

## DISCUSSION AND CRITICISM

### Cognitive issues in archaeology

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The following article is a summary of three lectures given by the author in March 1996, following an invitation by Professor Stanisław Tabaczyński under the terms of an exchange programme between the Polish Academy of Sciences and the *École des Hautes Études en Sciences Sociales*. The three parts of the article correspond to the three lectures, given under the same titles and in the same order in Warsaw at the State Museum of Archaeology (Part I), the Institute of Archaeology and Ethnology (Part II) and the Polish Academy of Sciences (Part III). A similar presentation later took place at the Institute of Prehistory in Poznań.

#### I. CHANGING PARADIGMS IN ARCHAEOLOGY AND THEIR CONTRIBUTION TO THE PROGRESS OF KNOWLEDGE

The word “paradigm” has many different uses in archaeology. It is often related to the changes of paradigms studied by Thomas Kuhn in his well-known book on the structure of scientific revolutions (1962). Archaeologists are prone to describe as revolutions the successive changes of ways and goals advocated in our discipline over the last fifty years. First came the New Archaeology (or processual archaeology), hailed in its time as a radical departure from “traditional” archaeology. The language used against representatives of the latter recalled more than once the invectives raised during the French Revolution against the *Ancien Régime*. Then came the anti-processual reaction with similar calls to arms against the previous orthodoxy. Some of you may remember Hodder’s manifesto in the introduction of his book on symbolic archaeology (1982), much in the same tone as Renfrew’s dramatic exhortations years before to scrap all our textbooks (1973 : 11). Two decades later, the same distinguished scholar again raised his voice to castigate “the anti-processual school, exemplified in some writings by Hodder [...] and perhaps quintessentially in those of Shanks and Tilley. [Given their] criteria for valid argumentation, there is nothing to distinguish

the research which they would produce from the most fantastical assertions of the lunatic fringe about flying saucers, earth magic and corn circles” (Renfrew 1994 : 9). The alternative now recommended is a return to “the well-established techniques of rational scientific inquiry” (*ibid.*), on the way “towards a cognitive archaeology” – the title of the text from which those citations are taken.

Thus, four major changes of paradigms have been proclaimed in archaeology over the last fifty years. Clearly, we are not operating on the same time scale as our colleagues in the natural sciences, at least if we follow Kuhn’s account of their own revolutions. One may therefore question the value of the analogy which some archaeologists like to make between the two pictures. More practically, do we have any way to assess the contribution of each of the four paradigms to archaeological knowledge, with a view hopefully to establish some kind of progress as we change from one to the next?

Before trying to answer that question, we should remember that other uses of the word “paradigm” exist in archaeology, at lower levels of abstraction. Some of them are mentioned in Fig. 1 here under two other broad headings, following the REVOLUTIONS just discussed. Under MODELS, I have listed examples of a few paradigms mentioned as such in our literature. The Marxist paradigm is one of the most widely cited, in an impressive range of papers dealing with its rise and fall, or its necessary reformulation. For my present purpose, however, I take it as part of a larger group of sociological models, in which social, economic or political phenomena are singled out as the major forces at work in the evolution of human societies. Among alternative visions that have attracted archaeologists in the last decades, a special place should be given to ecological and demographical models; but we now find references to more modern or post-modern paradigms – *e.g.*, feminism, critical theory – including some rather unexpected ones such as the sado-masochist or the science fiction paradigms (Barford 1993 : 268). The common denominator in all this, if any, is the emphasis laid on a particular set of factors that are taken to influence the course of human history – or our ways to reconstruct it. This last phrase calls to mind yet another range of schools distinguished more by the form than by the substance of their respective models, *e.g.*, structural, symbolic, contextual archaeology.

Finally, I have mentioned in the lower level of Fig. 1, under METHODS, some of the tools that are occasionally presented as the source of other paradigmatic changes in archaeology. One of them is the so-called science paradigm, understood in a narrow, instrumental sense: archaeology is sometimes said to have gained a scientific status from its increasing use of methods and techniques developed in studies of nature – *e.g.*, mathematics, computers, laboratory analyses of all sorts. This is of course a fallacy, but common enough to justify the inclusion of the “hard science” methods in our picture.

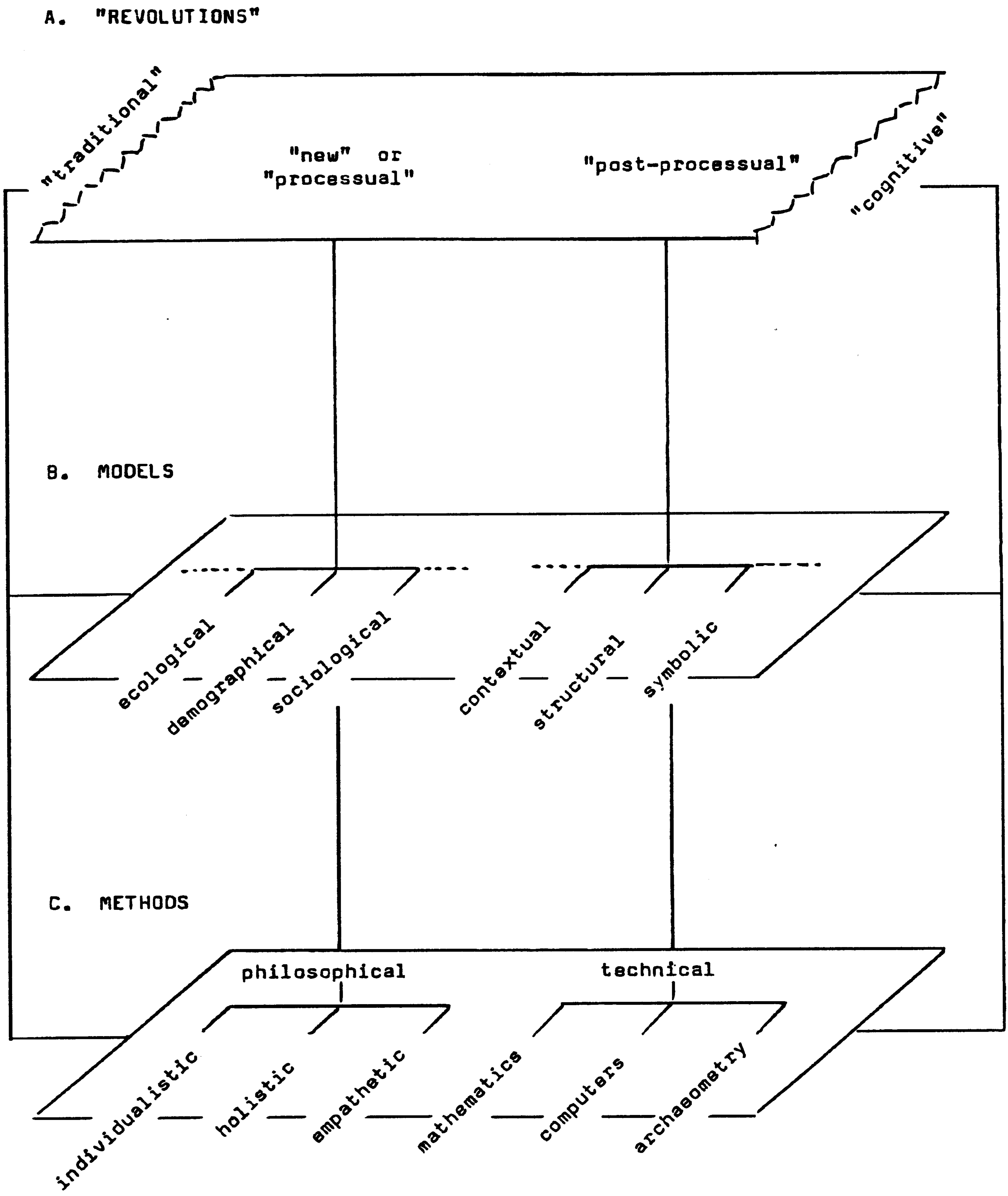


Fig. 1. Paradigms in archaeology.

It may seem strange that philosophical approaches should be placed on the same level as the latter in Fig. 1. The reason is that a similar confusion is at work when the use of a particular methodological principle defended on philosophical grounds tends to be regarded as the source of radical changes in our visions of the past.

The overall picture is thus a profusion of heterogeneous paradigms, in a very loose understanding of that word. Confusion often breeds confusion: reactions will surely differ regarding the appropriateness of Fig. 1 in terms of both substance and structure. This is not very important for my present purpose, for other summaries of the various currents that run through archaeology today would probably come up with no less confused pictures. The interesting question lies rather in the kind of comments that such a situation may suggest. Some of them would express a feeling of weariness over the successive banners that have been raised in the past decades to blame or praise in unnecessarily biting terms various complementary aspects of our trade. One could show for instance the irrelevance of so many references to revolutions *à la* Kuhn, since our changes of paradigms at the higher level of Fig. 1 do not meet the Kuhnian requirement of incommensurability. In particular, we would underline the permanence of “traditional” reconstructions of the past, besides the (post-(post-)modern) ones, as well as the anticipation by the former of quite a few “innovations” of the latter. I took that stand many years ago when presenting the logicist approach of archaeological theory which will be discussed later (part II) and its relation to the new archaeology of that time (1980: 166–9); echoes of the same views were heard recently in the Prague debate on post-processual archaeology (Neustupný and Kuna 1993).

A more productive way to examine the situation depicted in Fig. 1 consists of trying to bring out the contributions of the various paradigms to the progress of archaeological knowledge, as proposed in the title of this lecture. But where are we going to measure archaeological knowledge and its growth? A crude answer is in the textbooks that purport periodically to record our visions of past societies in specific segments of space and time, on the basis of archaeological finds. The changes noted in those books from one generation to another are an indication of progress at least in a kinetic sense: they bring out the “moves” made in successive accounts of the past without imposing that they be regarded as “advances” in our knowledge over a long period.

In relation to our present concern, we may make several observations. First, there are sectors of archaeological research in which the paradigmatic debate seems to occupy a relatively minor place, compared to its strength in others. This is (or has been) the case of well-established fields such as classical archaeology and egyptology. I do not mean that classicists or egyptologists shy away from symbolic or holistic interpretations, nor that they fail to take full advantage of archaeometrical techniques. Only, on the whole, their publications show less care than others for matters of paradigmatic orthodoxy, while treating the archaeological record in ways that do not differ from those of the more theoretically or philosophically oriented scholars. This is not an original finding: Kent Flannery made similar remarks in a humorous paper published long ago (1982). It is none the less relevant in our present discussion.

Another observation of a similar purport concerns the imbrication of the various paradigmatic layers separated in Fig. 1. Starting from the higher layer (level A), it is all too easy to find in each of the four schools mentioned instances of the various models, approaches or methods considered on levels B or C. I need not illustrate this point by providing examples for each of the many combinations  $A_i.B_i.C_i$  that come to mind: they abound in any of the well documented surveys of archaeological practice and theory published in the last decade (*e.g.*, Schnapp 1980; Gallay 1986; Hensel *et al.*, 1986 *et seq.*; Renfrew and Bahn 1991 – to name but a few). This imbrication makes it difficult to evaluate the respective contributions of each paradigm to the growth of our knowledge of the past on a worldwide basis. The case is perhaps less desperate if we restrict our inquiry to specific sectors of archaeological research, such as pre-colonial America, early medieval Europe, neolithic China and the like. The goal here is not to explore the reasons that explain the emergence or changes of paradigms (as attempted for instance by Gojda and Jiran in the Prague debate mentioned above: Neustupný and Kuna 1993 : 381–2, 387–8), but only to expose what has changed and what has remained constant in our knowledge of those particular sectors, over a long period.

Admittedly, any conclusions reached in this way are likely to be highly local, valid only for the sector under consideration. The following remarks derived from my own field – archaeology in Central Asia – are therefore merely working hypotheses, to be rejected, confirmed or qualified according to everyone's experience in others.

(A) The most visible aspect of cognitive growth in Central Asian archaeology is the continuing and spectacular extension of the data base. Surveys and excavations are not the only source of growth: the use of new archaeometrical techniques has been a powerful tool for the extraction of hitherto unavailable data from our materials, artefacts or ecofacts. To be sure, those techniques are a product of scientific theory; but the sciences to which we owe them have little to do with archaeology, even when the latter plays a part in the development of a particular analytical technique. In this respect, the occasional vindication of “archaeology as a science” on the sole ground of its increasing reliance upon archaeometrical data in the broadest sense (that is, including mathematics and computers) is wholly misleading.

(B) A related aspect of cognitive growth is the production of new categories of inferences derived from our expanding data bases. Our present textbooks on the archaeology of Central Asia are full of interesting views on past societies in that part of the world that were lacking in former presentations only because our predecessors did not have at their disposal the exploration techniques that are used today. This does not mean that their reasoning processes were inferior to ours. In particular, distinctions are needed regarding the kind and range of inferences observed in archaeometry. Some of them are intimately related to the technique itself; archaeologists may learn how to make such inferences themselves, under the

guidance of experts in physics, biology or other sciences; but then they are not acting in their own capacity. Their part really begins when they use the results of archaeometry, coupled with other data, in order to enrich the reasoning processes that connect archaeological findings to theories about past societies. In other words, the operations carried out by physicists or biologists in the course of their respective analytical explorations lead to “outputs” that are the “inputs” of archaeological interpretation proper – granted the desirable forms of interaction between the two sets. The interesting question should then be rephrased in more specific terms: is the phenomenon of growth also visible in our reasoning processes beyond the extension of the data base considered under A and B, as we observe them over a long period?

(C) The logicist programme that will be discussed later (Part II) was initiated twenty years ago to approach that question in a pragmatic way, through the analysis of archaeological publications. Only tentative answers can be offered at this stage, based on limited explorations. Again speaking for my own field, however, I submit that the most patent phenomenon is not so much the growing sophistication of our theoretical constructs as the relative uniformity of the parts that remain, in the course of time, as new empirical findings – *i.e.*, constraints – are continually brought in. In the long run, observations collected from a broad range of sources (not only archaeological) seem to bring about the eclipse of large fragments of our theories or points of view, however interesting or socially useful they may have been deemed in their time. The parts that survive, in successive textbooks, are the product of relatively simple interpretation processes that show little sign of much progress from one generation to the next.

I am of course aware of the fact that this diagnosis runs counter to the present orthodoxy. Its strength is that it rests on the analysis of archaeological papers published over a relatively long period on a specific geohistorical area, an analysis that is totally neutral with respect to the various paradigms mentioned or used in such papers.

(D) A mention should be made at this stage of the turn taken lately in the archaeological literature with respect to the validation issue. I have retraced elsewhere the successive stands taken for instance by Hodder on that matter. Validation was first presented as a pending problem which the new symbolic archaeology of the 80’s could not evade (1982); then as an essentially social issue (1984) – a viewpoint rephrased two years later in the following terms: “how then do we validate our hypotheses? Well, one answer is that we don’t ... there can only be continual debate and approximation” (1986: 13–14). I cited at the beginning of this lecture Renfrew’s severe reproof of the outcome; I was expressing similar reservations in my review of *Reading the past* ten years ago (1987a). It would be unfair, however, to omit later writings by Hodder in which the socio-cultural relativism of the past decade is matched by a come-back of empirical concerns,

needed after all to support the scientific status of archaeology, but not to the point of compromising the former ideological pledge (Hodder 1991). The conciliation exercise is not an easy one; it leads to ecumenical propositions which may cause embarrassment, for instance this one, questioned by Kuna in the Prague debate (Neustupný and Kuna 1993: 393): “post-processual archaeology accepts that the ‘truth’ or plausibility of an archaeological hypothesis is a complicated and social matter, It involves correspondance but also coherence, social context and rhetoric”. Kuna did not quite see how to make sense of that sentence with respect to the verification of hypotheses. I suppose Hodder’s answer would be his “double hermeneutic”, a subtle device – but for the terminology – to account for both the empirical and the sociological determinants of archaeological constructs (Hodder 1993: 369). Allow me to postpone my comments of this later version of post-processualism, for it presents interesting links with the “two cultures” issue that will be discussed later (Part III).

(E) Meanwhile, I wish to add another manifestation of the same drift, wholly unambiguous this time, and therefore more significant. It comes from James Bell, a scholar who divides his activities between archaeology and philosophy. I became acquainted first with this philosopher through a paper which he presented at a round table sponsored by the Centre National de la Recherche Scientifique (France) and the National Science Foundation (USA), both concerned by “the proliferation of approaches to the interpretation of archaeological remains” (Gardin and Peebles 1992: 1) Bell’s contribution was a survey of “the methods of incorporating agency [*i.e.*, the ideas, decisions and actions of humans] in theories about prehistory” (1992: 30); the emphasis therefore was on the subjective component of such theories and on the various ways currently proposed to control it in the human sciences as a whole. Some time later, I came across another paper by the same author, which dealt with archaeology alone and more specifically with cognitive archaeology, as seen by Renfrew (1994). Both the title and the substance of that paper indicated that the important thing now was testability, presented as an essential component of our theoretical works: “archaeologists should aim at constructing testable theories of prehistoric cognition” (Bell 1994a: 15). Or of anything else, for that matter: in his recent book on the reconstruction of prehistory, James Bell goes much further: “the degree to which a theory is testable is the most important single indication of its potential contribution to the advance of archaeological knowledge” (1994b: 97).

We are back to the conclusion to which I was led above, when trying to assess the contribution of changing paradigms to the progress of archaeological knowledge. The method which I used for that purpose was – and still is – the analysis of archaeological publications proposed many years ago under the name of logicism (1980: 13–16). Now, you might ask nervously: is logicism to be regarded

as yet a new paradigm? By no means: I was careful to stress that neither the goal nor the methodology of the logicist programme could be regarded as a new endeavour in the history of science (*ibid.*, 170–5). Yet, similar proposals are now made in the name of our last revolution, cognitive archaeology (Fig. 1, top right). This will form the subject of my next lecture.

## II. ARCHAEOLOGY AND THE COGNITIVE REVOLUTION

I mentioned earlier Renfrew's poor view of the research produced in the anti-processualist school; the passage quoted comes from a text entitled *Towards a cognitive archaeology* (1994), where the author gives a few hints of the approach that he has in mind under that name. It is refreshingly simple: a return to "the well-established techniques of rational scientific inquiry", as we saw; but how are we going to reach that goal in cognitive archaeology? By "developing ways of forming structure of inference, in an explicit (**and in some sense scientific**) manner" (*ibid.*, p. 5) [the emphasis is mine, this parenthetical reference to science being in no sense a side-issue]; or again, by keeping in mind that "for valid insights of the theoretical positions of archaeologists, we would do better to look at their working papers, that is to say the application of their thinking to specific cases, rather than to their more programmatic statements or their attempts to write philosophy" (*ibid.*, pp. 4–5).

At this stage, I should say a word of the work undertaken in the so-called French logicist school on precisely those two lines during the past twenty years: developing a formal structure that may help to bring out in an explicit manner the chains of inference that archaeologists use in their working papers. Allow me to do so only very briefly; the reason is that a sizable number of pages have already been published on the subject, in English as well as in French. The few indications that follow are merely intended to guide potential readers through the literature.

The logicist programme took shape in the mid-seventies. It followed a long series of research projects carried out during the preceding decade on the use of computers in archaeology and the human sciences (a summary of this part of the story can be found in Gardin 1991 : 43–58, reprinted from the inaccessible proceedings of a 1988 conference on the history of computer science in France). A number of theoretical issues had been raised in those early attempts at introducing computability into some of our customary intellectual activities – *e.g.*, searching bibliographic or factual information, forming typological classes, chronological series, *etc.* The answers given to those issues had taken the path of formal systems of description (semiological codes) and classification (mathematical methods). Both eventually proved unsatisfactory, in two respects: the two kinds of tools were

developed independently, in contrast to the standard practice of theory building in science, and without much concern, I must confess, for the cognitive benefits of our experiments. A change of strategy therefore took place in the 1970s (first announced in Gardin 1970: 361-4): archaeological constructs would henceforward be viewed as integrated wholes made up of interdependent parts – essentially, the set of symbols used to formulate (that is, constitute) the data, according to any semiological system (natural language or other), and the set of operations carried out to ground our theories upon that base.

Two examples were published in 1975 to illustrate the kind of analysis that we had in mind (Gardin and Lagrange 1975). Then followed *Archaeological constructs* (Gardin 1980), Fig. 2 here, a detailed presentation of the logicist programme, is

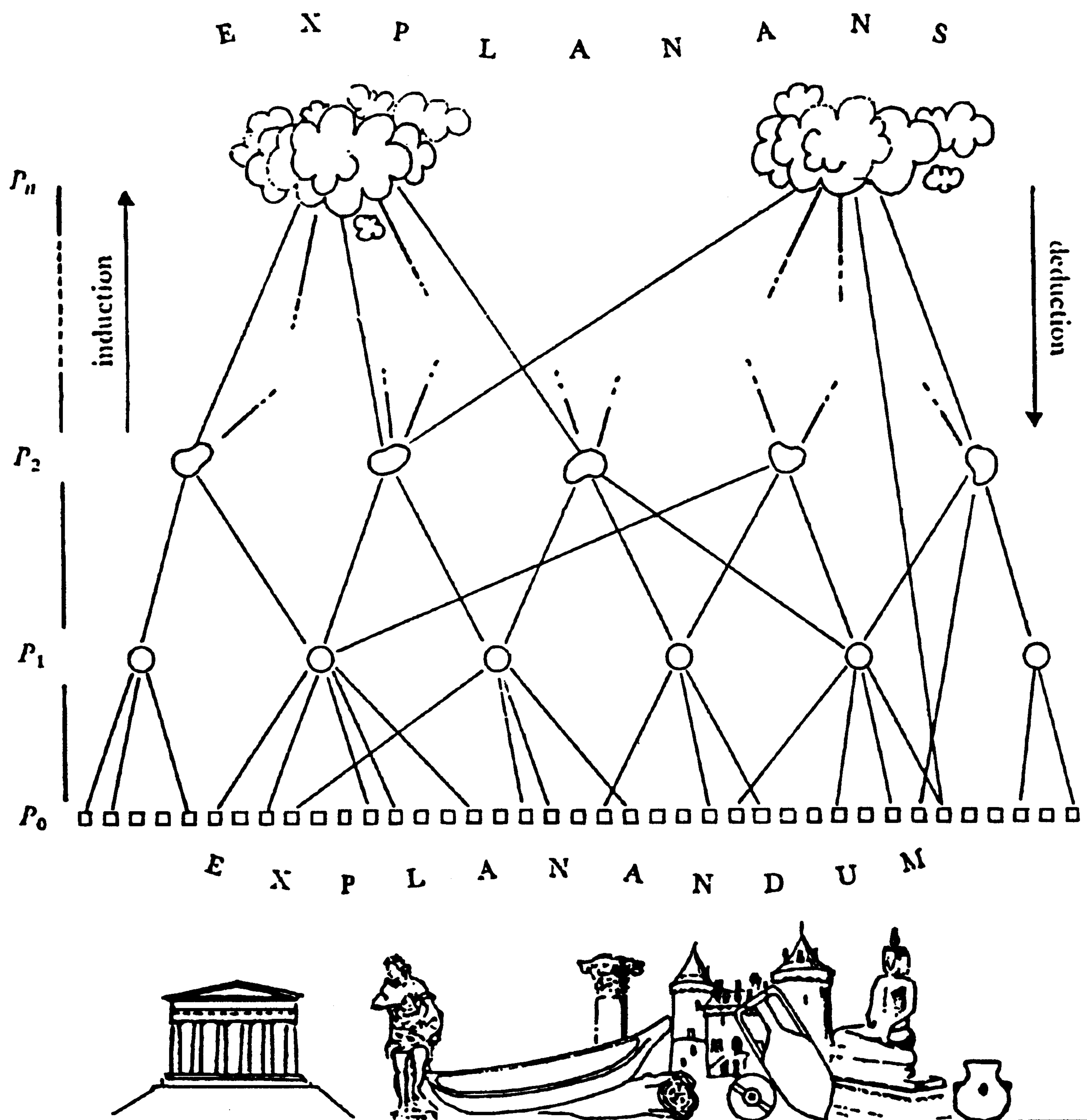


Fig. 2. The schematization of archaeological constructs in the logicist perspective. Reproduced from Gardin 1980: 103, fig. 20.

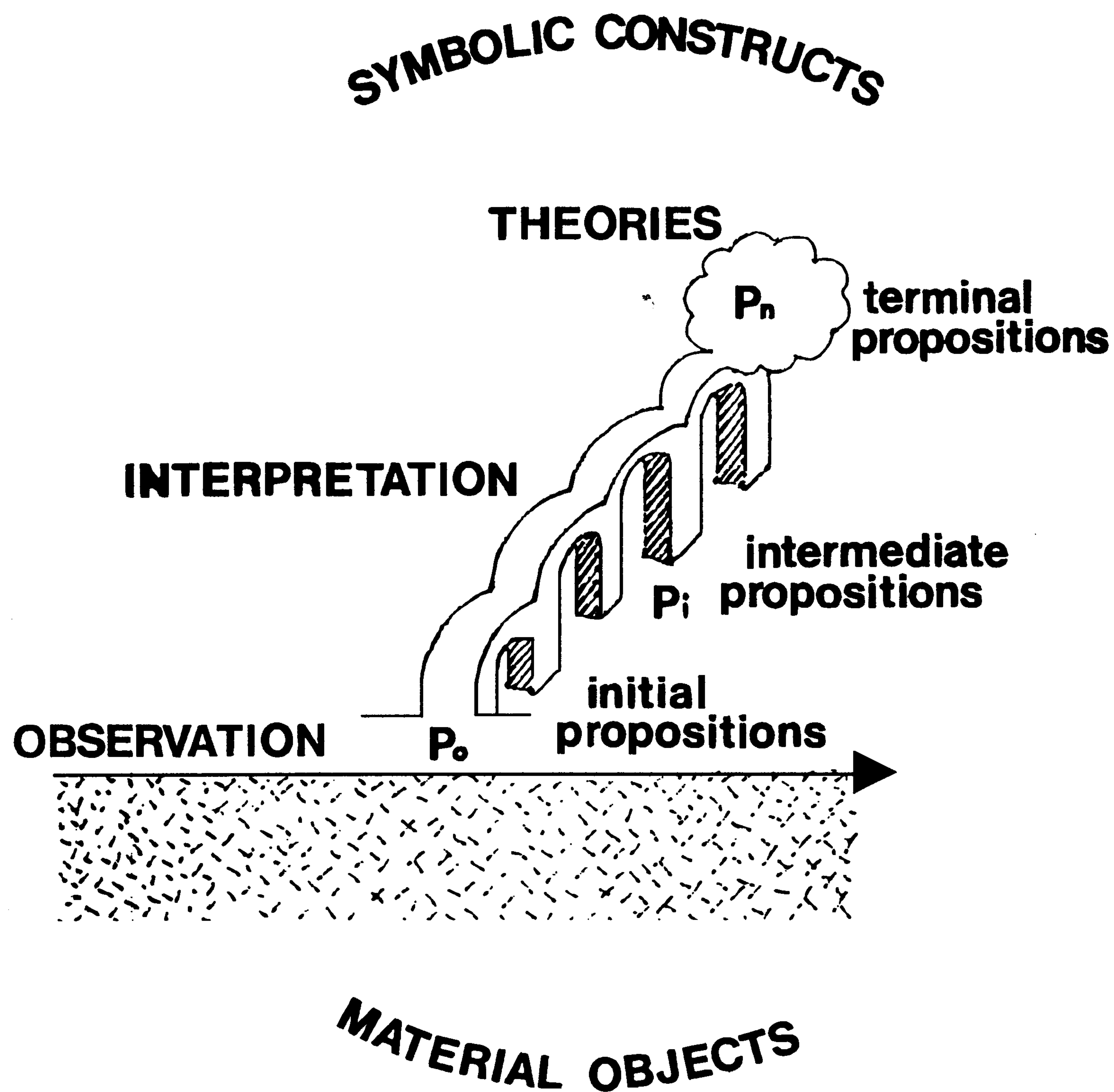


Fig. 3. Another version of Fig. 2. The bridge metaphor.

taken from that book; it has been reproduced many times to convey the form and function of the proposed “schematizations” of archaeological argument. They are meant to bring out, first, the database made up of all the propositions that have no antecedents in a given text (descriptions or presuppositions, conventionally designated in Fig. 2 as the set  $\{P_0\}$ ); then, the interpretation process, expressed as a succession of rewrite operations connecting  $\{P_0\}$  to the conclusions reached in the paper (that is to say, propositions that have no explicit consequents, conventionally designated as the set  $\{P_n\}$ ). An alternative way to build or read a schematization is from top down: the hypothesis is stated first and “demonstrated” through a succession of rewrite operation that connect it to the data base, in a (kind of) deductive process.

Fig. 3 offers another graphic metaphor of the same programme. Between the realm of observed or presupposed “facts” (bottom) and the realm of theories or “ideas” (top), we are expected to build bridges that may be crossed both ways, from one bank to the other. They are made of arches and pillars; the arches indicate the rewrite

operations (inferences, derivations, deductions, all expressed in a unique format  $\{P_i\} \rightarrow \{P_i \pm 1\}$ ), while the pillars remind us of the foundations upon which arches must be based if the bridge is to be declared safe (for a summary of the structure of archaeological theories in this perspective, see Gardin 1990a).

Analogies between the logicist programme and the philosophy of artificial intelligence were patent (Gardin 1980: 123–5); but the goal of the former did not include the promotion of computers *per se*, as in the latter. This point was raised many times: notwithstanding the historical and logical relationship of that programme with “the computational paradigm” (Lévy 1987: 115 sq.), its objective lies in cognition, not computers. I described it as a move towards “a practical epistemology”, that is to say, an exploration of the mechanisms and foundations of reasoning processes observed in special fields of the human sciences (1981). This reference to epistemology was however the source of another confusion, this time with philosophy: the Société Française de Philosophie was kind enough to offer me a chance to clarify the analogies and differences between our respective concerns (1987b).

I cannot say much more here about the various works related to the logicist programme. A selected bibliography was distributed to the participants of the Warsaw seminar, with a short summary of the scope and purpose of each work mentioned; it is reproduced at the end of this article. I also presented as an example the schematization of an article dealing with “the emergence of complex (proto-urban, proto-state) societies in Afghanistan during the Bronze Age, following the establishment of Harappan colonies” (a written presentation of this would take too much space here; readers interested in examples of schematizations will find them in some of the books listed in the Appendix, especially nos. 7, 8, 9, 11 and 14). I am certainly not the best placed person to evaluate the contribution of that programme to the progress of knowledge in archaeology; nor should I feel encouraged to do so by the mostly negative comments heard or read in the last years. The first critiques followed the publication of *Archaeological constructs* in 1980; the reviewers, mainly from Great Britain and the U.S.A., found the book difficult, objectionable in many respects, or at best unnecessary. Later comments based on a larger bibliography were no less critical; the most disheartening one came from France, in the book edited by Hodder on archaeology in Europe: it deplored “the stagnating effect” of the whole programme (Cleuziou *et al.* 1991: 100–102). It might therefore seem strange that I should still have faith in the soundness of the logicist perspective in archaeology. The rest of this lecture will be devoted to the sources of that confidence – or stubbornness.

Essentially, my reasons boil down to a single observation, namely the fact that the major issues raised in the course of our explorations, first dismissed on any number of grounds, are now drawing the attention of quite a few honorable

individuals and institutions. I already hinted at this phenomenon in my first lecture (Part I); let me now present in some detail two examples of that convergence, taken from a longer list.

(A) A practical example, first: the future of archaeological publications. The matter came up very early as an inevitable consequence of the logicist perspective. The schematization of an archaeological paper is not an abstract or a summary of that paper, but a reformulation of its content in a condensed form. The word “condensation” is here understood as in physics: a rearrangement of something into a more compact volume, without loss of substance. The idea logically follows that we could perhaps publish shorter papers, if not in the form of schematizations, at least according to “a new rhetoric” that would disclose more readily the ingredients and structure of our thought. A whole chapter was devoted to this matter in *Archaeological constructs* (1980: 147–164). It began with two citations, one by G.L. Isaac in Britain, the other by F.T. Cloak in the U.S.A. (*ibid.*, p. 147), showing that this suggestion again was not a revolutionary one: similar proposals had been made before. No steps, however, had been taken to implement them – nor mine, for that matter. Times have changed, however; and the form of our publications has lately become the subject of interesting debates in which our past projections seem to find ample support.

Two categories of factors are currently mentioned in favour of radical changes in our publication practices: financial and technological. I wish here to add a third, that will bring us back to the intellectual aspect of the cognitive revolution. The case for a compaction of the archaeological literature because of its costs is well-known, but irrelevant in the present context. It is often coupled with arguments in favour of using the new information technologies as alternative channels for the dissemination of archaeological knowledge; the benefits are then said to be not only economical but intellectual as well, through the increased range and speed of access to the world-wide stores of information. No one would expect, I suppose, that having long been held as a hard-grained promoter of computers in archaeology, I should now raise objections against their use in publishing, *i.e.*, making the results of our research available to the public through electronic means. I think, however, that the new technologies alone do not provide a solution to our present concerns. Why? Simply because the kind of information crisis that we are facing involves machines and minds, rather than computers and communication lines alone. Let us imagine for the sake of the demonstration that I have at my finger-tips – the standard formula in this case – all the archaeological and paleoecological materials collected in Central Asia, together with all the articles and books that have been published or prepared to make sense of them, in any language and according to everyone’s preferred paradigm. Let us further imagine (generously) that an all-purpose indexing system has been devised, thanks

to which I can immediately locate the sources that contain the materials and/or ideas that I happen to be concerned with at any moment. A marvellous prospect, to be sure, but also marvellously incomplete; for, leaving aside the many unsolved problems of storage and retrieval in this hopeful picture, I still am faced with the obligation to read the literature selected by “the system” in answer to my queries. The real problem is that I shall hardly ever be able to do so, because of the disequilibrium that has now set in between the growing volume of archaeological publications (many of which retain a potential relevance for several decades) and the fixed or decreasing amount of time that we can devote to reading that literature, even within the limits of computer selections.

A striking illustration of this point was presented a few years ago by Anthony Kenny, then President of the British Academy, in his introduction to a conference on scholarship and the new technologies sponsored by that institution. A small team of assistants had collected for him a list of papers published over the past few years in his field (by his own admission a narrow one), in medieval philosophy (only taking into consideration, he added, those written in English). The examination of that list, confronted with the overall economy of Dr. Kenny’s time schedule, led him to the conclusion that he had been and would remain unable to read more than a very small fraction of the relevant literature (under 1%, according to his estimations). Other computations produced the average number of readers per article, by far inferior to the author’s expectations... In conclusion, Kenny raised the question: “does it make sense to operate a system of publishing articles whose real readership is so small?” (1991 : 7).

Never mind the figures in this example: most of us would admit, I believe, that a similar unbalance would be found in our respective research areas, whatever the order of magnitude, if we cared to conduct a similar exercise. There are of course reasons for not doing so... Moreover, some of us seem satisfied with the usual kind of answer to the challenge: most of our papers are meant to be consulted, not read, so that searching archaeological information on disks or tapes through an indexing system is not after all very different from our actual “reading” practice. Assuming (again charitably) that we could accept the latter part of that proposition, we still are faced with the paradox implicit in the first part: if our papers are meant to be consulted, why should we continue to write and publish them as if they were going to be read? Would it not be wiser to explore new forms of presentation, consistent with the consulting strategy, rather than persist in writing pages after pages of so-called readable text that will in fact never be read, in the strict sense of the word?

The fact that the search for alternatives is now encouraged by academic institutions (Gardin 1987c, 1996) is a sign that earlier thoughts on the matter, in the logicist framework or otherwise, were not entirely misplaced.

(B) I now turn to the second example, a theoretical issue: namely, the phenomenon often described as multi-interpretation. We meet it all the time in the historical sciences: divergent views of the circumstances or factors that “explain” the French Revolution, the emergence of the State, the crisis of the 2nd millenium in Central Asia, *etc.*; or again, more humbly, in our disputes on chronology, diffusion processes, attributions, *etc.* The schematization of conflicting constructs of such sort is a way to observe precisely where and how they differ: the materials selected to ground the respective theories may not be the same, their conversion into data rests upon different conventions, the underlying semiological systems are not convertible into one another, the successive steps that make up the argument have little in common, *etc.* Let us concentrate on this last point.

Once they have been expressed as rewrite operations –  $\{P_i\} \rightarrow \{P_j\}$ , or “(IF)  $p \rightarrow$  (THEN)  $q$ ” – our inferences can easily be grouped on the basis of what they have in common: either the same antecedent  $p$  from which different  $q$  are derived, or the same consequent  $q$  drawn from different premisses  $p$ . The phenomenon of multi-interpretation considered above on a macroscopic scale – divergent views about the same objects of study (several examples in Moberg 1981) – then takes up another dimension, microscopic if you will. Having established a given (set of) proposition(s)  $\{P_i\}$  in an argument, different authors, or the same author in different circumstances, move to alternative (sets of) propositions  $\{P_j/1,2 \dots n\}$ , each regarded as a “natural” consequent of the former. The cumulation of such formulae observed in a specific universe of discourse is a way to gain a clear idea of the reasoning practices that account for its multiformity. Examples of that kind of exercise can be found in some of the works cited in the Appendix: nos.7 (chap. 9, by M.-S. Lagrange and M. Renaud), 8 (by O. Guillaume), 9 (by H.-P. Francfort), 11 (by W. Stoczkowski).

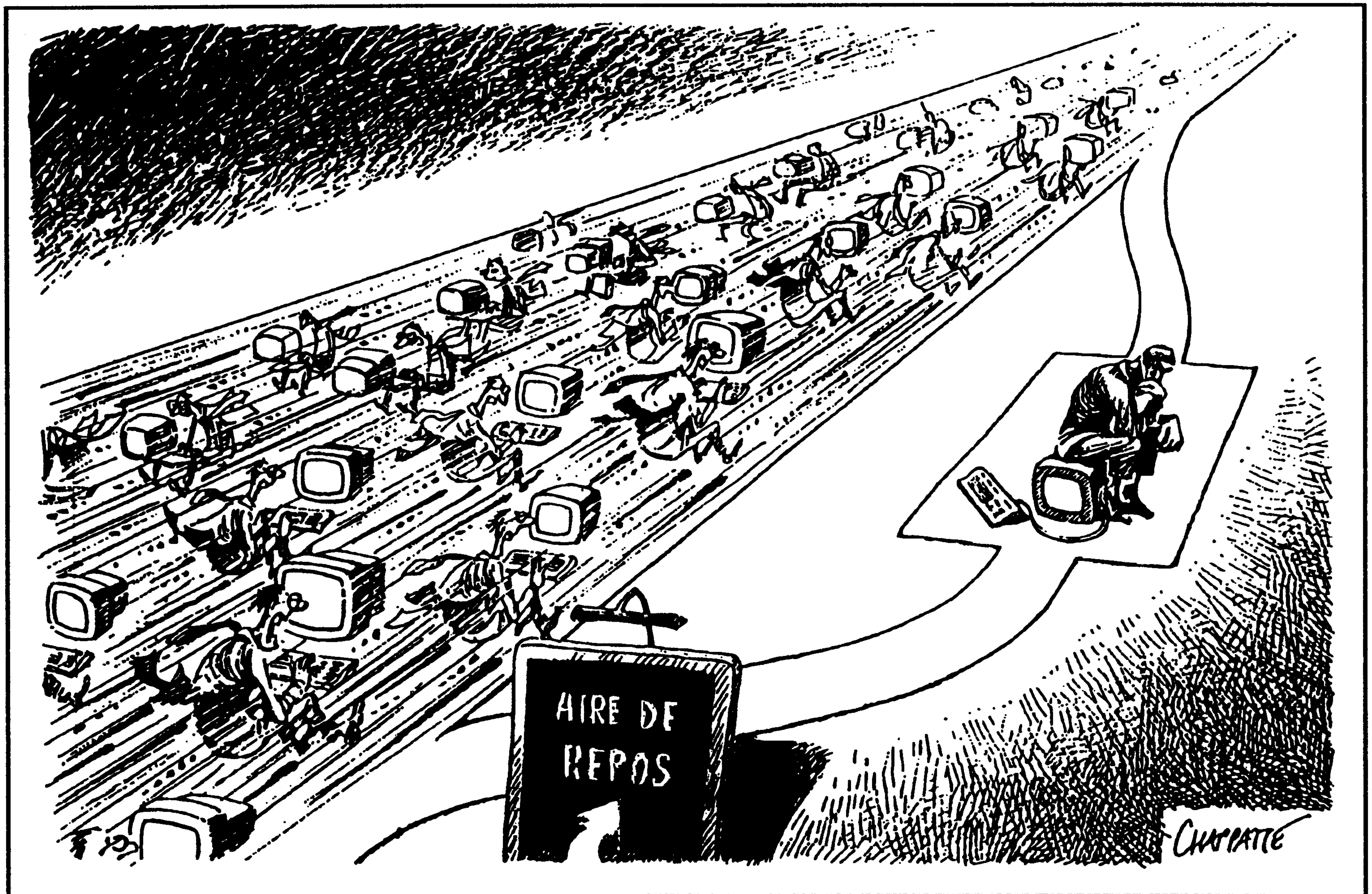
Questions were raised, however, regarding the value of the exercise. Should we push it to the point of trying to “disambiguate” all such formulae, using the standard procedures of science (Gardin 1990b: 37–41)? Or should we rather look at them as representing the normal state of affairs in the humanities, in accordance with the canons of hermeneutics, critical theory, cultural relativism, *etc.*? Needless to say, post-processual archaeologists took the latter view. The mere fact of regarding multi-interpretation as an intellectual issue seemed objectionable: “such an idea [...] strongly supported by the link between the development [...] of expert systems and the French logicist school [...] espouses an extremely narrow, reductionist and positivistic view of the subject of archaeology” (Stutt and Shennan 1990: 766).

Several points are missed in comments of that sort. First, though the goal of the logicist programme is to explore the discursive practices of archaeology as a science, it does not follow that the exploration aims at forcing archaeology into the moulds of science. The emphasis has been laid early enough on the limitations of such an endeavour (Gardin 1980: 165 sq.). Secondly, an assessment of limits

does not mean that “trespassers will be prosecuted”, according to a well-known formula; the Swiss logician J.-B. Grize, an expert in such matters, underlined exactly the contrary: *marquer une frontière, c’est se donner une chance d’aller au-delà* (cited in Gardin 1995a: 21). Thirdly, I fully agree that we should go beyond the limits of well-formed logico-empirical constructs in archaeology: my initial presentation of the logicist programme ended with the same plea (1980: 178–180). My proposal was, however, that we should then shift to another genre of discursive practices no less demanding than the former, namely the genre of Literature with a capital “L” (*ibid.*) – assuming, that is, that we have the talent. Failing which, we would leave that task to more gifted writers and be content with a justification of our professional status based on the kind of intellectual concerns just discussed.

I shall amplify those three points in my next lecture (Part III). Meanwhile, let me conclude the present one with a return to its title: archaeology and the cognitive revolution. You have surely noted the convergence between our approach of multi-interpretation and the characteristics of cognitive archaeology in its later formulations. The references in my previous lecture (Part I) are in this respect instructive enough. However, I would like to submit that the patronage of cognitive archaeology, even retroactively, is not only unnecessary but also improper. For one thing, the research carried out on multi-interpretation issues within the logicist framework was initiated in the 1970s, at a time when the present epistemological concerns of cognitive archaeology were not patent. This designation was coined then to embrace studies of the cognitive abilities or contents of “the ancient mind”, a subject which still occupies the major part of the interesting book recently published under that title (Renfrew and Zubrow 1994). Our own concerns, on the other hand, have been and still are the cognitive abilities or contents of the modern mind, personified in this case by contemporary scholars, myself included (I once published a schematization of an article of which I was the author: Gardin 1987d; and I am presently completing the same exercise on a forthcoming book on the archaeology of Central Asia, as I had promised somewhat prematurely in 1980, p. 164, n. 8).

But these are minor points; I can think of two more serious reasons for avoiding a merger with cognitive archaeology, despite the later overlaps. First, as I stressed in my previous lecture, the logicist perspective does not constitute a new paradigm in archaeology; it is merely a way of looking at past, present or future archaeological constructs, irrespective of the labels attached to them by their authors – cognitive included. Moreover, this perspective is anything but new, as I underlined long ago (1980: 165–170, to which I would now add Frerichs 1981, a reference which I owe to S. Tabaczyński), so that it would be not only improper but also slightly ridiculous to speak in this case of yet another school of archaeology, under any name – cognitive included.



**Autoroutes de l'information**

Fig. 4. Thinking in the computer age, seen by Chapatte

Finally, I think that a link can conversely be established between the emergence of the logicist programme in archaeology and the broad movement of ideas known as the cognitive revolution (Gardner 1985) – which has little to do with any of our revolutions in archaeology, cognitive included. This reference may sound unduly pompous and after all just as unnecessary as any other. I have nevertheless chosen to mention it because I think that the logicist perspective is but a local manifestation of the broader concerns encompassed within the cognitive revolution. The cartoon of Fig. 4 is a light way to substantiate that heavy claim. Two features of the cognitive revolution are combined in that picture: on the one hand, an evolution of our communication practices and mental processes following the advent of computers; on the other hand, the growth of so-called self-reflexivity (*la pensée réfléchie* announced in his time by Teilhard de Chardin), symbolized by *Le Penseur* to the right (and perhaps by the empty screens to the left), who has decided to take a rest and think about the thought processes at work on the information highway. The relevance of this picture to the logicist perspective was felt first by Alain Gallay who discovered Chapatte's cartoon and kindly sent it to me; I hope no further words are needed to convey the same feeling to you.

### III. ARCHAEOLOGY AND HISTORY BETWEEN SCIENCE AND LITERATURE

I mentioned earlier that that the logicist programme presented in *Archaeological constructs* ended with a defence of Literature, viewed as a desirable complement of Science in our reconstructions of the past (1980: 180). Most reviewers omitted that part of the argument, except to blame the “inconsistency”: how could one one speak of the merits of Literature as a mode of knowledge after having devoted a hundred pages or more to the formalization of cognitive processes? My answer in that book was that the logicist approach carried its own limitations: our visions of the past should not be restricted to well-formed constructs according to the standards of empirical sciences. There was room and need for further work based on the findings of such constructs in order to give them some form of life as in the fictions of Literature.

This seemed to me a rather simple standpoint, and one, moreover, that did not even claim novelty: I cited, among others, Isaac’s earlier support of the same view: “new levels of precision in presenting data and interpreting them can surely lead to briefer and more interesting technical reports as well as providing the basis for more lively portrayals of what happened in history” (Isaac 1971: 128). Why, then, should it be so difficult to discuss the relationship of archaeology with literature? The purpose of my last lecture is to outline the framework within which this debate ought to take place, given the dimensions it has now taken in the human sciences as a whole.

Archaeology is a historical discipline. I should therefore recall first that the relationship between history and literature has been the subject of a truly stupendous number of books and articles in the last two or three decades. The “narrative mode” is probably the most popular version of the bridge between the two genres; but the bibliography for that specific topic still remains enormous (the journal *Historical Abstracts* lists hundreds of works published in recent years the titles or summaries of which mention the narrative mode). Archaeology has been on the whole absent from that debate, as if none of us could find the courage or time to go through such a wide corpus (incidentally, a useful survey can now be consulted: Revel 1995). The task has in fact been made more awesome still since the narrative mode has become the subject of more innumerable pages outside history. The three thick volumes published by Paul Ricoeur on *Time and narrative* (1983–85), for instance, cover several disciplines; as did his previous books on hermeneutics, presented as the proper mode of interpretation in the human sciences. My reason for mentioning this particular author among so many others is that his work offers, to me, the best example of the absorption of the narrativity issue discussed by historians into the wider compass of hermeneutics. The consequence of this merger, however, is that the reference to Literature tends to

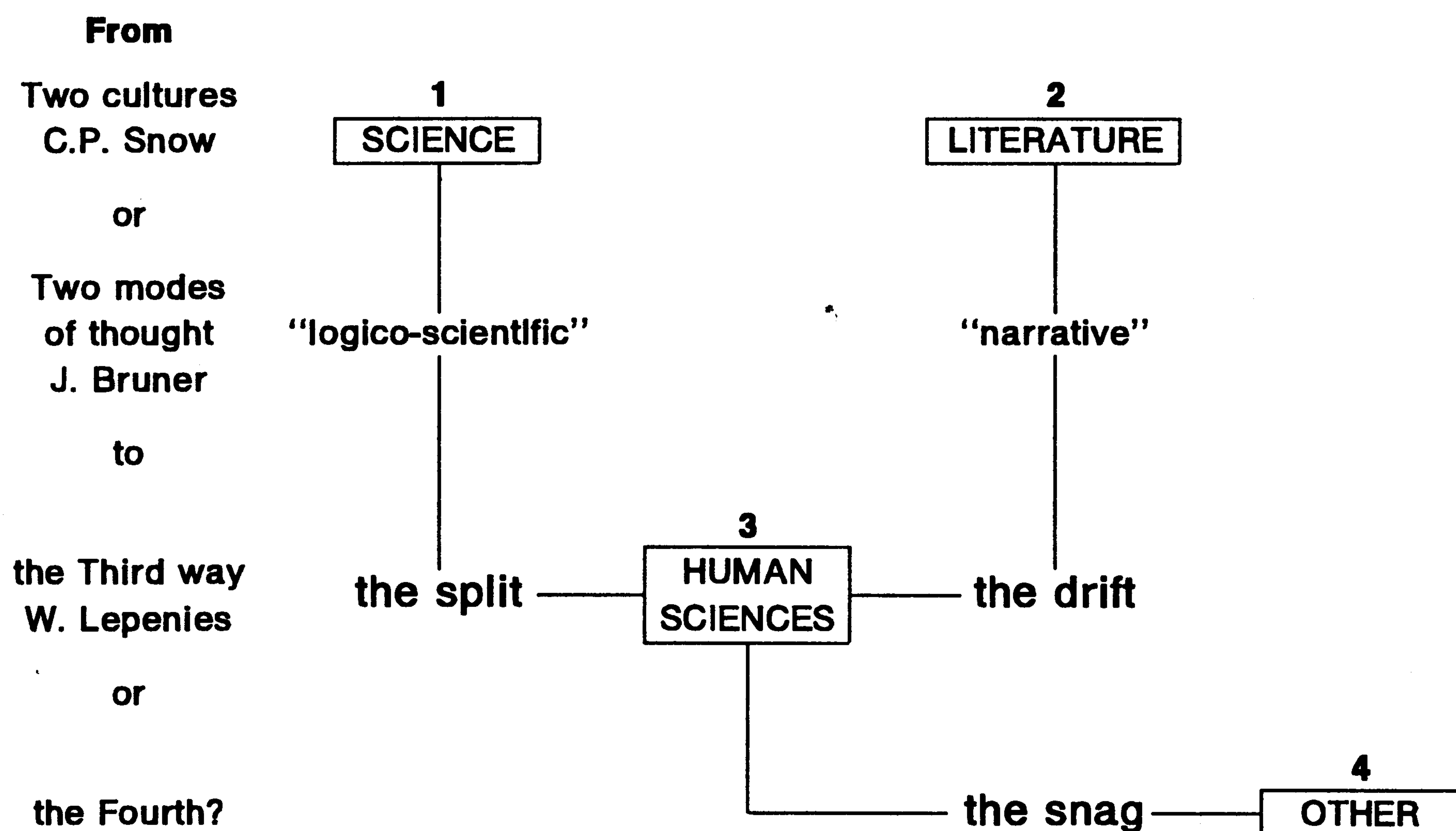


Fig. 5. The 2, 3 (4) cultures debate. Adapted from Gardin 1991: 30, fig. 2.

disappear. The hermeneutic interpretations of anything human – sacred texts, paintings, poems, chronicles, *etc.*, and now archaeological artefacts (Shanks and Tilley 1987) – may indeed be doomed to take the form of a narrative, rather than that of a schematization... but it is not required that it should display some of the qualities expected from a literary writer. The ordinary prose of laymen is *a priori* just as acceptable, not different from the kind of narratives written by journalists or reporters. I need not point out that the style of interpretive (discourse in) archaeology belongs entirely to the latter genre.

I have now named the three summits of the triangle within which archaeological thought and discourse may unfold itself: Science and Literature, our initial pair, plus now a third genre that I shall call Common Sense (and below I shall clarify what I mean by that). This lecture will essentially be devoted to a review of the major theories recently published regarding the position of the human sciences in that triangle.

Fig. 5, read from the top down, summarizes the issue. It begins with the well-known book by C.P. Snow, *The two cultures*, published in 1959. The position of the human sciences in that book was unclear, torn – as their very designation would indicate – between the world of Science, to the left of my figure, and the world of the Humanities to the right, explicitly included in Literature. In a revised edition of his book, however (1983), C.P. Snow took up the matter, only to suggest that the progress of the human sciences might eventually justify the addition of a third term to the picture.

Unexpectedly enough, the same question was raised twenty years later in more technical terms, when Jerome Bruner, one of the founding fathers of cognitive psychology, published a cognitivist version of that dichotomy. After having studied thinking for several decades, Bruner came to the conclusion that two modes of thought are at work in the quest of knowledge, and two only, viewed as “natural kinds” in the human species (1986: 1–43). One of them is the “logico-scientific mode”, as practised and understood in the natural sciences since Galileo; the second one is the “narrative mode”, in Bruner’s terminology, about which, he admits, “we know precious little” (1986: 14). Failing a definition, Bruner gave examples of the narrative mode, an impressive range of them, beautifully analyzed: they all belonged to the universe of Literature in the most elevated sense (plays, fictions, poems), none of them to the study of literature. Once more, the human sciences, their mode of thought, their prose were absent from the picture.

Intrigued, I had a chance to ask Bruner on which side of his diptych he would place “us”, archaeologists, historians, anthropologists. Our conversation took place at the end of a two day seminar held at the Centro Internazionale di Studi Semiotici e Cognitivi, San Marino 1991, where Bruner had been invited to express his views on the unmarked pole of his pair: “Narrative Thought and Discourse”. Again, Bruner had given examples, commented upon them, and proposed a number of distinctive features of the narrative mode; but the whole seminar had been about works of Literature, in the same way as in his book, without any reference to narratives in history or, for that matter, archaeology. Finally came the answer to my question, as non-committal as it could be: “that is a problem”, said Bruner with a charming smile, “that I would leave to decision-makers in science foundations”.

About the same time, a German sociologist was taking the step envisaged by C.P. Snow, regarding the possibility of a third culture: the social sciences were offered a position of their own, “between science and literature”. This formula occurred in the title of both the English and the French translations of the book published by Wolfgang Lepenies under a more neutral heading, *Die Drei Kulturen*, in 1985. A close look at this work, as well as a later article (1987), brings out a tendency of the social sciences to “drift” repeatedly towards the world of Belles-Lettres from which they originated (1987: 16). Our modern or post-modern times offer outstanding examples of that phenomenon among contemporary scholars, in addition to those mentioned by Lepenies for earlier periods.

A different tripartition has recently been proposed in France by another sociologist (Passeron 1991), speaking in the name of the historical sciences in general. Passeron endorses, of course, the “split” between the sciences of nature and the sciences of culture; but instead of a “drift” towards Literature, he describes the link that the human sciences are bound to keep with what he calls *le raisonnement naturel* – clearly an avatar of Common Sense in the broad acception of that term in Fig. 5. In other words,

our constructs are said to be the product of *un raisonnement de l'entre-deux* (Paseron 1991:29), situated this time between the poles of Science and Common sense, instead of Science and Literature as envisaged by Snow, hinted by Bruner, and posited by Lepenies.

The introduction of natural reasoning or common sense in our picture was to be expected. Many years ago, J.-B. Grize had surmised an equivalence between natural logic and the kind of argumentation observed in the human sciences (1966, 1974); and a book was later published in America under this peremptory title: *Common sense: the foundations for social science* (Van Holthoon and Olson 1988). The danger in this case is that the distinction between professionals and laymen may eventually be blurred, as the split with science becomes more radical; hence the “snag” indicated on the link between positions 3 and 4 in Fig. 5. The most extreme rejections of the methods of science in some post-modern corners have already produced a number of works in which it is indeed difficult to identify a professional component, other than in rhetorical terms.

This short account of the “2-3-4 cultures” contest is not complete. Other books have been published on the Third culture that are not mentioned in Fig. 5. The reason is that they are only marginally concerned with the fate of the human sciences; their goal is rather to advocate a rapprochement between the two poles of Snow’s early model, Science and Literature, through various forms of mediation (Davy 1961/1978, Serres 1991), or, more abruptly, a transfer to natural scientists of the cultural role hitherto left to scholars in the humanities (Brockman 1995).

Let us go back to archaeology. I noted earlier that it had on the whole kept away from that broad debate. I should now qualify this, since, obviously, the “in between” position fits very well with the post-processual philosophy. The ways of reading the past recommended by Hodder were said to pertain neither to Science nor to Art (1986:x). They consequently belong to a third genre, negatively constituted, even if no reference is made to the current debate on the subject. As a matter of fact, Hodder has now joined in that debate, if unknowingly, through his new formulation of our interpretation processes as “a double hermeneutic” (1993:369). As far as I can make it out, this expression is used in two different senses. It first refers to the customary contrast between “our” terms and “their” terms (*loc. cit.*), indeed basic in hermeneutic (and elsewhere). But some sentences seem to imply that hermeneutic no. 1 (“our terms”) is now identified with the ways of science in general, instead of covering as we would expect the personal or cultural moulds that influence our readings of the past. Thus, “the processual hypotheses-testing approach might work adequately for a single hermeneutic and for the ‘hard’ science aspects of archaeological enquiry” (*loc. cit.*); or again, “the hermeneutic procedure which I think most archaeologists implicitly use... involves searching for data correspondence with a theory which makes coherent sense of as

much of data as possible” (Hodder 1993 : 370). Then follows hermeneutic no. 2: “post-processual archaeologists tend to recognize that even correspondence and coherence are not sufficient in the evaluation of plausible hypotheses. Two other factors are the social usefulness of the theory [as in feminism] and the ‘rhetoric’ used [discursive strategies]” (*loc. cit.*, brackets are mine). I fail to see the need for a reference to hermeneutic in the first case. An interesting feature in this presentation, however, is the drift towards a “first... then...” perspective after the evasive “neither... nor...” of former times. There seems to be little difference between hermeneutic no. 1 (the hypothetical “single hermeneutic”) and the return to rationality and testability exposed in the preceding lecture (Part II) – that is to say, a return to Science, to make it short, in the diagram of Fig. 5. According to the same diagram, hermeneutic no. 2 can only be viewed as a variant of either Literature or Common sense, no other categories or genres being available in that picture. Judging from the prose of post-processual archaeology, and despite the allusions to rhetoric and discursive strategies, the second interpretation is more likely, especially if we keep in mind the meaning of Common Sense in the present context. It is definitely a socio-cultural concept, the word “common” referring to the views shared by members of a given community on the way to look at (interpret, explain) particular objects or phenomena. What seems natural to “them”, in that community, will be regarded as cultural in another: the various works mentioned above on **natural** logic or **common** sense all understand those two adjectives in that relativist perspective, as a matter of course.

Under the pole of Science, on the contrary, we find attempts to reach common viewpoints about certain events on a cross-cultural, if not species-wide basis. Science, in that perspective, is indeed a search for Uncommon Sense, as beautifully told in a recent book that bears this title (Cromer 1993). The danger of the Common Sense position then stands out clearly: interpretive communities that ground their specificity upon common sense “read” things differently (the past, or anything else) and may tend – like the “textual communities” studied by Brian Stock in medieval Europe (1983 : 88–240) – to enter into conflicts that have more to do with power struggles than scientific contests. Post-processual archaeologists like to cite Michel Foucault; they should then acknowledge this last point, since it forms the core of his thoughts on *les sociétés de discours*, discursive societies or sects (Foucault 1971 : 42–3).

I would readily admit that the pole of Literature, which has my preference, is fraught with the same danger. Substituting aesthetical value for empirical validation takes us back to relativist positions; and we all know that success in Literature is partly dependent upon political factors in a broad sense. Yet, it seems to me that the resources of Literature are needed to raise the “interest” of a large public for our historical constructs (especially if we are going to schematize the latter...). The word in quotation marks echoes the post-processual defence of “matters of interest” in

archaeology, besides or beyond “matters of fact” (Wylie 1989). The difference in our respective use of the term is that the kind of interest served by “lively portrayals of what happened in history”, to quote again Isaac (1971: 128), remains within the field of history itself, in contrast with the socio-political interests expressed in the non-literary prose of *Common Sense* – post-processual or other.

To sum up, archaeology today finds itself in the same situation as history, or the human sciences in general, faced with three competing kinds of discourse (Fig. 6a). The favourite proposal at present is the Third Way, defined sometimes in negative terms (neither X nor Y), sometimes as an intermediate course (between X and Y), sometimes as a mixed or synthetical process (both X and Y). In each case, the distinctive features of our reasoning processes are left in the dark, beyond those vague formulae. The logicist programme is an attempt to study those processes in situ, at the microscopic level of analysis described earlier (Part II). What comes out from such studies is, grossly speaking, the coexistence of three kinds of discursive operations: (A) some are amenable to a reformulation as provisional rules of reasoning applicable in specified contexts, subject to revision in the face of counter-evidence; (B) others are merely hypothetical inferences, plausible on the basis of limited observations – both formal and empirical – but calling for further tests against a larger corpus; (C) others still are intuitive leaps of a bolder sort, that by their very nature seem to preclude any kind of refutation. The three sets could be ordered on a continuum, their respective size increasing from A to C. Archaeological constructs would simply cease to exist if they were restricted to the A set; and they would be rather boring if no inroads were allowed into the C set. The apology of Literature in the logicist perspective is rooted in those simple findings, on the understanding that the requirements of Science have to be met first (A and B) to provide the basis for historical reconstructions of a more imaginative sort (C).

Similar views have lately been developed in various sectors of the human sciences (references in Gardin 1991: 36–37, to which I would now add Schama 1991, Rancière 1992 for history, and Gallay 1995 for archaeology). In my contribution to that last book, I tried to clarify the difference between earlier visions of History as Literature and the present trend to dissociate the two genres while insisting upon their complementarity (Gardin 1995b). In other words, the middle position of the human sciences in Fig. 6a does not mean that they have developed a methodology or an epistemology of their own, made up of a fusion or blending of the surrounding genres. It is merely a redrawing of Fig. 5, intended to bring out more vividly their “in between” status, following Lepenies, Passeron and others. Unfortunately, as Goethe said somewhere, what we find between alternative standpoints on any problem is not its solution, but the problem itself...

I therefore prefer the allegory of Fig. 6b: as the wheel of Time turns, and the cognitive revolution (r)evolves, furthering deeper explorations of our thought

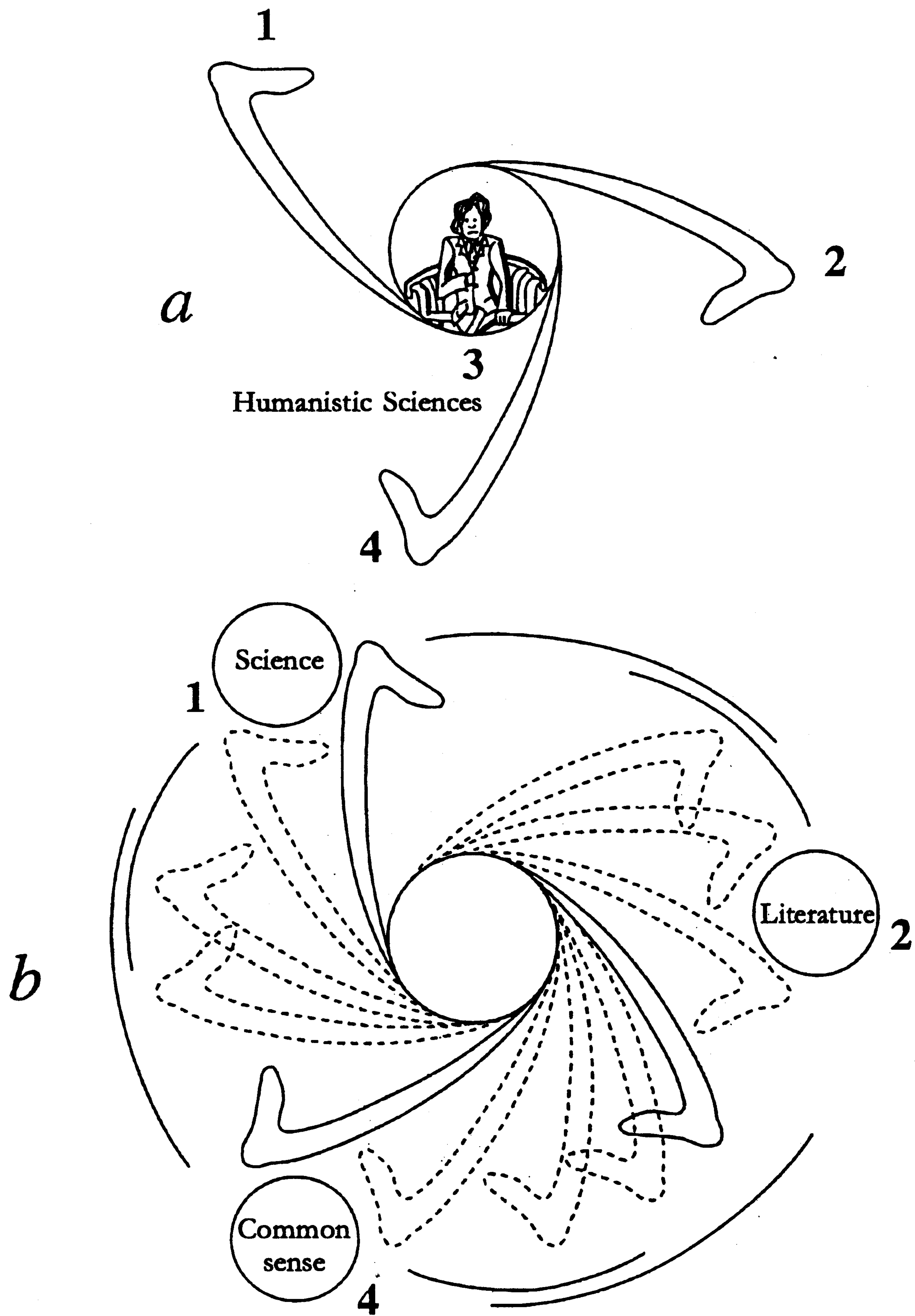


Fig. 6. Another version of Fig. 5: a possible outcome of the Third culture (a) in the course of time (b).  
 Reproduced from Gardin and Borghetti 1995.

processes, we slowly discover that the middle position is emptying itself, a victim of centrifugal forces (Gardin and Borghetti 1995 : 102). We may have eventually to abandon the central position and chose, if regretfully, among the three known ways of talking about wordly matters, human or others.

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## APPENDIX:

### Selected works on the logicist analysis of scholarly texts, its principles and applications in various fields, arranged in chronological order.

1. Gardin, J.-C. 1974. Des sciences du discours au discours de la science. In *Les analyses de discours*, 10–60. Neuchâtel–Paris. Reproduced in *Le calcul et la raison: essais sur la formalisation du discours savant* 95–125. Paris 1991.

[The automatic analysis of meaning: an overview of the methods proposed in various contexts (documentation, content analysis, narratology, literary analysis, *etc.*) and their relation, weak or non-existent, with the sciences of discourse (linguistics, text grammar, semiotics, pragmatics). The goal is to bring out the theoretical relationship between those methods and the formalization of reasoning processes in scholarly texts, and yet the considerable difference observed between the two categories of works].

2. Gardin, J.-C. and M.-S. Lagrange 1975. *Essais d'analyse du discours archéologique*. Notes et Monographies techniques du Centre de Recherches Archéologiques 7. Valbonne–Paris.

[Formal analysis of the reasoning in two articles dealing with the interpretation of a particular monument: a stele found in the city wall of Konya, Anatolia, 13th cent., and an arabo-sassanian coin found in Iran].

3. Lagrange, M.-S. and Ch. Bonnet 1978. *Les chemins de la Memoria: nouvel essai d'analyse du discours archéologique*. Valbonne.

[Analysis of the reasoning processes followed by Ch. Bonnet in reconstructing and interpreting the memoria of La Madeleine, a paleochristian church in Geneva. The goal is to associate the author with the analyst (M.-S. Lagrange) in the search for a schematization of those processes acceptable by both parties].

4. Gardin, J.-C. 1979. *Une archéologie théorique*. Paris. English translation 1980: *Archaeological constructs: an aspect of archaeological theory*. Cambridge–Paris. Russian translation: *Teoreticheskaia arkheologija*. Moscow 1983.

[A general presentation of the logicist analysis of archaeological publications, viewed as “constructs” made up of two components: (a) a semiological component, *i.e.*, the representation of objects in any symbolic system – natural language, information language, scientific or specialized language – in order to constitute the data base of archaeological constructs, descriptive or explanatory; (b) a computing component, *i.e.*, the set of rewrite or inference operations that link those data to the hypotheses or conclusions of explanatory constructs. The homology between schematizations of reasoning processes in those terms and the kind of formalization used in artificial intelligence (expert systems)].

5. Gardin, J.-C., M.-S. Lagrange, J.-M. Martin, J. Molino, and J. Natali 1981. *La logique du plausible: essais d'épistémologie pratique*, 3–91. Paris. (Second revised edition 1987).
- (a) J.-C. Gardin (1987: 27–100).  
[The computational analysis of interpretive processes and its contribution to the progress of a “practical epistemology” in the human sciences].
- (b) M.-S. Lagrange (1987: 221–275).  
[An overview of current research on the systematization of archaeological discourse].
- (c) J. Natali (1987: 103–144).  
[‘Les Chats’, by Baudelaire, and the many interpretations of that poem proposed in the wake of the foundational article published by R. Jakobson and C. Lévi-Strauss in 1962: an analysis of some of them, with an emphasis on the latter. The goal is to bring out the sources of the divergences observed, both in the nature of the data and in the kind of inferences mobilized in the various interpretations].
- (d) J.-M. Martin and J. Molino (1987: 145–220).  
[A linguistic analysis of a subset of La Rochefoucauld’s “Maximes”, aimed at a tentative model of their structure. The perspective is that of generative grammar applied to the original work rather than the schematization of interpretive comments].
6. Gallay, A. 1981. *Le Sarnyéré Dogon: archéologie d'un isolat, Mali*. Paris.  
[Analysis of a corpus of African pottery and its classification. The goal is to propose a system of representation and ordering of the material that might give a formal basis to that classification (or others)].
7. Gardin, J.-C., O. Guillaume, P. Herman, A. Hesnard, M.-S. Lagrange, M. Renaud and E. Zadora-Rio 1987. *Systèmes experts et sciences humaines: le cas de l'archéologie*, Eyrolles, Paris. (English translation: *Artificial intelligence and expert systems: case studies in the knowledge domain of archaeology*. 1988. Chichester).  
[A reminder of the principles of logicism and its relation with artificial intelligence, followed by six case studies illustrating the use of expert systems in different archaeological domains: the Bronze Age in Cyprus (Herman), Central Asia in the Hellenistic period (Gardin, Guillaume), the Mediterranean in Roman times (Hesnard), the Medieval period, Islamic (Lagrange & Renaud) or Christian (Zadora-Rio). Epilogue on the merits and limitations of such studies].
8. Guillaume, O. 1987. *L'analyse des raisonnements en archéologie: le cas de la numismatique gréco-bactrienne et indo-grecque*. Paris. [English version: *Analysis of reasonings in archaeology: the case of Graeco-Bactrian and Indo-Greek numismatics*. Delhi 1990].  
[Analysis of the major studies of Greek and Indo-Greek coins struck in Central Asia after Alexander’s conquest: first, the catalogues published in the 19th and 20th centuries on the larger museum collections of such coins; then, the two most frequently cited books on the history of Greek states in Bactria and India, a history founded for the most part on coins. The goal is to illustrate the logicist approach of those two classes of constructs – “compilations” (catalogues) and “explanations” (historical works) – as well as the kind of lessons that may be drawn therefrom in the perspective of “practical epistemology” (cf. no. 5a)].

9. Francfort, H.-P. 1990. Modélisation des raisonnements interprétatifs en archéologie à l'aide de systèmes experts: conséquences d'une critique des fondements des inférences. In *Interpretation in the humanities: perspectives from artificial intelligence*, R. Ennals and J.-C. Gardin (eds), 101–29. London. Reprinted and revised: The sense of measure in archaeology: an approach to the analysis of proto-urban societies with the aid of an expert system. In *Representations in archaeology*, J.-C. Gardin and C.S. Peebles (eds), 291–314. Bloomington 1992.

[Analysis of recent works on the emergence of proto-state societies in the ancient world and constitution of a knowledge base on the subject (PALAMEDE, with the collaboration of M.-S. Lagrange and M. Renaud). Application of that knowledge base to the interpretation of data pertaining to archaeology (the Bronze age site of Shortughai in Afghanistan) and ethology (animal societies), with the help of an inference engine (SNARK, by J.-P. Laurière). Comments on the outputs]

10. Gardin, J.-C. 1990. L'interprétation dans les humanités: réflexions sur la troisième voie. In *Interpretation in the humanities: perspectives from artificial intelligence*, R. Ennals and J.C. Gardin (eds), 22–59. London. Reprinted in *Le calcul et la raison: essais sur la formalisation du discours savant*, 237–54. Paris 1991.

[The modes of reasoning in the human sciences are often said to be distinctive of an “in between” position, differently described: between Science and Literature for some (e.g., Lepenies), or between Science and Common sense for others (e.g., Passeron). The logicist analysis of scholarly constructs shows that it is difficult to give a positive characterization of that “Third way” in operational terms, beyond the usual definitions of the “neither this nor that” sort].

11. Stoczkowski, W. 1991. *Origine de l'homme: entre l'anthropologie naïve et savante*. Doctoral thesis, Ecole des Hautes Etudes en Sciences Sociales, Paris.

[Analysis of many theories on the origins of man, from ancient times to our days, and schematizations of the underlying arguments. The goal is to bring out the relationship between “naïve” and “scholarly” constructs on the subject. A reader-friendly version of that thesis has been published in *Anthropologie naïve, anthropologie savante: de l'origine de l'homme, de l'imagination et des idées reçues*, Editions du CNRS, Paris 1994].

12. Ravoux Rallo, E. 1993. *Méthodes de critique littéraire*. Paris.

[Analysis of a number of literary studies, in the logicist perspective, with an explication of the underlying presuppositions. The goal is to provide students with a handbook of current interpretations of literary works, with comments on their mechanisms and foundations].

13. Evrard, E. 1995. Horace, C.I, 11. *Les Etudes Classiques* 63 : 23–37.

[Logicist analysis of Horace's famed poem *Carpe diem* – Ode I, 11 – leading to a new reading of the text].

14. Gardin, J.-C. and M. Borghetti 1995. *L'architettura dei testi storiografici*. Bologna.

[The logicist analysis of historical constructs, with possible developments in artificial intelligence; the criticisms raised against that programme and their refutation (Gardin). Example of an application bearing on an article published by P. Bairoch in *Annales E.S.C.* (1973), about the origins of the Industrial Revolution in England (Borghetti)].