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Introduction

An increasing interest in the history of archaeological research has been observed in many countries. This phenomenon is a manifestation of the growing methodological awareness amongst archaeologists in general and recognition that such insight can yield valuable perspectives on research carried out in our own time. However, in spite of the appearance of general surveys and many special studies, the history of archaeology remains a neglected field of research. Many important problems still await treatment, not least those concerning questions of methodology in early work on prehistory.

In 1974 I published in Swedish a book entitled *Relative Dating: Chronological Methods in Scandinavian Archaeology*[1] in which I made an analysis of the structure and dating premisses of the non-scientific chronological methods used in archaeology.[2] In my opinion, these aspects cannot be ignored in a study of the emergence of the chronological methods and will be referred to in chapter 2, *The conceptual framework*. However, the book also included a study of the development of chronology in Scandinavian archaeology during the nineteenth century which is presented here in a largely revised form.

I have not produced an all-inclusive history of archaeological research in the Nordic area. For a general survey, reference may be made to Ole Klindt-Jensen's book *A History of Scandinavian Archaeology* (1975).[3] My aim is primarily to illustrate a more limited but all the more important aspect, namely the gradual growth and development of the chronological systems and methods during the nineteenth century, from the emergence of C. J. Thomsen's Three-Age System up to the completion of Montelius' Bronze Age chronology in 1885.

Owing to favourable circumstances, archaeological research in Scandinavia was, for a large part of the nineteenth century, methodologically in advance of its time. This applies especially to chronological research. In judging the contribution made by Scandinavian archaeology in this field, emphasis has, first and foremost, been placed on the development of the typological method. Without doubt, the emergence of typology as a dating method has greatly influenced archaeology as a whole, in a positive as well as a negative sense. In this book I will try to explain that the development of this concept and method was preceded by and closely connected with the construction of a chronological framework primarily through the evidence provided by the finds.

In my opinion, the most important contribution of Scandinavian archaeology to the development of chronological methods was not typology as a means of dating, but the early understanding of careful observations of the find contexts in combination with the development of a closer type analysis and type classification. The gradual refinement of

the chronological analysis of find observations was by far the most important achievement: the very basis of the development of archaeology from a speculative antiquarianism to a sound science. This elementary stage of archaeology during the first half and the middle of the nineteenth century was the basic premiss not only for the realization of the potentials of typology as an independent method of dating, but also for modern chronology, including physical dating methods. It seems that this fact has been too much obscured in most writings on the history of archaeology.

During the nineteenth century Scandinavian archaeology exerted a significant and growing influence on European antiquarianism and archaeological work. This was made possible not least by an informal system of contacts, communication by letter and personal meetings on journeys. From the middle of the century the academic communication system was gradually extended, primarily by the establishment of international congresses and symposia. Although printed literature is a natural medium for the diffusion of scientific ideas, the number of works by Scandinavian archaeologists available to an international public in translation was strikingly low. European colleagues simply could not read most of the work written by Scandinavian archaeologists in the nineteenth century. Even today, most modern reviews of archaeological history present brief glimpses only of the development of Scandinavian archaeology during this period. The few translations which were produced usually contained general, summarized surveys. Printed congress reports mainly presented results but rarely described how the result was achieved. Primary research reports were virtually never published in foreign languages. Although the non-Scandinavian reader could gain an idea of the level of knowledge in Scandinavian research and of current explanation models, these translated studies afforded limited insight into the analytical methods in Scandinavian archaeology, unless you were very observant. In this connection the considerable time-lag of publication in foreign languages must also be mentioned. The publication of C. J. Thomsen's famous *Guide to Northern Archaeology* took a long time even in Danish, and it did not appear in English until 13 years later. Worsaae's *Primeval Antiquities* was published six years after the original publication and Nilsson's *Primitive Inhabitants* after 25 years.

It may be stating the obvious that all research is a product of its own period and that every researcher bases his work on and progresses from the experience and knowledge of his predecessor. Nevertheless, this is an aspect we tend to ignore when we assess our own research; above all, this attitude often reflects a lack of understanding for the scientific conditions under which the archaeologists of previous generations worked. We have no right to pass judgment on a scientific achievement without relating it to the situation of its own time.

Today chronological work plays an insignificant role in archaeological research. Problems more directly associated with the real aims of archaeology are favoured instead. This is a great step forward, but many modern archaeologists have, as a consequence, almost completely lost the ability to execute a sophisticated chronological analysis on purely archaeological grounds. It is also easy to forget that the chronological work of the scholars of earlier generations forms the platform without which archaeology could not have developed into a real social and humanistic science. What is more,

the chronological arrangement of the archaeological material which we now take for granted is not very old. The early antiquarians were not able to draw correct historical conclusions because of a lack of chronological facts. Therefore, the most important task of the early archaeologists was to create, from an original chaos, a reliable chronological division of the archaeological sources. For them, dating was a necessity, never an end in itself. This latter phenomenon belongs mainly to the first half of the twentieth century.

It is true that our chronological knowledge has been increased and differentiated since the last century, but seldom because of revisions which have radically transformed the old systems. In the main, it has been a slow and gradual process of consolidation, in which further fine graduations and adjustments have been made within existing frameworks. The chronological systems which were constructed for the metal ages in Scandinavia during the nineteenth century form the skeleton of those still in use today. This is especially valid for the Bronze Age. No other major chronological work in the whole of the archaeological literature has lasted as well as Oscar Montelius' *Dating in the Bronze Age* (1885).[4] For a century Montelius' detailed chronology of the Scandinavian Bronze Age has been confirmed by new finds. On the whole, this is also the case with the Iron Age chronology. The results were not fixed with the same precision and certainty, but, broadly speaking, the chronological groundwork for the Iron Age was completed with the publication in 1895–7 of Montelius' book *The Chronology of the Scandinavian Iron Age*.[5]

It seems essential that modern archaeologists who use these chronological systems almost every day or insert new material into them should have some knowledge of how they were originally formed. Discussions of theoretical methodology are sometimes also fuelled by hazy ideas about the development of the dating methods. Therefore, greater enlightenment regarding the development of the dating methods and the chronological systems may increase our understanding of questions of chronological method.

One basic point in such an investigation is to try to distinguish the relative contributions made by the different dating methods. How significant were the observations based on the find circumstances? What part was played by pure evolutionary typology? How important were the historical records for the chronological division? How were absolute dates achieved and what was the relationship between relative and absolute dating? The concept of typology has always occupied a central position in discussions of chronological method. It therefore seems justifiable to try to ascertain how the method developed and how the scholars who introduced typology as a means of relative dating applied the method themselves and what meaning they attached to the concept.

However, even if we can, in theory, demarcate evolutionary typology from, for instance, the find combination method, these two methods share certain basic elements which may make it difficult to distinguish between them in practical work. This is because every dating method, whatever its starting-point, includes an element of analogy, without which no results of universal validity can be achieved. It may therefore be hard to define the proportions of the various dating premisses in the chronological argumentation, especially in the case of early research literature with its inadequate reports.

The main source for an investigation of this kind is scientific literature which presents the information directly or indirectly. One problem is that in the early literature different operations, such as the reporting of the material or the analysis and presentation of results, are often inseparably interwoven. It was (and still is) fairly common for chronological results to be presented in the form of complete period divisions, chronological sequences or typological series without the methodological procedures being explained. In such cases, it may be difficult or even impossible to shed full light on the methods actually used to carry out the chronological analysis. However, it would seem possible to follow the developments in their essential features.

Another source of information consists of statements by various archaeologists of methodological principles, whether they are concerned with concrete examples or are of a general nature. However, this material requires critical scrutiny and cautious use. Some scholars' accounts of their procedures obviously conflict with the results yielded by an analysis of their works. Such information requires the verification of independent sources in order to be accepted as evidence. The material also includes unprinted preparatory works, correspondence, autobiographical material, contemporary biographical notices, etc.

If we consider the immense advances which were made in archaeological research during the nineteenth century and its considerable volume, the extremely small number of active scholars who carried out the work is striking. It would seem to be the reason why methodological improvements made in respect of a particular period of time were, as a rule, rapidly put into general circulation: archaeologists were few and productive and the leading archaeologists did not specialize to any great extent, but worked over the whole chronological scale and the entire archaeological field.

NOTES

1 Gräslund 1974.
2 Gräslund 1976a and 1976b.
3 Klindt-Jensen 1975. Cf. Kristiansen 1978.
4 Montelius 1885a.
5 Montelius 1895–7.

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The conceptual framework

The traditional, often routinely employed, terminology for chronological method has proved to be inadequate as a means of analysing chronological arguments. I have therefore prepared a special conceptual apparatus, which I shall briefly present below. I have found it useful in analysing the chronological works of the nineteenth century.[1] In addition, an analytical instrument of this kind may also help to identify methods and appraise them. This is not entirely unimportant, as many archaeologists are innocent when it comes to understanding the basic premisses of the dating methods they use. To avoid disturbing readers who are not over-fond of conceptual discussions it has, however, been given a rather obscure place in the book as a whole. Needless to say, this book deals only with purely archaeological, non-scientific dating methods.

As a starting-point, I wish to call attention to the use of the term *typology*. It is seldom clear what archaeologists mean precisely by this term, and there is no unambiguous definition which one can claim to be generally accepted. Typology is, especially in Scandinavia, used to mean an evolutionistic *gradation of types* according to similarity, but typology is also used to denote the process of *type classification*. But the term typology is also used to denote the *result* of either of these procedures or *any classification* whatever the method behind it.[2] In short, typology is used to stand for practically every conceivable analysis of similarities and classification.

A term with such an extensive meaning is unusable as an analytical instrument. A clear demarcation between basic methods and procedures within methods seems necessary. The fact that chronological research in practice often consists of a complicated interaction between different kinds of analogies calls for a differentiation of the terminology. In order to understand the distinctions between them, the basic procedures then have to be analysed in their purest form.

Conceptual basis

The first prerequisite is to distinguish between the *grouping* and the *grading* dating procedures.

As archaeological dating often is a complicated process, the terminology should have a certain amount of flexibility. The present terminology has therefore been adapted to two main, independent principles of classification, based on different chronological premisses.

The two poles consist of

(a) *type analogy* based on the comparison of the *physical properties* of the artefacts, and

(b) *find analogy* based on the *spatial relations* of the artefacts.

Furthermore, it is necessary to have a conceptual instrument which describes the different stages in all conceivable dating methods. For the purposes of structuring, I have chosen the following main concepts for all grouping methods:

(a) Type-forming analogy
(b) Horizoning type-analogy
(c) Contrasting type analogy

These terms and concepts together serve as an instrument for giving a general description of the operations associated with the basic, chronological methods. At the same time, they tell us something about the product which they have resulted in.

Grouping type-analogy

The grouping dating procedures can thus be roughly differentiated in the following three groups.

(a) *Type-forming analogy*. The procedure of bringing together artefacts or other units to form types on the basis of comparisons with regard to similarity and dissimilarity. Whether pronounced or not, type affinity is considered to often reflect chronological affinity. Type formation is the primary and fundamental stage in *all* general, chronological analyses.
(b) Horizoning type-analogy simply means a more systematic kind of type formation than the former, which produces a type with a certain quantitative range, so that it is regarded as a type horizon and a time horizon.
(c) *Contrasting type-analogy* means the contrasting of types and type horizons on the basis of dissimilarity and concluding from this that they are *not* contemporaneous.

(a), (b) and (c) together represent the *grouping type-analogy*. They represent chiefly differences of degree. Thus, the contrasting procedure presupposes the occurrence of at least two different type horizons, and the horizoning procedure in its turn involves a quantitative widening or systematization of the type-forming procedure. The collective term grouping type-analogy expresses the chronological premiss of all three procedures – the bringing together of artefacts to form types and type groups. Thus, grouping type-analogy includes all forms of archaeological classification and, consequently, all kinds of archaeological dating.

Grading type-analogy

This means the procedure of arranging artefacts, chiefly types, according to their degrees of similarity and dissimilarity, in what is assumed to be a causally coherent sequence, which is interpreted as an unbroken, chronological order. The grading type-analogy is always preceded by an element of grouping type-analogy.

Grading type-analogy comprises typology in the sense of the classical, Scandinavian, development typology. It includes related procedures, such as the seriation of types unsupported by collective finds, i.e. development seriation or form seriation. It

embraces this concept as a whole, irrespective of whether or not premisses in the form of development theories or the like are referred to and irrespective of how simple or complicated the operations are.

The find-combination method

The term find-combination method should, properly, have been 'find-analogy method'. However, 'find-combination method' is strongly entrenched in Nordic archaeology and, as there is no real disagreement as to its meaning, there is no reason to abandon it.

I here give the concept find combination a relatively broad meaning, not confined only to closed finds in the form of grave or depot finds. Every find which is *used* as a chronological unit is counted as a find combination, irrespective of how wide its chronological span is. It is usual to distinguish between two kinds of collective finds – closed finds and accumulated finds.

A *closed find* is interpreted as having come into existence on one and the same occasion. Thus, in a closed find the artefacts are assumed to have been deposited absolutely simultaneously. Closed finds are chiefly grave finds, but sacrificial and depot finds and hoards may also be closed finds.

An *accumulated find* has been formed by accumulation over varying periods of time and has some common, spatial framework. Thus, the chronological affinity within an accumulated find is not contemporaneous in the strict sense but a relative chronological affinity. Here we are concerned chiefly with settlement finds and other gradually accumulated finds, for example, many sacrificial finds and stratigraphically demarcated units within these finds.

A dwelling-site, for example, may be reckoned as a find combination in a chronological sense, regardless of what its chronological span may be. This question is decided entirely by the purpose of the investigation and of the nature of the source material. Finds originating from periods and societies in which cultural changes took place at a

A + B + C D + E + F G + H + J

Fig. 1. Three finds with different type contexts. A *single* series like this proves very little from a chronological point of view.

A + B + C D + E + F G + H + J
A + B + C D + E + F G + H + J
A + B + C D + E + F G + H + J
A + B + C D + E + F G + H + J
A + B + C D + E + F G + H + J

Fig. 2. Groups of finds with different type contexts. Archaeological types are seldom completely arbitrary but reflect some common norms in prehistoric society (stylistic, functional, social, etc.). As prehistoric types were generally produced over a certain period of time many closed finds contain artefacts of about the same types, which are from the same 'periods'. Repeated finds of this kind help to establish type and find horizons, but they cannot without additional information be used to create chronological sequences.

slow rate naturally allow us to assume a greater chronological span in the finds than those in which development proceeded more rapidly. In other words, the question of the find-combination concepts is also the question of whether a find is used as a find combination or not.

In order that the chronological affinity of a find may be used for chronological purposes and brought out onto a wider plane, a comparison must be made between artefacts in the find and other artefacts. In other words, a type analysis must be carried out in accordance with the grouping-type-analogy procedure.

Owing to the fact that archaeological types always have a certain, varying period of manufacture and use, the closed finds will often consist of types of somewhat different ages. In many of the closed finds, some or all of the artefacts may have been used for varying periods before they were buried together. Such a find thus links together types of different ages, making it possible to arrange them in continuous, vertical time-scales, i.e. in a relative-chronological system, according to the chain-link principle. This possibility would be very limited if every find contained artefacts used for exactly the same period of time. What is needed is an adequate number of finds with chronologically slightly mixed contents, so that groups of finds which, through a grouping type-analogy, have been brought together to time horizons can be linked together in vertical order. Consequently, the limiting weakness of the find-combination method, the inner time-span of finds, is at the same time the foundation and prerequisite of the method. In my experience, many archaeologists, including experienced and skilful chronologists, lack a clear understanding of this fundamental fact.

A sort of chain-link procedure is also used to establish contemporary find horizons. If the investigation is extended to geographically separate, cultural regions, this procedure is often called *cross-dating*.

The following combination procedures can thus be distinguished.

1 *Horizoning, combination method*. The method of bringing out the finds' special chronological affinity, in order to establish time horizons of artefact and find types, with the aid of horizoning type-analogy.
2 *Contrasting, combination method*. The method of bringing about, with the aid of contrasting type-analogy, the chronological content of the find, in order to establish distinctly separate, time horizons of artefact types and find types.

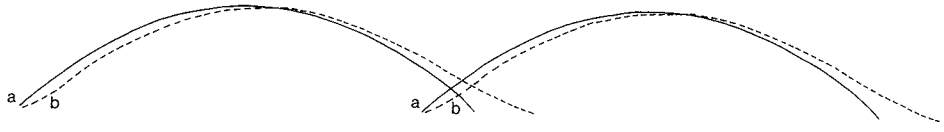

Fig. 3. Schematic curves showing, (a) the production, (b) the consumption of two subsequent types. Utility goods generally had a short life-span. Therefore, the majority of the artefacts of this kind were deposited within the time of production. However, a minor number was always in circulation *after* production had ceased. In addition, the production of one type may also have begun before the production of the preceding type had ended. All this creates opportunities for the appearance of chronologically 'mixed' finds, containing types characteristic of two adjacent 'periods'. Such finds may complicate find combination dating, but they are, at the same time, the main instrument for linking together type horizons into relative chronological sequences (see also fig. 5).

The horizoning and contrasting procedures together form the *grouping combination method*.

3 *Grading combination method*. The procedure of arranging types, on the basis of the different ages of the artefacts within the finds and with the aid of the grouping type-analogy, in continuous time sequence in accordance with the chain-link principle. As for the type-analogy method, distinct and sharp boundaries cannot, as a rule, be drawn in practical work between the horizoning and contrasting stages.

Summary

The terms and concepts for the procedures discussed above can be summarized as follows:

Type-analogy procedure	*Find-combination procedure*
Type-forming analogy (type classification)	
Grouping analogy	Grouping, combination method
(a) Horizoning	(a) Horizoning
(b) Contrasting	(b) Contrasting
Grading analogy	Grading, combination method

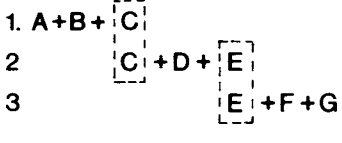

Fig. 4. Three different find combinations connected by artefact types C and E. A *single* series of this kind does not tell us whether this is a chronological sequence from A/B to F/G or whether all the artefacts from A to G are contemporary. Cf. fig. 5.

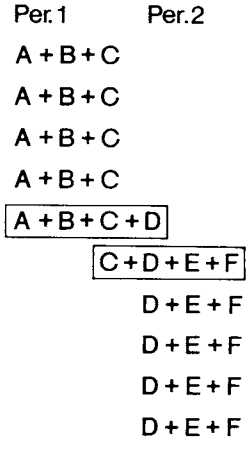

Fig. 5. Most find combinations reflect a type of time stabilisation, they are within a 'period'. However, there is, as a rule, a sufficient number of chronologically mixed finds from the transition between the periods (fig. 3) to make a link between the horizons possible. In contrast to the case in fig. 4, the number of finds makes it clear that this is a chronological sequence.

Stratigraphy

Stratigraphic dating is based on the fact that artefacts or other archaeological units have been deposited on top of each other, proving that the uppermost artefacts were deposited later than the underlying ones. On the other hand, the stratification seldom tells us about the span of time involved. Thus, the time difference within a specific layer may well be greater than that between two distinct, adjacent layers.

While the find combination may tell us that the artefacts are absolutely contemporaneous as regards the date when they were deposited, the stratigraphical relation is the opposite. The stratification indicates non-contemporaneousness as regards deposition. The stratification has yet another chronological characteristic: it indicates in principle the chronological *direction* of the units concerned.

It is essential to make these distinctions between stratigraphy and the find-combination method, precisely because the methods are in practice often so intimately interwoven. For, if there are separate layers, either natural or metric, there are also find units which correspond to the concept of find combination. In interpreting and using separate, accumulated layers as chronological *units*, we are also operating in the sphere of the combination method, irrespective of how long a time span the layers represent. This is also what generally happens in archaeological work. We are then faced with a chronological procedure which might be called combination stratigraphy. Stratigraphy in its pure form is in fact a much rarer phenomenon than combination stratigraphy.

In other words, combination stratigraphy makes use in principle of *three* dating components: (1) the absolute non-contemporaneousness of the stratification of the deposition, (2) the information about the *chronological direction*, and (3) the absolute or relative, *chronological affinity* of the find combination.

Stratigraphy is, of course, applied with the aid of type analogy. The chronological value of stratification is therefore also conditioned by the type properties of the artefacts, and is proportional to the degree of type definability of the artefacts.

Thus, all stratigraphy is *directive* as regards chronology. In its pure form, it is *contrasting*. Combination stratigraphy occurs in *contrasting and grading* forms.

Quantitative methods

A detailed conceptual apparatus for the quantitative methods of dating may be left out of consideration here, as these methods largely belong to a later phase of archaeological development than that described in this book.[3] They have been applied particularly to accumulated finds but may, of course, also be applied to closed finds. The basis is the observation of which types which *occur* and *not occur* and *how often* they are found together. We accordingly note the *occurrence and non-occurrence* of the types in the finds, and the *number* of finds in which they are combined with each other. This kind of find-combination analysis involves making an external comparison of the types. It is a complete counterpart to the classical, combination method applied to closed finds, as reflected, for example, in Montelius' Bronze Age chronology of 1885[4] and Flinders Petrie's sequence dating of Predynastic, Egyptian grave material.[5]