on the one hand, and of language on the other – was undertaken and carried out without the assistance of writing: it was a very formal, demanding and time-consuming, but largely oral exercise – barring only the interaction with unconscious, innate elements about which little is known. The various tasks were assigned to classes of specialists who were looked upon as scholars of scientists and called *śiṣṭa*, 'expert.' It is because of the achievements of these classes of experts that ancient India, like the ancient Near East, China or Greece, is one of the cradles of science – albeit of a type of *human* science that, in the West, is still relatively rare. One of the characteristic features of this type of science is that it originated in close connection with the oral transmission of mantras.

It has become customary to contrast Indian and Western civilization by the development and central position accorded to linguistics and mathematics, respectively (see, e.g., Ingalls 1954, Ruegg 1978, Staal 1963, 1965). This comparison could be extended and supplemented with the further observation that the originality of Indian science lies in the discovery of *rule-governed activity* as a feature of what in the contemporary West is generally and somewhat misleadingly referred to as 'human behavior.' Of course, such generalized characterizations should not introduce stereotypes and need not conflict with the development of other types of science, e.g., mathematics, chemistry or botany in India, or linguistics in the West. Both mathematics and linguistics are closely related to formalization, and the degree of formality that hypotheses and theories exhibit (a feature that has nothing to do with 'quantification') contributes to the measure of their explicitness and clarity. In India, the sciences of ritual and language paved the way for the subsequent burgeoning of mathematics. We have already noted that geometry developed, as it did in Greece, in the context of altar construction, which is one of the subjects of the science of ritual.

In order to understand how mantras were orally but formally transmitted we have to take a closer look at a characteristic of mantras that is also a characteristic of the Sanskrit language: they are subject to the rules of *sandhi*, or ‘euphonic combination.’ These rules will provide us at the same time with illustrations of the concepts of ‘rule-governed activity’ and ‘underlying rule.’ The following example is formulated in the manner in which Sanskrit sandhi is taught in modern Western grammars – which is not the same way in which it was first expressed and explained in India, as we shall see in the next section. The sandhi rules apply to the *sound* of language, which is one of the subject-matters of the science of language just as altar construction is of the science of ritual.

It is characteristic of Sanskrit that if two words such as *ehi*, ‘come’, and *atra*, ‘here,’ are combined in a single utterance occurring in the flow of speech, the latter is pronounced as *ehyatra*, ‘Come here!’ We explain this activity by postulating an underlying sandhi rule of the form:

final *i* followed by initial *a* becomes *y*.

The rule is, in fact, more general: it holds with respect to any initial vowel except only (long or short) *i*. In other words, we have to postulate an underlying rule of the form:

final *i* followed by any initial vowel except *i* becomes *y*.

This accounts not only for:

ehi + *atra* becomes *ehyatra*,

but also for:

ehi + *ugrasena* becomes *ehyugrasena*, ‘come, Ugrasena!’

Such rules are similar to the insertion of *n* after the indefinite article *a* in English when followed by a word with an initial vowel, e.g.: ‘an apple.’

Now let us consider a verse, e.g., Rigveda 6.16.16, that subsequently turned into a mantra:

ehyū śu bravāṇi te’gna itthetarā girah | ebhir vardhāsa indubhiḥ | ‘Please come here quickly, Agni, I will tell you: those other chants are thus (belong to others); take your strength from my drops of Soma!’

The background for this verse is the rivalry between different communities of human priests (or gods and demons, as it is described in Aitareya Brāhmaṇa 3.49): all are trying to attract Agni by means of chant and Soma to come to them and not to others. It is possible that the bard who recited this verse made an uncomplimentary gesture (e.g., pointing down his thumb) when reciting ‘thus’. But when the verse turned into a mantra, this background and its meaning became irrelevant. For a mantra is not simply a verse; it is a verse used ritually. In order to understand its

ritual analysis – and its subsequent linguistic analysis as well – we have to study the *formal* structure of its language, and the several concepts that evolved in the context of this study. The point of departure of this formal analysis is the analysis of the continuous flow of the mantra into its separate words by dissolving the underlying application of the rules of sandhi that cement the words together. This is not simple in the present case because the mantra of Rigveda 6.16.16 involves the application of *six* different rules of sandhi, of which *two* are applied twice:

the first expression, *ehyū*, consists of three parts: *ā*, ‘(towards) here,’ *ihī*, ‘come,’ and *ū*, ‘please,’ combined together on account of two sandhi rules that I shall approximately characterize as follows:

- (1) $\bar{a} + i \rightarrow e$ (this results in the same *ehi* we met before);
- (2) $ehi + \bar{u} \rightarrow ehy\bar{u}$ (this is the rule we have already discussed);

The next word, *ṣu*, is derived from *su*, ‘well, easy:’ (3) the dental *s* turns into a retroflex *ṣ* because of the preceding vowel.

bravāṇi, ‘I will tell,’ and *te*, ‘you,’ are not subject to sandhi rules in this context; but *agna* comes from *agne*, the vocative ‘O Agni!’, in accordance with the rule:

- (4) final *-e* → final *-a* when followed by initial *i-*.

itthetarāḥ comes from *itthā*, ‘thus,’ followed by *itarāḥ*, ‘others,’ in accordance with rule (1); and *itarāḥ* yields *itarā* in accordance with:

- (5) final *-h* of *-āḥ* disappears when followed by an initial vowel.

giraḥ, ‘chants,’ remains unmodified. *ebhir* comes from *ebhiḥ*, ‘from these’, i.e., ‘from mine’ in accordance with:

- (6) final *-ḥ* (after vowels other than *a*) → final *-r* when followed by (certain consonants including) *v*.

vardhāsa comes from *vardhāse*, ‘take your strength,’ in accordance with (4); *indubhiḥ*, ‘from drops,’ remains unmodified.

We are now in a position to summarize this linguistic analysis by listing the words in the order in which they occur in the mantras, but without applying the sandhi rules, viz., each word separately in isolated position:

<i>ā</i> ;	<i>itthā</i> ;
<i>ihī</i> ;	<i>itarāḥ</i> ;
<i>ū</i> ;	<i>giraḥ</i> ;
<i>su</i> ;	<i>ebhiḥ</i> ;
<i>bravāṇi</i> ;	<i>vardhāse</i> ;
<i>te</i> ;	<i>indubhiḥ</i> .
<i>agna</i> ;	

The analysis that is embodied in such lists was at first undertaken only in order to *preserve* the mantras; but this analysis constituted at the same time the beginning stage of the two sciences of ritual and language. I shall illustrate this with the help of some linguistic observations, leaving the ritual developments for later. Comparison of the list with the original mantra shows that it exhibits several peculiar features that did not fail to be noticed in ancient India. The first of these will remain invisible in the present context because it pertains to *accent* – a feature that I have omitted for the sake of simplicity. Almost all the words of the language are accented, and these accents are also subject to sandhi: that is, the accent of a word is often influenced by the accent of the preceeding and the following words. The accents of the words as they occur separately in the list are therefore different from those in the original mantra.

A second and more specific feature is the particle \bar{u} , which I have translated as ‘please;’ there are several others that are similar (e.g., u) and these are often lost and become difficult to find or reconstruct because of sandhi modifications. Accordingly, the need arose to provide them with a special mark, for which use was made of the mark of quotation that spoken Sanskrit employs, viz., *iti*. However, since the marker itself would combine with words like \bar{u} into another form on account of sandhi, this could introduce further ambiguity. The \bar{u} itself was therefore further marked with a final nasal. The resulting form is: $\bar{u}m\ iti$.

A third complication that occurs in the list and about which there was initial confusion is word endings such as $-bhiḥ$ that correspond to English prepositions such as ‘from.’ The question is, are they separate words? This ancient Indian uncertainty captures a fact about universal grammar: that the relationship expressed by $bhiḥ$ could be expressed either by a separate word or by a part of a word. The hesitation is explained by the uncertain status of the stem *indu* of *indubhiḥ* which seems to be the same as, or very close to the word for ‘drop’ (*induh*) itself.

A fourth feature pertains to the *form* of rules. If we compare sandhi rules such as (1), (2), (4) and (6) with the ‘disappearance’ rule (5), which looks in many respects like a different kind of rule, we notice that a generalized form for all such rules can be obtained provided we express (5) as: final $-ḥ \rightarrow \text{O}$ when followed by an initial vowel.

In this type of context we witness the birth of the linguistic ‘zero’ which preceded, probably by many centuries, the discovery of the mathematical ‘zero.’

A fifth feature pertains to the *order* of rules. We have seen that *ehyū* results from $\bar{a} + ihi + \bar{u}$. We have first applied a sandhi rule to $\bar{a} + ihi$ and next another one to (the resulting) $ehi + \bar{u}$. What would happen if we reversed the order: first combine the last two words and then the first with the result? The same final result would be reached:

$ihi + \bar{u} \rightarrow ihy\bar{u}$

$\bar{a} + ihy\bar{u} \rightarrow ehy\bar{u}$.

But this is not always the case. In: *bhakṣa + ā + ihi*, 'food come here,' there is scope for three rules to apply. One we already know:

(1) $\bar{a} + i \rightarrow e$

and two new rules:

(7) $a + \bar{a} \rightarrow \bar{a}$

and:

(8) $a + e \rightarrow ai$.

The reader should verify that, if we apply first (7) to the first two words, and then (1) to the result and the third word, the result is: *bhakṣe-hi*. But if we first apply (1) to the last two words, and then (8) to the result and the first, the result is: *bhakṣaihi*. Grammar has to postulate rules that generate the correct results: *bhakṣehi* happens to be correct, but *bhakṣaihi* is ungrammatical. So something had to be done to handle the situation in the correct fashion.

This problem was solved by postulating a 'metarule' (*paribhāṣā*) which had the effect that the correct result was reached; but to explain its precise formulation and function would take us too far. All we need to appreciate is that discussions on *rule order* were required. They played an important role not only in grammar but also in the science of ritual.

This brief sketch should suffice to illustrate how the analysis of mantras undertaken for the sake of their oral transmission led not only to a variety of viewpoints and arguments, but also to important discoveries.

2. CHRONOLOGY

In order to evaluate the significance of our data within the twofold context of oral tradition and the origins of science, it will be necessary to obtain some idea of the chronology of the transmission and study of language, ritual and mantras within their Indian context. Indian chronology is notoriously volatile, but it is not therefore arbitrary. We shall first concentrate on relative chronology before paying attention to absolute chronology. This will enable us to show at the same time that language, ritual, mantras, and also religion are related developments that are yet to a large extent independent of each other.

When I first referred to oblations into a fire that are characteristic of a certain type of ritual I called them 'Indo-European.' This is in fact a linguistic appellation. The Indo-European language family comprises most of the languages that are now spoken in India, Iran, Europe and the Americas and, chiefly because of English and Russian, in many other parts of the world. The people who originally spoke the ancestor languages of this family appear to have developed these fire cults. They are still found among those who speak the languages of the Eastern or Indo-

Iranian sub-family of Indo-European: the Zoroastrian Parsis mainly confined to Bombay and Indians that speak Indo-Aryan languages (i.e., most of the inhabitants of North India). On the Western side, the only survival of this ancient fire cult may be a widespread attachment to open fires that cannot be easily explained along utilitarian lines. On the Eastern side, the link between ritual and language becomes less close with the passage of time: the Vedic or 'Indo-European' fire cults were first adopted by speakers of Dravidian languages in South India and then exported with Buddhism into Central Asia (where an Indo-European language, Tocharian, was still spoken) and beyond into areas where other languages of different types were spoken: e.g., Chinese, Korean, Japanese, and Tibetan (see Skorupski 1983 and Strickmann 1983). At roughly the same time, these fire cults spread to South East Asia as far as Bali where the languages are equally unrelated to Indo-European (see Hooykaas 1983). The entire development demonstrates that ritual and language are independent from each other.

The mantras that are part of the ritual recitations present a different picture. For they have been, surprisingly, mostly preserved in approximately their original, Indo-European form. They have undergone phonological influences from the surrounding languages and their sounds have accordingly been modified to some extent: but they have only been phonetically transcribed and not translated into those other languages. Thus *agni*, 'fire,' may change its appearance into something similar – as it did already in the form *o-gnā-i* which is found in the Sāmaveda; but its occurrence in mantras is never replaced by a Tamil, Japanese, or Balinese word for 'fire.' Similarly, such 'defensive mantras' as the *kili-kili* of Sino-Japanese Tantric Buddhism may be traced back to a Sanskrit form, itself perhaps borrowed from Proto-Dravidian (AGNI II: 67, 445); but it is not translated if 'translated' it could be. These curious facts seem to show that language and mantras are closely related. It is customary to regard mantras actually as a kind of language; but this does not follow and is, in fact, unlikely because mantras do not change when language changes (cf. the Indian discussion referred to above, page 7; and Staal 1985a with the literature cited).

The same and similar data illustrate the independence of ritual from religion. That Vedic ritual is not a feature of Vedic religion, but rather a ritual without religion, has been demonstrated in AGNI (Volume I, *passim*). Moreover, this ritual is not only Vedic but also Zoroastrian; and therefore independent of either. Older textbooks mention a second religion that appeared in India after the so-called Vedic: 'Brahmanism.' But this label is a simple creation of nineteenth century scholarship, and has obligingly vanished from the more recent scholarly literature. The next presumed religion of India is 'Hinduism': a creation not merely of scholars, but of aliens in general. For 'Hindu' is a label attached by foreigners

to all Indian traditions that are not explicitly assigned to another religious tradition. This fact is not altered by the circumstance that the term has, in recent centuries, also been adopted by Indians. So far, then, we cannot say that 'ritual' and 'religion' are independent; for although we are dealing with a ritual that is Indian – albeit not exclusively Indian – we have yet to come across something like an Indian religion.

With Buddhism we reach an Indian tradition that, despite considerable differences (see, e.g., Staal 1985b, 1986b), resembles more closely what in the West is called 'religion.' But now we observe something surprising: the 'Vedic' fire cult, which survived in the so-called Brahmanic and Hindu traditions, is also maintained in Buddhism. It moreover occurs in Tantrism – a development that is Buddhist as well as 'Hindu' – and some of its features seem to be related to Taoism. We conclude that ritual and religion are independent from each other.

This rough sketch of the general background will have paved the way for a brief discussion of absolute chronology, which must begin with the Rigveda itself.

The discovery of the Rigveda was momentous. Here was an extensive work, faithfully preserved by communities of brahmins but composed in a language that they did not understand and that was either very distantly related to the languages they spoke (in the case of speakers of Indo-Aryan languages such as Hindi, Marathi, Gujrati, etc.) or not related at all (in the case of speakers of Dravidian languages such as Tamil, Malayalam, etc.). The historical and comparative investigations of several generations of Western philologists established that the language of the Rigveda was, in fact, one of the oldest languages of the Indo-European family, closely related to the ancient Iranian found in the Avesta and the Old Persian inscriptions, and relatively close to the Eastern languages of the Indo-European family such as the Slavic, Armenian, Albanian and Hittite. The crowning conclusion of this work was the demonstration that the Rigveda was composed around 1500 B.C., give or take a few centuries in either direction. Given customary Western notions and prejudices, it would be natural to assume that the faithful preservation of the Rigveda throughout the colossal time-span of three-and-a-half millennia was due to ancient inscriptions and manuscripts, somehow miraculously preserved. But no material depositories of this kind were ever discovered. A few manuscripts of the Rigveda turned up, but they were generally fragmentary, defective and of later date than the eight century A.D., at the earliest. Moreover, the brahmins who preserved the 'text' did not possess any 'text'; they had committed the entire Rigveda to memory as they had learned it from their teachers, who had committed it to memory as they had learned it from their teachers – and so on, like the proverbial turtle on which the world rests, which rests on a turtle which rests on a turtle which rests on a turtle – 'turtles all the way down.'

All of this sounded unbelievable – nay, absurd. It was readily agreed that the verses of the Rigveda were originally composed and transmitted orally for the simple reason that the semi-nomads who composed them were illiterate. But it was hardly conceivable that this process of oral transmission had continued for three-and-a-half millenia without the text being thoroughly changed and corrupted. Moreover, the Rigveda could not be a forgery since the brahmins who preserved it were not familiar with the language, bristling with unpronounceable symbols and asterisks, that European scholars had postulated and described in their inimitably unintelligible fashion in learned journals and publications. And yet, the language of the entire composition conformed in every detail to the state of Indo-European that comparative and historical philology had postulated. Everything fitted perfectly and the Rigveda precisely filled a gap that philology, history and geography had left open. The only thing lacking was an acceptable hypothesis about feasible channels of transmission. At this point most Western scholars, more interested in Indo-European than in India, left it at that, vaguely assuming that some written sources must have existed at some time or other to safeguard the purity of the text and its characteristic lack of corruption.

The puzzle was solved much later when Western scholars had gradually broadened their views and adjusted their opinions and when Indian culture was beginning to be better known and understood. I shall discuss some of the stages of this slow development and the shifts of perspective it brought about. That Indian culture and insights substantially contributed to the solution is not surprising for the methods of ‘comparative grammar’ which helped to establish the conclusions of Indo-European philology, introduced by Franz Bopp in a famous publication of 1816 which adopted a procedure of analysis adapted from the Sanskrit grammar of Charles Wilkins of 1808, were ultimately based upon Pāṇini’s Sanskrit grammar of the sixth century B.C. (cf. Thieme 1982–1983¹).

Although the Rigveda is often regarded as the fountainhead of Indian civilization, and has in fact exerted an important influence on Indian ritual, mythology, politics and social organization, its compositions originated among small bands of semi-nomadic peoples that came from Iran or Central Asia, trickling into the Indian subcontinent after crossing the formidable mountain ranges of the Hindu Kush and the Western Himalayas. This background is illustrated by the simple but significant fact

1. Thieme objects to calling Pāṇini’s grammar a grammar. I am not moved by this objection which rests on a rather unclear and at any rate idiosyncratic use of the term. Thieme is correct, however, in emphasizing that Pāṇini’s grammar was not a primer, was not entirely complete, was not a ‘guardian of correct usage’ (as Wackernagel had written) and marks ‘the birth of science out of magic’ (1982/1983:22).

that the six oldest of the ten 'circles' (*maṇḍala*) or main subdivisions of the Rigveda are 'family books,' each attributed to a single priestly family. The names of these families and the names of the poets of the 1,028 hymns have been handed down orally together with the compositions themselves. And so we have to explain not only *how* these compositions were handed down with such remarkable fidelity, but also *why*. It could hardly be due to the richness of the language or the sophistication of the poets, impressive as these may be. Nor can it be accounted for by the contents or subject-matter of these compositions, for many other bands of semi-nomads must have had similar oral traditions which are, however, lost. Why the tribal and strictly local compositions of this particular handful of aliens, transmitted through apparently occult channels, came to be regarded as the core, the 'Great Tradition,' of one of the world's great civilizations, remains totally obscure.

Although the art of writing was not known among these semi-nomads that entered the Indian subcontinent from the outside, it is possible that a writing system had earlier existed in India: for in the course of excavation of the remnants of the earlier Harappa civilization, a few hundred seals were found which contain symbols or symbolic shapes that could be interpreted as a form of script. At the present state of our knowledge these symbols, which have not been deciphered, may be regarded as a script, ownership marks, astrological formulas, or something else. Whatever their nature, it is clear that there are no links between these 'inscriptions' and the later Indian scripts that are based upon forms introduced into India from the Near East, probably not long before the third century B.C. It is also clear that there were originally no connections between the semi-nomadic Indo-European groups that entered India from the north-west and composed the Rigveda, and these large and sedentary indigenous city civilizations of earlier centuries and millenia of which only material remnants are left.

The poems of the Indo-European intruders were combined in the Rigveda, which was put together and codified within a few centuries after the composition of its parts – say, around 1200 B.C. There are no variations or variant 'readings' in this 'text'. Quotations from the Rigveda in other works are always identical in form. We must therefore assume that the codification, though oral and orally transmitted, was done with extreme care. This is confirmed by the establishment of a version in which the sandhi was dissolved and which corresponds precisely to the lists of words of which an example was discussed in the previous section. This latter version is referred to as the *padapāṭha*, or 'word-for-word recitation.' It was established for each of the Vedas – first, it seems, for the Sāmaveda – around 1000 B.C. In contrast with the *Padapāṭha*, the original version, was now called *saṃhitā-pāṭha*, or 'continuous recitation.' The term 'Saṃhitā' in its later use simply refers to the original parts of each of the Vedas.

The *padapāṭha* of our previous example, Rigveda 6.16.16, – again with the accents omitted – is what we expect it to be:

*ā | ihi | ūṃ iti | su | bravāṇi | te | agne | itthā | itarāḥ | girah | ebhiḥ | vardhāse
| indu-bhiḥ ||*

The difference with the list we discussed before is that this sequence is *recited* in an measured manner, a brief pause being observed at each point I have marked with the slanted bar /. We find *ū* marked in the manner referred to before, and *indu-bhiḥ* recited with a pause in the middle of the word, here referred to by means of a hyphen.

The earliest linguistic works that have survived derive from the analysis which led to the formation of this *Padapāṭha* mode for recitation: they are the *Prātiśākhya* treatises attached to each of the branches (*śākhā*) of the Veda, and the early grammatical works referred to by Pāṇini but eclipsed by his own grammar and therefore lost. Although the *Prātiśākhya* of the Rigveda, or *Ṛkprātiśākhya*, may not be the oldest of this genre, its original version must have been early. In its present form it is probably not earlier than the grammar of Pāṇini itself, i.e., of roughly the sixth century B.C.

Most of the *Ṛkprātiśākhya* is given to technical details, but its fifteenth chapter provides an account of a preceptor teaching pupils to recite the Rigveda. First, it provides rules for the teacher's position: he should sit to the east, the north or the north-east, with the pupils to his right. Next comes a description of the teacher's recitation which starts with *OM*, should *not* be linked with what follows through sandhi, and be pronounced only after the students have touched his feet and asked him: 'Recite, Sir!' The teacher then pronounces a group of two or more words, after which the first pupil recites the first, and the others the remaining words. This refers to the *Padapāṭha*. There follows an exhaustive description of the subdivisions of the recitations and of the appropriate methods for treating the accents. There are detailed discussions of the relationship between the *Samhitāpāṭha* and the *Padapāṭha* versions which constitutes, in fact, the main subject-matter of the *Prātiśākhya* literature.

In addition to the *Padapāṭha* and *Samhitāpāṭha*, the *Prātiśākhya* literature introduces 'modifications' (*vikṛti*) that are based upon the *Padapāṭha*, and that 'strengthen' the oral tradition, that is, minimize the chance of a single word being lost. The first of these is the *Kramapāṭha*, in which each word is repeated once but in such a way, that it is first linked through sandhi with the word that precedes, and then with the word that follows. In other words, if the the separate words of the *Padapāṭha* are referred to by numerals as follows:

1 / 2 / 3 / 4 / 5 / ...

the *Kramapāṭha* becomes:

12 / 23 / 34 / 45 / ...

It is clear that sandhi combinations of the Saṃhitāpāṭha are reintroduced here, for they obtain within each of these pairs, but not between the pairs. At the same time, it becomes more difficult to forget a single word: for if a pair were forgotten, the continuity between the succession of pairs would show a break. Note that this does not apply to the recitation of the Saṃhitā or Padapāṭha themselves: if a word is forgotten in their recitation, it does not leave a trace. 'The study of the Kramapāṭha,' says the Prātiśākhya of the Atharveveda (4.108), 'has for its object the fixation (*dārḍhya*) of Saṃhitā and Pada.'

Subsequent modifications render the oral transmission even more firm and stable by introducing methods that resemble the scanning of a tape by a computer, e.g.:

Jaṭāpāṭha:

1 2 2 1 1 2 / 2 3 3 2 2 3 / 3 4 4 3 3 4 / 4 5 5 4 4 5 / ...

Ghanapāṭha:

1 2 2 1 1 2 3 3 2 1 1 2 3 / 2 3 3 2 2 3 4 4 3 2 2 3 4 / 3 4 4 3 3 4 5 5 4 3 3 4 5 / ...

Such techniques of oral transmission introduce new sandhi combinations (e.g., '2 - 1', '3 - 2') that did not occur in the Saṃhitāpāṭha and thus further minimize the probability of a single word being lost. It is not surprising that as a result of these widely practised mnemonic techniques of oral transmission, there is less variation among the oral traditions of the Vedas than among the manuscripts of much later date that Western scholars have used and that are themselves based upon these oral recitations.²

The Kramapāṭha is fully explained in the R̥kprātiśākhya and is mentioned by Pāṇini; it must therefore be at least as old as the 6th century B.C. The other modifications are of later date. All survive at the present day and can still be heard in many parts of India (cf. Staal 1961, Chapters 2, 5 and 6; Levy-Staal 1968).

The fixation of the oral tradition by these mnemonic techniques pertains only to the *form* of the mantras; there is no corresponding tradition that fixes and preserves their *meaning*. On the contrary, discussions on the meanings of mantras, already alluded to, continue through the centuries and demonstrate that meaning is ephemeral. This fact continues to puzzle Western scholars with their customary emphasis on meaning, but it is easily explained: the aim of their fixation is to make the mantras readily

2. It does not follow that the editor of a text should only use the oral tradition or prefer it in all cases to written manuscripts. He should in the relevant cases (e.g., when publishing Vedic sources for which a vigorous and reliable oral transmission exist) make use of both. This was done in Staal 1961:76-81 and, much more systematically, in Sreekrishna Sarma's 1968 edition of the Kauṣītaki Brāhmaṇa ('In all cases of doubt the authority I have relied upon was the recital of the KB by Mr. Ērkkara Rāman Nampūtiri (designated ER)': Preface: page vi).

available for what is their proper purpose – to be recited during ritual performances where their form is all-important and where meaning plays no part.

Although the formal features of the oral transmission are much richer than has been indicated, this sketch should suffice in the present context (for more detail, see, e.g., Staal 1961). We must now turn to the science of ritual that originated in the context of this tradition. I shall discuss, again by way of illustration, the ritual ‘application’ of our mantra, Rigveda 6.16.16. This mantra is one of the 360 mantras that are recited during the ‘Morning Litany’ (*prātaranuvāka*: see AGNI I:600–601) according to the Kauṣītakins or followers of the ritual branch of Kauṣītaki – one of the two schools of the Rigveda. This recitation which lasts for about an hour takes place long before dawn on the day the Soma will be pressed – the most important day of any Soma ritual. The entire recitation is done by a single priest: the Hotā or chief priest of the Rigveda.

The ‘Morning Litany’ consists of three parts of which the middle part is the most important: it is addressed to, or otherwise connected with Dawn (*uṣas*). This portion is sandwiched between one part related to Agni and another part related to the Aśvins – divine young men who ride the wind. The threesome of Agni, Uṣas and the Aśvins are called ‘gods that move in the morning’ (Aitareya Brāhmaṇa 2.15.2). Within each of the three portions, the verses are arranged according to their meter, as is common in most subdivisions of the Rigveda itself. But the order of verses is only in a few cases the same as the arrangement we find in the Rigveda. Elsewhere it is entirely different. This change of arrangement is a fundamental feature of Vedic ritual: ritual episodes are always accompanied by mantras taken from many different sources – verses and prose passages that are distributed far and wide in different parts of the Vedas. To give an idea of the ensuing assemblage – which from the point of meaning could only be described as a confused jumble – I shall quote the beginning or Agni section of the list of mantras that make up the Morning Litany (alle references are to the Rigveda, by ‘circle,’ ‘hymn,’ and verse):

10.30.12 (three times)	7.16.1-12
1.74.1.-9	3.16.1-6
1.1.1-9	3.10.1-9
6.16.15-27	8.23.1-30
2.5.1-8	1.150.1-3
4.7.2-11	1.140.1-7
4.2.1-20	5.11.1-6
7.12.1-3	5.6.1-10

This portion of the list provides us with 158 out of the 360 verses we require. The list continues in the same vein, without much apparent rhyme or reason. For although all these mantras from the beginning portion are indeed concerned with Agni (as is our Rigveda verse 6.16.16

which the reader will doubtless have spotted), there are thousands of mantras concerned with Agni, and there is no known reason for the selection of these particular ones, and even less of a plausible semantic motivation for the order in which they occur. If we knew more it is possible that some of these reasons could be understood. But there undoubtedly remains an important element of chance that is involved in the composition of such assemblages. Many mantras come from the original composition 'like a seed that falls from a blossom and is carried through the wind until it settles down somewhere' (MacFarland-Staal 1987).

How does the 'science of ritual' deal with these apparent irregularities? They are explained in as far as they can be explained: all the information I have so far provided about the Morning Litany in general does find its place in the basic sources. But the actual lists are not included just as the Vedic mantras themselves are not included: they are only referred to for they are assumed to be known as part of the oral tradition. Complete lists are found for the first time in the very much later (in fact, often medieval) so-called 'Prayoga' manuals, which were apparently *written* when these lists were no longer memorized. Even at that time the mantras were not given in full, but referred to by their initial words: for the oral tradition that transmitted the mantras in the original order in which they occurred in the Vedas was still alive and firm although the ritual arrangements of the same mantras were beginning to be forgotten.

The first of the 'basis sources' of the science of ritual to which I referred is the Śrauta Sūtra of Baudhāyana. This is an early work: it may be assigned to the 8th or 7th century B.C. Willem Caland, who drew attention to its importance and edited it, for the first time, from written manuscripts (in three volumes, published between 1904 and 1923), showed that originally this Śrauta Sūtra had been, like the Vedas themselves, an oral composition. I shall mention a few of his reasons because they are illustrative of the kind of argument that is pertinent in the present context. First, Baudhāyana's work is always referred to in Sanskrit literature as a *pravacana*, which literally means 'oral instruction, exposition' (from the verbal root *vac*, 'speak'). Caland's interpretation of this term as referring to 'the fixation of the ritual in oral tradition' (Caland 1903, reprint 1966:3) has been accepted by all scholars of Vedic ritual (e.g., Kashikar 1968:43; Gonda 1977:514).

The second reason adduced by Caland for establishing the oral nature of this work is that Baudhāyana uses on several occasions expressions that are only intelligible when accompanied by a gesture. For example, it is a feature of Vedic ritual that, when the fire has to be installed on the altar, a stick of firewood has to be carried to the hearth in the following manner: during the first third of the way, it has to be carried at knee height; during the second third, at the height of the navel; and during the third, at the height of the neck. But Baudhāyana merely says: 'he first

carries it at this height, then at this height, then at this.' There are other examples of this 'performative' style, some mentioned by Caland and others, later, by Kashikar (1968:44).

In the present context I shall not pursue in greater detail why it is justified to call the ancient Indian science of ritual a science; I have done this on several occasions (e.g., Staal 1981), in greatest detail in a monograph of that title ('The Science of Ritual': Staal 1982). That the Sanskrit grammar of Pāṇini is not only a work of genius, but a work of science as well, has been generally acknowledged not only by Sanskritists but also by linguists; so I shall not further elaborate on this either. However, in order to appreciate how the scientific character of grammar is related to that of the ritual discipline, and how both derive from the oral tradition of mantra transmission, I shall discuss an example of the application of Pāṇini's grammar to a particular case of sentence formation. This will at the same time illustrate what such a 'scientific derivation' from rules looks like. I shall only refer to the essential steps in the derivation. The illustration is *akṣair dīvyati*, 'he plays with dice' (taken from an earlier study on Pāṇini's syntax and semantics: Kiparsky and Staal, 1969:84-85). The rules of Pāṇini's grammar required for this derivation are referred to by means of three numerals: the chapter (of which there are eight in the grammar), the section (four within each chapter) and the particular rule within the section (numbers vary).

First of all we need 1.4.42 which introduces a semantic relation (*kāraṇa*) called the instrument relation. Rule 2.3.18 introduces the Instrumental case as a particular realization of this semantic relation. Rule 4.1.2 introduces the suffix *-bhis* as a particular realization of the Plural of the Instrumental case. The three rules combined enable us to derive the still ungrammatical form:

**akṣabhis dīvyati*.

We now need 7.1.9, which turns *-bhis* to *-ais* in *a*-stems, thus converting this form into:

**akṣais dīvyati*.

This remains ungrammatical (as the asterisk indicates) because we still need to apply a sandhi rule (8.2.66, with 8.3.15 to assure us that something else will not happen) in order to derive the correct result:

akṣair dīvyati.

The derivation I have given is not complete: for each of the rules of the grammar presuppose other rules which, in general, precede them in earlier sections. Thus 1.4.42 presupposes 1.4.1 and 1.4.23, 2.3.18 presupposes 2.3.1, etc. In addition, there are the 'metarules' already referred to (*paribhāṣā*: cf. Staal 1975) that are presupposed in almost every derivation. Ex-

cepting the latter, the list of rules required for our present derivation is:

1.4.1	3.1.1-4	8.2.1
1.4.23	4.1.1-2	8.2.66
1.4.42	6.4.1	8.2.108
2.3.1	7.1.9	8.3.2
2.3.18	8.1.16	8.3.15

Each later rule in this list happens to be a later rule in the grammar. However, this is not always the case.

Why do we have to go through such a jumble of rules to arrive at the correct result? The famous American Sanskritist William Dwight Whitney did not know why. He attacks in the Preface to his own Sanskrit Grammar of 1879, Pāṇini's work for its 'highly artful and difficult form of about four thousand algebraic-formula-like rules in the statement and arrangement of which brevity alone is had in view, at the cost of distinctness and unambiguity.'

The complexity of Pāṇini's grammar had earlier been observed by Max Müller, whose own grammar of 1866 is greatly indebted to Pāṇini. He was full of admiration for his great predecessor, but in his own Introduction he writes: 'I do by no means pretend to have arrived on all points at a clear and definite view of the meaning of Pāṇini and his successors. The grammatical system of Hindu grammarians is so peculiar, that rules which we should group together, are scattered about in different parts of their manuals. We may have the general rule in the last, and the exceptions in the first book, and even then we are by no means certain that exceptions to these exceptions may not occur somewhere else.' Max Müller illustrates this 'peculiar' arrangement with an example, too complex to be reproduced here, and ends his discussion with the quotation of a Sanskrit verse by an Indian grammarian which, tongue in cheek, celebrates that same complexity and which may be freely translated as follows:

'Lengthening, Expansion, Lengthening, Expansion, Prohibition,
Option, again Expansion,
And then Exception, followed in the First Instance by
Transformation of *r* into Semivowel,
These are the Nine Results!'

(Whitney's and Müller's views, together with similar quotations, have been published in Staal 1972:138-140, cf. also Staal 1963:32 = 1965:115).

Following the pioneering nineteenth-century studies of Franz Kielhorn, Western scholars have come to realize that there are in almost all cases good reasons for Pāṇini's 'peculiar' procedures. Of course, Pāṇini was not perfect; he made mistakes, and the earliest commentators did not fail to note them. But in many cases the at first sight puzzling order of Pāṇini's rules enables him to make generalizations that would fail to be captured otherwise. I shall give one simple example. Western grammati-

cal works generally contain a chapter on nouns and another on verbs. That seems a very basic demarcation. Pāṇini knows, but does not accept this. On the contrary, he formulates cases of generalized rules that apply to both verbs and nouns. These would have remained undiscovered and could not be formulated in a simple and nonredundant manner if the two parts of speech were consistently treated separately. For example, in the sentence:

śivāya pacāmi, 'I cook for Śiva',

the lengthening of the *a* that occurs twice is due to a single process which applies under the same conditions to the dative of the noun:

śiva- + *-ya* → *śivāya*

and to the first person singular of the verb:

paca- + *-mi* → *pacāmi*.

The present section on the chronology of the development of the Indian sciences from their recitational background remains incomplete without a brief reference to the introduction of writing into the subcontinent. Throughout the nineteenth century, discussions on this topic among Sanskritists and Indian historians have been lively but no firm conclusion seems to have been reached. It appears certain that the first scripts were introduced from the Near East and were based upon a fairly early form of Semitic writing. By the third century B.C., we find them used in the Brahmi inscriptions of King Aśoka, written from right to left in the extreme north-west, and from left to right elsewhere. All we can conclude from these facts with certainty is that a Semitic form of script was introduced into the subcontinent some time before the third century B.C.

The earlier literature contains several references to script, but we do not know what kind of writing the authors had in mind. What is clear is that the first Indian uses were confined to royal edicts and commercial transactions. Writing was alright for keeping accounts but it continued to be emphatically and meticulously excluded from the ancestral traditions which were considered too pure to be written down. The low evaluation of what was regarded as an alien and barbaric invention is illustrated in a variety of quotations, some assembled by Ghurye 1950, others by Staal 1961 (I,1). For example, *Aitareya Āraṇyaka* 5.5.3: a pupil should not recite the Veda 'if he has eaten flesh, or seen blood, or a dead body, or done what is unlawful ... or had intercourse, or written ...'.

The most remarkable feature of the Indian scripts is not their shapes but their scientific arrangement which is basically the same in all the many forms with which we are familiar. Instead of the haphazard ABC's of the West, the Indian scripts begin with the series of vowels – basically *a, i, u, e, o, ai, au* – followed by the consistently ordered consonants begin-

ning with *ka, kha, ga, gha, nga*, etc. It has been noted long ago that this arrangement shows that the scientific analysis of the sounds of language was completed in India *before* any script was introduced, and was so widely known that the newly introduced invention was adapted to this analysis as a matter of course. Renou and Filliozat (1953:668) went one step further: 'On doit même remarquer à ce propos qu'une écriture alphabétique du type sémitique aurait pu entraver les études phonétiques si elle eût alors existé dans l'Inde, car elle aurait donné le modèle d'une analyse commode mais non scientifique des sons du langage' ('One is forced to observe in this context that a Semitic type of writing would have hindered phonetic studies if it had existed at the time in India, because it would have provided a model of analysis of the sounds of language that was practical but not scientific').

I shall end the present section with two remarks on terminology. One concerns the word for 'rule' that is used in formulating the concept of 'rule-governed activity.' This is none other than the celebrated term *sūtra* which was subsequently employed in a variety of senses. This term was introduced and employed at approximately the same time by ritualists and grammarians (see, especially, Renou 1941-1942 and 1963). Its earliest Buddhist usage was also in the sense of 'rule' ('aphorisme normatif': Renou 1963: 216, note 48).

Finally, it should not surprise us that the entire orally transmitted Vedic tradition was later referred to as *śruti*, a term that does not mean 'revelation,' as some missionaries and theologians have assumed, but simply: 'what is heard.'

3. CONCLUSIONS

In 'Literacy in Traditional Societies' (1968), edited by Jack Goody in collaboration with the literary historian Ian Watt and several other anthropologists, and in subsequent papers by Goody alone, the idea was presented and developed that the written transmission of traditional knowledge is more faithful than any oral transmission can ever be. This was not a startling thesis to most members of literate societies since they already subscribed to it. But Goody developed this idea much further by showing that writing, and subsequently alphabetic writing and printing, were important influences that contributed to the origin and development of the spirit of rational and scientific analysis and of science itself. The entire discussion was timely as Goody rightly pointed out: for the ways in which writing had influenced the social life of mankind had received 'surprisingly little attention.'

What was touched upon but not emphasized in this entire discussion but was undoubtedly present in the background or in the minds of at least some of the participants is that these issues assume a much greater

significance when placed in a wider perspective. For the contemporary world is characterized by the curious fact that literacy is attacked from opposite directions: the importance of societies that had not originally known literacy is greater than it has ever been, while most members of literate societies are at the same time glued to television and subject to other non-literate forms of communication that never existed before. The entire world thus seems to be in the grip of a powerful combine of pre-literate and post-literate powers.

Among the anthropologists who contributed to the Goody volume, two were concerned with the larger South Asian area which has also been the setting for our two preceding sections: Kathleen Gough wrote on traditional India and China, and on Literacy in Kerala; and Stanley Tambiah contributed a chapter on literacy in a village in Northeast Thailand.³ Although both Gough and Tambiah added interesting observations and Gough drew attention to certain relatively minor problems in Goody's thesis that the latter subsequently took into account, both authors supported the Goody-Watt thesis by and large and neither paid attention to the oral transmission of mantras or the ancient Indian sciences of ritual and grammar. This is ironic especially in the case of Gough because the Nambudiri brahmins, whom she of course mentions (e.g., 'Most of Kerala's literature was written by Nambudiri Brahmins before the sixteenth century, and much of it thereafter ...': p. 143; cf. also the passing reference to 'grammar and syntax' as 'separate cognitive disciplines': p. 152), are the best known example of an orthodox (or rather: orthoprax⁴) community of brahmins that has orally preserved the Vedic mantras together with the sciences of ritual and grammar that originated in the context of their transmission.

Have all these scholars been simply wrong and does India refute the Goody-Watt thesis? Not quite, but as we have already seen, things are not as simple as they have been made to appear. The oral epics of India largely support the thesis in the form in which Goody and Watt presented it. This is obvious from even a brief glance at what contemporary scholars

3. Tambiah's interesting paper raises the question as to whether Buddhism, which has always been more friendly disposed toward merchants and princes than toward brahmins, has also perhaps emphasized literacy more than the Vedic and 'Hindu' traditions. In the Far East, undoubtedly; but as far as India is concerned, the answer is in the negative. The first Buddhist councils of the fourth and third centuries B.C., which were held in India and were concerned with the fixation of the tradition – not: 'of the scriptures' as many Western scholars have written (even leading Buddhologists such as Etienne Lamotte; also Filliozat in Renou-Filliozat 1953:494) – were carried out orally. Only at the council that was held in Sri Lanka around 20 B.C. was writing used as an accessory and for the first time.

4. The term 'orthoprax' (first introduced perhaps in Staal 1959) refers to correct activity just as 'orthodox' connotes correct opinion.

have had to say about the Indian epic. Here is how van Buitenen depicts a typical instance of oral transmission of the *Mahābhārata*:

In a number of typical instances ... the reciter would first give a resume, a brief summary containing the salient features and little more. Then he would be prevailed upon to give the fuller story with all the detail he could think of. Even then his audience might interrupt him and ask for more information on certain points. All this creates the impression that what would come down from generation to generation were, first, the summaries, and, second, the technique of spinning out a tale to please the listeners. The reciter was thus also a creative poet, within the idiom of his craft.

Also handed down were a number of finished verses that summarized an incident, offered a moral, or in some other way contributed to the narrative. These were not signed, no more than the summaries were. Such a bardic tradition is by its nature anonymous.

That the main story of the *Mahābhārata* was a conscious composition is, to me, undeniable, and one poet, or a small group of them, must have been responsible for it. The original story is now irrecoverable, but it is likely to have been substantially shorter than the shortest recorded summary. It is from this modest beginning, and from a bard whose name has been forgotten, that the *Mahābhārata* began its incredible career (Van Buitenen 1973: xxiv).

Goldman comments in a similar vein on both the *Rāmāyaṇa* and the *Mahābhārata*. He is specific on the 'finished verses':

Both poems employ the style of the popular oral-formulaic epic and share a considerable body of gnomic phrases and commonplaces as well as the same meters (Goldman 1984:16),

and shows how the oral transmission of the *Rāmāyaṇa* must account for the numerous interesting and important textual differences that characterize the various recensions, subrecensions, and versions of the epic,

adding, however, that these differences,

are not, in fact, reflected in any significant variations in the major outlines of the story, its contents, tone, moral, or characterizations (p. 6).

These cases, to which many others could be added, show how oral transmission has, also in India, resulted in instability and change, at least on that verbatim level that is significantly called 'literal.' After a period of change a point is reached at which texts are written down; from then on, there is much greater stability. Scholars are now in a position to reconstruct this 'archetype' from the other end. Goldman writes (1984:5-6): 'elaborate text-historical studies of the *Rāmāyaṇa*, culminating in the preparation of the critical edition have, in our opinion, more than adequately established that all existing recensions and subrecensions are ultimately to be traced to a more or less unitary archetype.'

The Rigveda, too, may have gone through a period of change that is not entirely dissimilar to the oral vagaries of the epics: but if it ever took place, it happened *before* its codification around 1200 B.C. After that it was *not* written down, but entered the period of oral transmission which I have described, which fixed it for more than 3,000 years in the course of which it preserved as stable and solid a state as any textual ‘archetype’ ever has. There is, however, good reason to doubt that it underwent major changes even on the formal level prior to its codification: for unlike the epics, with their simple and identical meters, ‘gnomic phrases and commonplaces,’ the Rigveda exhibited from the beginning a high level of poetic sophistication comprising a variety of meters – about fifteen in all – that sets it apart also in formal terms from the later epic literature of India, and prevents the facile application of concepts that have elsewhere been successfully applied to more popular oral epics. There is, moreover, another difference that goes a long way to explain the contrast between the loose orality of the epic and the fixed orality of the Vedas: the former were transmitted by bards, addressing villagers in open settings; but the latter were transmitted from father to son and from teacher to pupil, in strict and often secret isolation.

We thus find in India at least two traditions of transmission that are formal and more or less reliable in their preserving function. One is written and of relatively recent date; it exhibits structures that are also found in other similar traditions. The other is oral and very ancient; it is closely related to typically Indian forms of science. This latter tradition is by far the more remarkable, not merely because it is characteristically Indian and unlike anything we find elsewhere, but also because it has led to scientific discoveries that are of enduring interest and from which the contemporary West still has much to learn. The existence of this latter tradition demonstrates in passing that the Goody-Watt thesis is not without important exceptions and therefore not generally tenable.

Having gone this far we can go further. The information I presented in the first two sections was mostly well known – perhaps not to anthropologists and the public at large, but certainly to Sanskritists and many Indologists. And yet, its implications have never been drawn. We are still under the sway of cultural prejudices: the prejudice that writing is more reliable and therefore better than memory; the prejudice that non-human science is more reliable and therefore better than human science; and the crowning prejudice that links the two others: that science and even rationality originated from literacy. All these prejudices are not merely cultural; they illustrate in text-book fashion the double origin of contemporary Western civilisation. One element goes back to the old maxim of ‘le miracle grec’, implying that the Greeks had invented everything, and especially science; the other goes back to the origins of monotheism and the ‘religions of the book’ – as the Koran aptly calls Judaism, Christianity

and Islam; both are finally and naturally strengthened by that always comforting feeling that we are ultimately more reliable and therefore better than anyone else.

There is some support for this position from outside the West; it comes, not surprisingly, from China. Not surprisingly, because the Chinese possess an ancient system of writing – albeit not of the alphabetic variety; and made great discoveries in natural science that supported their technology. No wonder that there is a Chinese proverb that says: ‘the strongest memory is weaker than the palest ink.’ This was approvingly quoted by the French religious philosopher Louis Lavelle (1947:162). Another Western philosopher, however, A.N. Whitehead, always a great admirer of Plato – who was a much more intransigent enemy of literate culture than Goody (1968:52) admits – once made a remark with very different implications (Whitehead 1956:140): ‘Print has had a damaging effect. Before the mind had the assistance of the page it was given much harder work to do.’

No doubt, such expressions are partly sentimental; a nostalgia tinged with the Protestant ethic that hard work is good for you. But even when we eliminate such extraneous considerations, we still have to explain the two chief examples of hard work of the mind that we have met and that are distinctive of the work of the ancient Indian ritualists and grammarians. There is an uncanny resemblance between these two: uncanny since one remains unexplained because it seems to be largely a product of chance, but the other can be fully explained because it is entirely rational. I am referring to the two lists that exhibit the ritual application of the mantra Rigveda 6.16.16 and the linguistic derivation of the sentence *akṣair dīvyati*:

10.30.12 (three times)	1.4.1
1.74.1-9	1.4.23
1.1.1-9	1.4.42
6.16.15-27	2.3.1
2.5.1-8	2.3.18
4.7.2-11	3.1.1-4
4.2.1-20	4.1.1-2
7.12.1-3	6.4.1
7.16.1-12	7.1.9
3.16.1-6	8.1.16
3.10.1-9	8.2.1
8.23.1-30	8.2.66
1.150.1-3	8.2.108
1.140.1-7	8.3.2
5.11.1-6	8.3.15
5.6.1-10	

The differences in kind between these two lists are minor: the first contains longer sequences of successive numerals; in the second, the number

combinations increase in terms of the numbering systems they represent. The latter feature is not characteristic, however, as we have already noted. And so we are left with a resemblance that is striking in one respect. The lists share the randomness that puzzled Max Müller: 'what we should group together is scattered about in different parts.' These 'scattered' and apparently haphazard lists are not only very common but also highly characteristic of almost all the investigations undertaken by the ancient Indian ritualists and grammarians.

I must, at this point, reveal a misleading feature, an inadequacy, in fact, of our Western modes of representation: all these lists that refer by means of numbers to expressions that occur in a corpus of orally transmitted utterances are artificial creations of modern scholarship. There were no numbers in the original compositions. Caland commented on this with reference to Baudhāyana's Śrauta Sūtra: 'Es scheint nämlich, dass die verschiedenen, die Beschreibung des Śrautarituals liefernden Abschnitte eine Zeit lang ohne bestimmte Zahlung im Umlauf gewesen sind' ('For it appears that the various sections that deal with the description of the śrauta ritual were for a long time current without any definite numbering:' 1910: 8). The same holds for the Rīgveda and for Pāṇini's grammar (for a picture of a manuscript page from the latter which illustrates this, see Staal 1973, Plate III, page 68). In fact, Pāṇini's grammar was originally transmitted with sandhi between the rules (Thieme 1935: 53, 128). Even the later philosophical systems were handed down orally by means of probably unnumbered sūtras (Frauwallner 1953: 275-278). The only numbers that occur in many manuscripts are put in for memotechnic reasons: they are not functional within the scientific system; they mark units that can be conveniently learnt by heart. 'Convenient,' that is, if one is a traditional Indian with a first rate and thoroughly trained memory. All these manuscripts with their un-numbered sections have long been a cause of despair to Western scholars who could not have made any initial progress in gaining access to their subject-matter and in understanding them had they not been assisted by Indian *paṇḍits* who knew the entire 'text' *by heart*.

A closer look at the matter will demonstrate that our two lists exemplify equally clearly the work of a trained mind, and can neither be created nor studied with the help of writing unless many more scriptural paraphernalia are also introduced and employed. A demonstration of this view can be given by *reductio ad absurdum*: so let us make the experiment and try to study these lists with the help of *writing*. First of all, the original units (whether verses or rules) have to be numbered. This can be easily done, of course, orally as well as in writing. Next, we have to put these units somewhere where they can be found. If this is done in writing, it can only be done in the form of something like a book, *which has numbered pages and is accompanied by an index*. But Indian books have never been like that

even during those recent periods during which they were finally widely fabricated and employed. Let me once more quote Van Buitenen (1973: xxix) who is eloquent on this point:

In essence, an Indian book consists of a number of loose leaves held together by two loose boards and tied by a piece of string running through one or two holes in the leaves and the boards. The old writing materials, before the introduction of paper after A.D. 1000, were birchbark in the upper north and palm leaf in the south. Both materials are very perishable in the alternately humid and dry Indian climate and also extremely vulnerable to vermin: for a text to survive it was necessary for it to be transcribed regularly. By way of illustration: the vast bulk of manuscripts that have survived date from the sixteenth century and later. A manuscript was a person's private property, acquired either with money or by his labor in copying another manuscript. It was his to do with as he pleased. If it pleased him to insert in his loose-leaf book a couple of leaves containing a variant version of one of the stories, he would do so without compunction, just as we do not scruple to write comments on the margins of the books we own.' (It should be added here that Indian manuscripts have no margins.) 'There is just so much you can scribble on the margins of bound volumes or scrolls, but there is literally no limit to the expandability of a loose-leaf book. It was equally subject to losses: since a book's destiny hung on the thread with which it was tied together, a break in the string could cause the loss of whole chapters.

Are the pages of these 'books' ever numbered? They certainly are. But in no two copies of the same text do the numbers correspond for the simple reason that palm leaves (not to mention the birchbark which is so rare as to be virtually nonexistent) and therefore books are of variable length. Given the absence of constant page numbers, indices that refer to pages would therefore be useless; for if anyone took the trouble to make such an index, it would be good only for a single copy and therefore without general value. The only helpful indices are those that refer to the numbers of a numbered sequence of scientifically functional units such as verses or rules. But these are often not numbered, as we have just seen.

The absence of indices in Indian books, therefore, makes a lot of sense: they would be useless. Unnumbered lists, on the other hand, are quite frequent: haphazard or not, they are generally useful because they enumerate the sequence of items within a composition and may contain additional information. The famous Anukramaṇī of the Rīgveda is one such list: it provides the first word of each hymn, the number of verses, name and family of the poets, names of the deities and meters. Such a list is not an index because it does not help anyone to *find* anything; it is an accessory to the oral tradition because it is orally transmitted, fixes the order of units that are already known by heart and adds further information. It is part and parcel of the oral tradition and serves no other purpose.

A Western scholar who studies the Vedas or the ancient grammatical tradition depends not only on his printed editions; he is, in addition, to-

tally dependent on their indices. An addiction that is contagious and probably without a cure, but innocent and therefore not frowned upon. Boehlingk's splendid 1887 edition of the grammar of Pāṇini consists of 480 pages of text followed by 358 pages of indices. The equally magnificent Poona edition of the Rigveda brought out by the Vaidika Saṁsodhana Maṇḍala between 1933 and 1951 consists of five bulky volumes; the fifth contains nothing but indices – 1120 pages of them. Modern scholars are constantly, if not desperately, fingering through these indices attempting to gain access to what they are looking for. Traditional Indian *paṇḍits* don't have and don't need indices because they carry the 'text' in their heads. But this orality is not a picturesque survival or a whim, that may baffle us or elicit our admiration if we are romantically inclined; it is an essential and integral part of the nature and structure of the Vedas, of the sciences of ritual and grammar, and of many traditional Indian compositions.

It is instructive to observe how the Vedic and the grammatical traditions are still taught and learnt. The first step or undergraduate stage is for the student to learn the entire corpus of his discipline by heart. He is not yet in a position to understand a word of it; but he needs to have it at his finger tips, or rather, hooked up in the right manner at the synapses within his brain. Learning the grammar of Pāṇini by heart will not take very long: it consists of about 4000 brief and, at first, totally unintelligible rules. Learning the Rigveda will take a few years; if it is made firm and fixed in the mind with the help of the various modifications such as the Kramapāṭha, it will take not less than five. The students should therefore start early: in their seventh or eighth year. To do so is to implement that celebrated 'study of the Veda' (*vedādhyāyana*) which it is the duty of every brahmin to undertake *because it is the only means by which the oral transmission is preserved*. This explains the superiority of brahmins, which is ritual and not economic or political, as was shown, especially, by Dumont (1966).

Most brahmins have always left it at that, and in recent times that mastery is only rarely attained. But prospective scholars have to go beyond it, and in order to understand these more advanced moves that are akin to graduate work we have to make further distinctions. Let us begin with the science of ritual, keeping in mind the situation that is portrayed, but inadequately, by our first list.

A prerequisite for the traditional study of ritual is that the student knows his own Veda by heart. He must know it thoroughly, from beginning to end. When given any couple of words, he must be able to continue the recitation from there. If he is good or takes pleasure in games, he can recite it backward; recite every other word; do with the words anything that a computer can be programmed to do; single out or count their occurrences, group them together according to certain criteria; in brief, perform precisely the kinds of exercise of which the *vikṛti* 'modifi-

cations' are simple examples. *On this foundation* he can learn to *change* the traditional order that he has committed to memory; and here we witness the beginning of those extraordinary exercises that are the bread and butter – or rice and ghee – of Vedic ritual. Most of these make no sense in terms of meaning (for the meaning has never been learnt), and often little sense even in terms of form; because many of them were, at the outset and at least in part, either due to intuitions that are no longer recoverable, or simply due to chance. Once put together, these exercises can be learnt. There may be elements that facilitate their study, for example, the occurrence of certain words; such as the word for dawn – *uṣas* – that the pupil will be familiar with even if he need not know what it means. Or 'Agni,' for that matter; much more common and familiar; yet to the young scholar who is beginning to find his way in the ritual maze, primarily nothing but a sound.

It is in this manner that the 'Morning Litany' is committed to memory. This is not the end, but the starting point of what comprises 'ritual competence.' For now the student has to know the ritual 'application:' that is, he has to know when, where and by whom the Litany is to be recited. He has to know what the other priests are doing at the same time, what other acts, recitations or chants may have to be engaged in earlier, at the same time or later, and who is responsible for all of these. Moreover, all this knowledge often constitutes an element treated as a complex unit by means of which larger ritual structures are constructed at another time. The 'Morning Litany' is a case in point. For toward the end of the Agnicayana ritual, which was performed by Nambudiri brahmins in 1975 and is the object of AGNI, another recitation takes place which incorporates a modification of the Morning Litany. This is the 'Recitation for the Aśvins' (*āśvinaśāstra*) performed also by the Hotā priest and long before dawn, but on the final day of the ritual. It contains 1,000 verses instead of 360, and there is a close relationship between the two recitations. This may be described in approximate terms as follows: a specific number of mantras are omitted from each group of metres of the Morning Litany, and others are inserted in order to arrive at the number that is required for the Aśvin Recitation.

The description of this latter recitation in AGNI proceeds in the customary artificial fashion of modern scholarship: it refers to the verses by the numbers that Western scholars have assigned to the various elements. But AGNI also specified the verses that were *omitted* from the Morning Litany, because these alone make the enterprise intelligible. Since the issue that is relevant in the present context has been treated at some length in AGNI I, I will quote from that book:

It might be asked why *omitted* mantras should be part of the description of the 1975 performance ... Only the omission and insertion of particular mantras can explain the extraordinary feat of memory that is here on display. The hotā knows

thoroughly the Ṛgveda Saṃhitā, from beginning to end. Throughout the recitation, he never hesitates when he is within a hymn, or at the end of a hymn when he is about to recite the next hymn. But when he is about to recite *another* hymn, or *other* verses than the ones that traditionally follow, he pauses at his last breathing pause, i.e., in the middle of the last verse. At that time, obviously, he concentrates on what is to be done next. Once he remembers it, he continues with the next part of the verse, and continues immediately, without taking breath, with the other hymn or verses that are prescribed. ... The Recitation for the Aśvins is similar to the Morning Litany. Since he has learnt how to recite the Morning Litany by deviating from the order of the Ṛgveda Saṃhitā as it is handed down, he has learned to further deviate from the litany when he recites the Recitation for the Aśvins (AGNI I:685-686).

The entire procedure that is described here exemplifies the general structure of Vedic learning that had been outlined at the outset of the same work. It relates several concepts we have already met with to each other and places them in their proper perspective:

The oral transmission of the Vedas from father to son or from teacher to pupil is known as *adhyāya*, 'learning' or 'recitation.' This is contrasted with *prayoga*, 'ritual application,' which refers to the general use of Vedic texts in ritual, or *vinīyoga*, which refers to the recitation of a particular mantra at a particular point in the ritual. Vedic ritual is primarily characterized by the recitation, by one or more priests, of Vedic passages. The structure and organization of this recited material follows the requirements of the ritual. As a result, sentences and verses are often taken out of their original context (which is preserved in the *adhyāya* only) and adapted to new surroundings. A reciter who is familiar with the *prayoga* has learned different arrangements of fragments of the oral tradition that he has already memorized, and knows where to insert them into ritual structures. This new dimension of learning may be handed down orally too, and without any connection with ritual activity. And so we meet with three kinds of knowledge, handed down orally, each presupposing the former. Most reciters preserve the Vedic texts in their original, or presumed original, order. Some among them have, in addition, learned how recitations have to be modified and rearranged for use in the ritual. A few have preserved the ritual practice itself, and know what, how, where, and when to act as well as to recite (AGNI I:31-32).

A modern scholar can only approximate what is being done here by frequenting libraries, climbing stools to reach rare editions on the upper shelves, turning the leaves of numerous publications and ploughing through endless indices. He may still fail but only a scholar would be in a position to even try. A library could not come up with the appropriate answers even when provided with a thousand computers and the most sophisticated information retrieval system that has yet been devised. The amount of print that needs to be amassed and processed, and the devices required to find access and one's way around, would not only exasperate a librarian; they also boggle the mind. Yet, a traditional Indian scholar can perform all of this with the help of precisely that latter device: his – albeit extensively trained – mind.

A remarkable conclusion follows from these facts. When studied in depth, these ritual exercises demonstrate that the mind, in handling them, is not only vastly superior to any instruments that literacy and literacy-aided-by-computers have devised, but constitutes, perhaps for the time being, the only device that really works well. The reason for this must lie at least in part in the nature of the storage system that characterizes the human mind and that gives us immediate and direct access to the most diverse facts. This is a subject that is beginning to be explored by psychologists and neurologists but on which I am not competent to throw any further light.

Let us now take a brief look at the science of language which is in several important respects different from the science of ritual. In grammar, the meaning of the rules is an essential component of the process of analysis. And yet, the mechanism of access to the rules is essentially the same. Again, we need to be in a position to call up rules because of certain specific features that are not easily indexed. For example, unless one knows the grammar by heart, it is not easy to formulate a procedure for finding in Pāṇini's grammar the rule that the final *-s* becomes, under certain circumstances, a final *-r*. Actually, Pāṇini's system is set up in such a way that not *-s*, but *-r* is the point of departure for substitutions. Unless one *knows* this none of Boehtlingk's indices, indeed no indices that can be imagined, are going to be of any help. Again, a scholar may manage where a library would necessarily fail. Yet, even a scholar has to go through an amount of scurrying around that is inversely proportional to the extent of his knowledge of the text. There are two limits: no indices are necessary if he knows the text by heart; and no devices can help him if he does not know it at all. The traditional Indian student is therefore the only kind of person who is precisely in the right position to deal with the material. He has the 'text' hooked up in his brain before he even starts. The teacher has subsequently explained what some of the rules mean. Somewhere along the road, depending on his competence and the particular problem he is working on, he can call up the required rule with that lightning speed that is the prerogative of a trained mind.

I have come to my final topic: the creation or invention of these sciences themselves. That the Rigveda was orally composed – no one has ever doubted it. That the science of ritual, which relies so heavily on memory, might have been orally composed, can be imagined, though barely – depending on who does the imagining. But that Pāṇini's grammar, 'one of the greatest monuments of human intelligence' (Bloomfield 1933:11), could have been orally composed is an idea that has never appealed or even made sense to Western scholars. The only important exception was Max Müller – an exception not easily brushed aside for he was one of the greatest pioneers of precisely these studies that are at the heart of the Indian oral tradition. It is well known that Max Müller was

one of the great nineteenth century polymaths, not only a Sankritist but also the pioneer of the new ‘Science of Religion.’ But he was also the first editor and translator of the Rigveda, which he published in six volumes that appeared between 1849 and 1873, and in which he included the R̥kprātiśākhyā.

Boehtlingk discussed the part that writing may have played in the composition of Pāṇini’s grammar in the Introduction to his edition and translation. But Boehtlingk did not say: ‘may have played;’ he said: ‘must have played.’ Boehtlingk was also a great scholar; he did not only know a great deal, but possessed an original and disciplined mind; moreover, he relied on argument and not on hearsay or fashion. When such a person feels strongly that something must be the case, but has no real argument to support it, he relies on a device that serious scholars rarely use: the exclamation mark. The exclamation mark occurs once in Boehtlingk’s Introduction; it is used on the one occasion when no argument is given and when he refers to Max Müller’s opinion that the Brāhmaṇa’s and Sūtras ‘ohne Kenntnis der Schrift verfasst worden seien!’ (‘were allegedly made without the knowledge of writing!’)

We have taken note of Caland’s demonstration (which appeared sixteen years after Boehtlingk’s edition) that the Sūtra of Baudhāyana was an oral composition. Pāṇini’s grammar is also a Sūtra work; in fact, it has been called (by Renou), ‘l’apogée du genre.’ Max Müller does not explicitly refer to Pāṇini when he refers to ‘the Sūtras;’ but he did, of course, include him. The difficulty of his implicit assumption that the grammar was an oral composition is that the sūtras are interdependent in an extraordinary complex manner – more so than the ritual sūtras. One change in a sūtra in any of its chapters will necessitate numerous changes in several other sūtras in several other chapters. Even a change in the order of two sūtras – a simple inversion, for example – would have far reaching implications and consequences. A circumstance, incidentally, that exemplifies an important linguistic fact: the inversion of two rules in the deep structure of a grammar may have the most dramatic effects on its surface manifestations – just as an inversion of the amino-acids within a gene may lead to diametrically opposed characteristics in the phenotype.

We have already met with a simple example of the effects of such an inversion of rules (above, pages 11-12). Let me now describe it in more general and abstract terms. In a system in which the rules are ordered in such a way that each rule has to be applied before the next, the sequence of rules:

$$\begin{array}{l} a \rightarrow b \\ b \rightarrow c \end{array} \quad \left. \vphantom{\begin{array}{l} a \rightarrow b \\ b \rightarrow c \end{array}} \right\} (1)$$

has the same effect as the single rule:

$$a \rightarrow c. \quad (2)$$

But if the rules are interchanged, as in:

$$\left. \begin{array}{l} b \rightarrow c \\ a \rightarrow b, \end{array} \right\} (3)$$

not (2) but something quite different results: there are now two kinds of 'b': one that was already present but is now replaced by 'c'; and another that is 'new' for it comes into being whenever we start with 'a'. The second 'b' might as well be given another name, say, 'd', so that the sequence of rules (3) becomes:

$$\left. \begin{array}{l} b \rightarrow c \\ a \rightarrow d. \end{array} \right\} (4)$$

Now, if we reverse the order again to see what difference it makes, we obtain something that is quite different from (1), viz.:

$$\left. \begin{array}{l} a \rightarrow d \\ b \rightarrow c. \end{array} \right\} (5)$$

I have little doubt that a mind like Pāṇini's could solve these kinds of problems that lesser minds would find difficult or impossible to handle without pencil and paper, and that in our letter-bound culture cannot even be imagined: he would do it, in principle, by combining the uncommon analytical gifts he undoubtedly possessed with the extraordinary feats of memory that were part of his culture, having strenghtening this powerful combination further by exercising it through constant and regular practice. After all, Pāṇini was a trained grammarian who must from his early days have been steeped in the knowledge of the grammatical works of his preceptors and predecessors – works of which at present and thanks to him only the names survive.

Of course one cannot prove a theory that makes the most of the elusive notion of genius; I can only try to argue that it is a reasonable and promising hypothesis, and therefore quite feasible to pursue it. But if it would ultimately run into serious problems or not find favor, I can still think of another explanatory scenario: Pāṇini worked in close collaboration with some colleagues or, more likely, pupils. Let us assume, for example, that he had more or less completed the rules of vowel sandhi, and provisionally formulated these in a consistent manner and to his satisfaction. Now there appears a problem elsewhere in the grammar; and the only way in which it can be given a simple solution is by inverting two of the sandhi rules he had just formulated. Immediately a host of problems arise, and the rule system begins to generate ungrammatical forms. How to save it, safely modify and keep track of it without losing the thread?

The solution is simple: Pāṇini asked his favorite pupil to memorize the rules for vowel sandhi he had provisionally formulated. He turned his attention elsewhere, and returned to effect the required inversion. The student who was given the special assignment heard it, and knew precisely how to react to it by reformulation. Other pupils who had memorized other portions of the grammar were eagerly listening in order to find out how any proposed modification would affect their domain; and if trouble arose, they immediately took steps to overcome the problem by changing the rules, their order, their formulation, or whatever else had to be changed. This led to other revisions elsewhere in the grammar, supervised and synthetized by Pāṇini himself. There are many *ad hoc* devices for patching up rules that must have been resorted to on such occasions and that can in fact explain certain oddities that we meet with in the corners of Pāṇini's grammar.

Is the idea of such team-work alien to Indian civilization which is depicted, after all, as a culture of solitary navel-gazers? Not at all, for that picture is nothing but a caricature. We have already seen how the Ṛkprātiśākhya described the teaching of Veda recitation to a group of students. A few decades ago, when the Jaiminīya branch of the Sāmaveda was on the verge of extinction – for it had been transmitted in its full breadth only in Kerala and only in twenty Nambudiri families (see Staal 1961:86) – one of the foremost Sāmavedins belonging to that school, Itti Ravi Nambudiri, rose to the occasion and set out to *remember* and finally *write down* the entire Jaiminīya tradition *with the help of his pupils*. Does this phrase indicate that his pupils helped him with the transcription? No, not at all; he would not entrust that to anyone. What he did is chant the songs together with the others, going over them again and again. Sometimes one would stop, because he could not remember; at other times another. Sometimes it was Itti Ravi himself who seemed to have forgotten an uncommon chant even though it was he who had originally taught it to the others – but that had, in some cases, been several decades earlier. It should be noted that we are dealing here with the ritual domain of the so-called *gāna* songs that is much more specialized than the Sāmaveda Saṃhitā; there is no such thing as a Padapāṭha, not to mention modifications such as Krama or any of the others (cf. AGNI I:276-278). In these rarified chants, a pupil might remember what the master himself had forgotten; only if it was recognized by several others including himself, Itti Ravi would accept it as authentic.

I believe that it would be profitable for Western psychologists who are studying memory to learn Sanskrit. This would enable them to go to India and study the mnemonic techniques and practices of those increasingly rare traditional *paṇḍits* that are in popular parlance referred to as 'walking encyclopedias.' It would be interesting to enquire into a phenomenon that I can only explain by introducing a notion of 'collective

memory': I am referring to a practice that is common among Vedic reciters and chanters. Vedic brahmins always prefer to recite in pairs; for two do not only know more than one; two that recite together know more than the same two reciting separately. At first I did not understand or like this practice; it does not make for clear recordings – especially since the Vedic chanters do not seem to favor the musical notion of singing in unison. However, I finally understood that reciting together does not only increase the confidence of the chanters; it also leads to the recovery of a larger portion of the oral tradition than could ever be recovered by single performers.

And so we may return from ritual to grammar and attribute to Pāṇini the masterminding of an art that I shall provisionally refer to as 'collective composition' and that is exclusively *mental* and *oral*. It explains, among other things, the extraordinary Indian insistence on the importance of the *guru*.⁵ This art itself is ultimately explained by the requirements of the ritual. For ritual requires precision, accuracy and an extreme degree of formality. The *form* of the mantras is all that counts and it is their form that had therefore to be preserved. The emphasis on formality that characterizes the science of ritual was equally important to the science of language. That latter science was also inextricably linked to oral transmission: for grammar exists *rakṣārtham*, 'for the sake of preservation', as Pāṇini's commentator Patañjali formulated it unambiguously in the Introduction to his *Mahābhāṣya* or 'Great Commentary.' The insistence on formal accuracy, the exclusion of meaning, and the extraordinary precautions that were taken to preserve the Vedas; the concomitant sciences of ritual and grammar – all of these were therefore rooted in ritual. In the final resort, we have to extend this conclusion beyond the confines of India: for Western philology and linguistics would not exist without the Rigveda and Pāṇini, and these were only preserved because of the ritual tradition. Thus came into being the two sciences of ritual and language, one still exclusively Indian; paradigms of what Max Weber called 'formal rationality,' a feature he regarded as 'the essential differentiating factor of Western civilization' (Goody 1968:65). These sciences, however, were not only Indian; they also were, from beginning to end and throughout their development, *oral*.

Contemporary scholarship exhibits at its peaks a synthesis of literacy and science. Science for its part remains, whether one likes it or not, the greatest achievement that distinguishes our human species from the other

5. The importance of the guru is deeply ingrained in the counterculture. However, since the invention of writing and especially of printing, gurus are much less relevant and rarely expound a doctrine that is not already known from texts. Their importance is now confined to the teaching of practices that cannot be easily learned from books, such as meditation.

animals. Horribly misused again and again, science alone can lead us closer to rational insight and truth, and to the realization of hopes and dreams that no other agency can provide. Literacy is a lesser good; a method of expression and preservation, a medium that at best may turn into an adornment or even an art. The term 'literature' comes to mind, but inappropriately, for it is not confined to the written language and has been misleadingly so coined.

Earlier I alluded to the pre- and post-literate powers that hold our contemporary world in their grips. If rationality and science depended on literacy, a future that already appears bleak would assume an imminent gloom. But past events provide hope: the case of India demonstrated, before the dawn of history, that the humanities are not merely 'Great Books,' but can rise to the level of science; and that the *sine qua non* of science is not literacy, but the human mind.

BIBLIOGRAPHY

- AGNI: see Staal 1983
 Bloomfield, Leonard (1933), *Language*, New York
 Boehlingk, Otto (1887), *Pāṇini's Grammatik*, Leipzig. Reprint 1964
 Bopp, Franz (1816), *Über das Conjugations-system der Sanskritsprache, in Vergleichung mit jenem der griechischen, lateinischen, persischen und germanischen Sprachen*, Frankfurt
 Buitenen, J.A.B. van (1973), *The Mahābhārata: 1. The Book of the Beginning*, Chicago
 Caland, W. (1903), 'Über das Rituelle Sūtra des Bauddhāyana,' *Abhandlungen für die Kunde des Morgenlandes* 12.1:1–65. Reprint 1966
 Dumont, Louis (1966), *Homo hierarchicus. Essai sur le système des castes*, Paris
 Frauwallner, Erich (1953), *Geschichte der indischen Philosophie*, I, Salzburg
 Ghatge, V.S. (1926), *Lectures on R̥gveda*, Poona
 Ghurye, K.G. (1950), *Preservation of Learned Tradition in India*, Bombay
 Goldman, Robert P. (1984), *The Rāmāyana of Vālmīki: 1. Bālakāṇḍa*, Princeton
 Gonda, Jan (1977), *The Ritual Sūtras*, Wiesbaden
 Goody, Jack (ed.) (1968), *Literacy in Traditional Societies*, Cambridge
 Goody, Jack (1977), 'Against "Ritual": Loosely Structured Thoughts on a Loosely Defined Topic,' in: Moore and Myerhoff, eds., 25–35
 Gough, Kathleen (1968a), 'Implications of Literacy in Traditional India and China,' in: Goody (ed.) 69–84
 Gough, Kathleen (1968b), 'Literacy in Kerala,' in: Goody (ed.) 132–160
 Hooykaas, C. (1983), 'Agni Offerings in Java and Bali,' in: AGNI II:382–402
 Ingalls, D.H.H. (1954), 'The Comparison of Indian and Western Philosophy,' *Journal of Oriental Research* 22:1–11
 Kashikar, C.G. (1968), *A Survey of the Śrautasūtras*, Bombay
 Kiparsky, Paul and Frits Staal (1969), 'Syntactic and Semantic Relations in Pāṇini,' *Foundations of Language* 5:83–117
 Lavelle, Louis (1947), *La parole et l'écriture*, Paris
 Levy, John and Frits Staal (1968), *The Four Vedas*, LP Album, New York
 MacFarland, Pamela and Frits Staal (1987), 'Ritual Language Dismantled,' in: Strickmann (ed.)
 Moore, S.F. and Myerhoff, B.G., (eds.) (1977), *Secular Ritual*, Amsterdam
 Muller, F. Max (1866, 1870), *A Sanskrit Grammar for Beginners*, London

- Renou, Louis (1941–1942), 'Les connexions entre le rituel et la grammaire,' *Journal asiatique* 233:105–165. Also in: Staal 1972:434–469
- Renou, Louis (1963), 'Sur le genre du *sūtra* dans la littérature sanskrite,' *Journal asiatique* 251:165–216
- Renou, Louis and Jean Filliozat (1953), *L'Inde classique*, II, Paris
- Ruegg, D. Seyfort (1978), 'Mathematical and Linguistic Models in Indian Thought: The Case of Zero and *Śūnyatā*,' *Wiener Zeitschrift für die Kunde Südasiens* 22:171–181
- Ryle, Gilbert (1949), *The Concept of Mind*, London
- Seidenberg, A. (1983), 'The Geometry of the Vedic Rituals,' in: *AGNI* II:95–126
- Skorupski, Tadeusz (1983), 'Tibetan Homa Rites,' in: *AGNI* II:403–417
- Sreekrishna Sarma, E.R., (ed.) (1968), *Kauṣītaki-Brahmaṇa*, Wiesbaden
- Staal, J.F. (1959), 'Über die Idee der Toleranz im Hinduismus,' *Kairo. Zeitschrift für Religionswissenschaft und Theologie* 1:215–218
- Staal, J.F. (1961), *Nambudiri Veda Recitation*, The Hague
- Staal, J.F. (1963), *Euclides en Pāṇini. Twee methodische richtlijnen voor de filosofie*, Amsterdam; reprinted in Staal 1986a:77–115
- Staal, Frits (1965), 'Euclid and Pāṇini,' *Philosophy East and West* 15:99–116
- Staal, Frits (1972), *A Reader on the Sanskrit Grammarians*, Cambridge, Mass. and London
- Staal, Frits (1975), 'The Concept of Metalanguage and its Indian Background,' *Journal of Indian Philosophy* 3:315–354
- Staal, Frits (1982), *The Science of Ritual*, Poona
- Staal, Frits (1983), *AGNI. The Vedic Ritual of the Fire Altar*, I–II, Berkeley (= *AGNI*)
- Staal, Frits (1985a), 'Mantras and Bird Songs,' *Journal of the American Oriental Society* 105:549–558
- Staal, Frits (1985b), 'Substitutions de paradigmes et religions d'Asie,' *Cahiers d'Extrême-Asie* 1:21–57
- Staal, Frits (1986a), *Over zin en onzin in filosofie, religie en wetenschap*, Amsterdam
- Staal, Frits (1986b), 'In the Realm of the Buddha,' *Natural History* 95/7:34–45
- Strickmann, Michel (1983), 'Homa in East Asia,' in: *AGNI* II:418–455
- Strickmann, Michel (ed.) (1987), *Classical Asian Rituals and the Theory of Ritual*, Berlin
- Tambiah, S.J. (1968), 'Literacy in a Buddhist Village in North-east Thailand' in: Goody (ed.) 85–131
- Thieme, Paul (1931), 'Grammatik und Sprache, ein Problem der altindischen Sprachwissenschaft,' *Zeitschrift für Indologie und Iranistik* 8:23–32
- Thieme, Paul (1935), *Pāṇini and the Veda*, Allahabad
- Thieme, Paul (1982–1983), 'Meaning and form of the "grammar" of Pāṇini,' *Studien zur Indologie und Iranistik* 8/9:3–34
- Whitehead, A.N. (1956), *Dialogues*, New York
- Whitney, William D. (1879, 1889), *Sanskrit Grammar*, Leipzig
- Wilkens, Charles (1808), *A Grammar of the Sanskrit Language*, London