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STATISTICS AND GRAPHS IN THE STUDY OF PREHISTORIC INDUSTRIES

VIII. *A Method for the Study of Potsherds*

When excavating a settlement great masses of potsherds are usually found. If we want to examine these potsherds thoroughly we will have to make use of statistical methods. So far such a method has not yet been used with potsherds. Consequently when studying the material of the Danubian settlement at Geleen in 1957 I had to invent one myself. I started from my experiences with statistical methods for the study of great quantities of flints from Palaeolithic and Mesolithic settlements. In this initial stage only simple descriptive statistics are used in which the visual judgment of histograms is of great importance. The future will show whether statistics further elaborated by means of various mathematical values e.g. mode, median, mean deviation, standard deviation and variance will be of practical use.

Besides Neolithic Danubian material (fig. 9) an entirely different material dating from the Iron Age of the Frisian 'terpen' was used (fig. 10). This material is in the collection of the Frisian Museum at Leeuwarden.

The material of these two cultures was specially chosen because they widely differ both typologically and in space and time and because both clearly show an ornamentation.

The diagrams referring to them have been divided into two sections. The section above the black horizontal line shows only the ornamentation. To this end all potsherds (even rimless fragments) showing a more or less distinct ornamentation were used. Below the black line the measures have been mentioned. For this purpose only rimfragments have been used.

The most important ornamental units have been numbered on the diagram and these numbers appear again before the histogram referring to it. For this histogram the percentage of the various ornamental units was calculated and rendered in such a manner that one small square (1.4 mm × 1.4 mm) represents 5%. The total numbers of the potsherds measured have been mentioned in the right hand bottom corner of each histogram.

The separate typometrical histograms below the black line have been made in

a similar way. The measurements themselves have been put together in groups of which the values have been indicated. The number in the right hand bottom corner of each histogram indicates again the number of the measured potsherds.

The types of ornamentation had to be drawn up separately for the two different cultures; the measurements, on the other hand, may be used almost unaltered for each culture.

The question may arise how we have arrived at the measures given here. This can be easily explained. The number of excavated pots, either whole or to be reconstructed is so small that statistics cannot be based upon them. Consequently, in practice, the most important measures of a pot, e.g. the diameter near rim, neck, belly and foot and the distances between these diameters, cannot be obtained in sufficient numbers.

For this reason it was necessary to use only the measures of the potsherds. In addition to potsherds with ornament, rimsherds were used. If this sherd is large enough, the diameter of the rim (D_1) may be determined with the help of a diagram on which e.g. at every half centimeter concentric circles have been drawn (see fig 6). Occasionally the potsherd is so large that even the diameter of the belly (D_2) may be measured. Mostly, however, the potsherd is too small for the D_2 to be determined. Frequently in this case it is still possible to measure the angle R (see fig. 7).

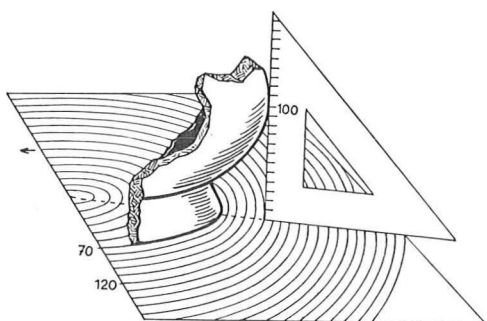


Fig. 6.
Method of measuring the diameter of the rim (D_1), of the belly (D_2) and of D_1/D_2 .

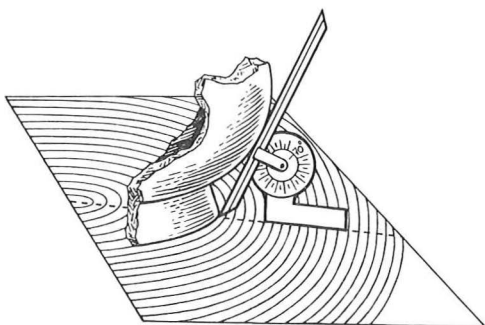
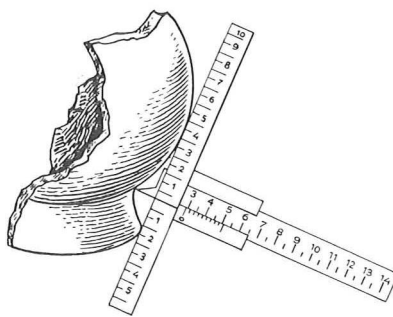


Fig. 7.
Method of measuring the rim angle (R).

Fig. 8.
Method of measuring T, A and B.



If, however, even the rim sherd is too small for D_1 to be determined, then it is often still possible to determine the distance $A + B$ (see fig. 8 and 9) and at the same time the depth of the neck ('I') and the separate measures A and B. These measures are also obtainable if the neck is not marked off distinctly from the rest. Only the deepest point is determined. If, on the other hand, the neck is distinctly marked, then the height of the neck (H) may be determined as well. Naturally it would be far more elegant to measure the diameter of the neck, but to do this from a potsherd is practically impossible. With the help of T and A and B (and if possible H) we are still able to ascertain something about the shape of the neck. This holds good also in case we are unable to measure diameters. With the help of the angle R we are nevertheless able to say something as to the bulge of the pot.

Given a certain D_1 , D_2 and D_1/D_2 there is a certain relation to R. It may easily be imagined, however, that there are several values of R imaginable with the same D_1 , D_2 and D_1/D_2 and also several measures of T with the same D_1 , D_2 , D_1/D_2 and H.

It must be determined experimentally for each of the measures how important they are for certain groups of find-spots and which of the measures have to be maintained.

The shape of the rim (with facets, with one surface, thick or thin, curved, straight etc.) is sometimes also of importance and was used by us to differentiate the 'strep-band'-pottery. This shape, as so many other features, may always be inserted into the histogram as a special feature.

Generally speaking it should be noticed that this method is 'open', new elements and measures may always be added.

Within the scope of this publication, which merely wishes to suggest a method for a statistical study of potsherds, a description of the pottery of the two cultures mentioned cannot be inserted. We refer to the literature in question¹.

¹ H. T. Waterbolk, *Offa* 19, 1962, pp. 9-46.

P. J. R. Modderman en H. T. Waterbolk, *Palaeohistoria* 6-7, 1960.

As to the Iron Age material I have made use of the following typology employed by H. T. Waterbolck.

Streepband II (with faceted rimprofile SB II)	}	200-0 B.C.
Streepband I (with plainer rimprofile SB I)		
Ruinen - Wommels III <i>b</i> (ornament 4-9; so-called Frisian geometrical RW III <i>b</i>)	}	300-200 B.C.
Ruinen - Wommels III <i>a</i> (ornament 1-3; so-called Frisian geometrical RW III <i>a</i>)		
Ruinen - Wommels I and II (RW I and RW II)		300-500 B.C.

From the diagram of these groups the following conclusions may be drawn:

1. The number of grooves at the rim increases from RW I and II towards RW III.
2. The number of 2 and more shoulder grooves increases from RW I and II, via RW III*a* and RW III*b* towards SB I and then decreases slightly in SB II.
3. D_1-D_2 becomes smaller from RW I and II via RW III*a* and RW III*b* towards SB I. At SB II, however, D_1-D_2 increases again.
4. The angle R decreases from RW III towards SB I.
5. The depth of the neck (T) decreases from RW I and II via RW III*a* and RW III*b* towards SB I to increase again towards SB II.
6. A decreases from RW I and II via RW III*a* and RW III*b* towards SB I to increase again slightly towards SB II.
7. $A + B$ decreases from RW I and II via RW III*a*, RW III*b* towards SB I to increase again towards SB II.
8. The height of the neck (H) decreases from RW I and II via RW III*a* and RW III*b* towards SB I to increase again towards SB II.

In nearly all of the eight features mentioned, which are largely independent of one another, a similar development from older to younger may be found. In six cases, however, a slight reversion from SB I to SB II appears. It seems to me that the finding of a largely parallel development of facts fully justifies the application of this method.

A further, more exact elaboration will only arise when we shall have the disposal of the material of the stratigraphically excavated 'terp' of Tritsum. Then it will be possible to draw up histograms for the various stratigraphical levels and to determine accurately the development of groups of types with their ornamentation and their measures.

To give an impression of such a diagram we present the complete RW III mate-

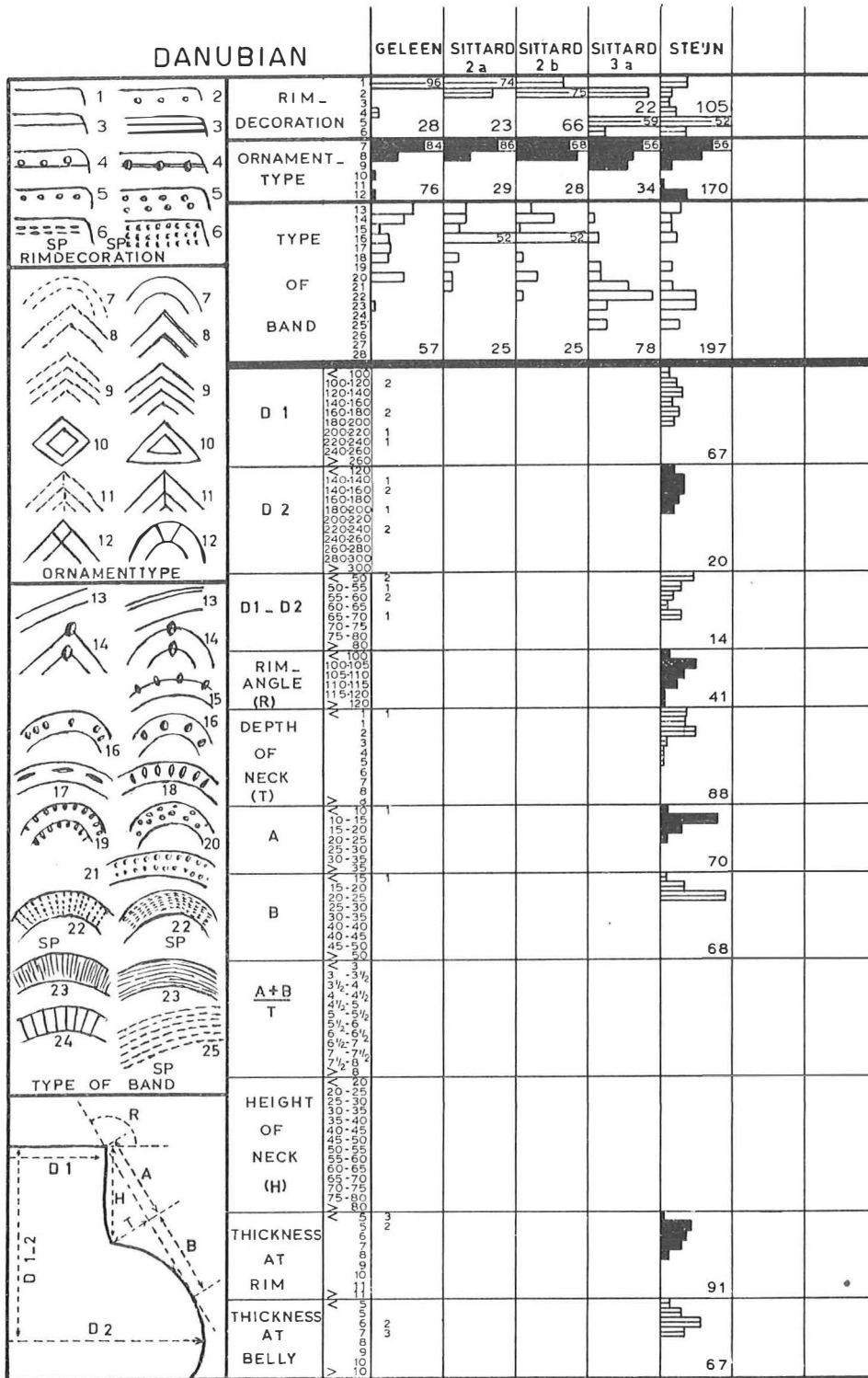


Fig. 9. Histograms of potsherds of some Bandkeramik sites in the Netherlands.

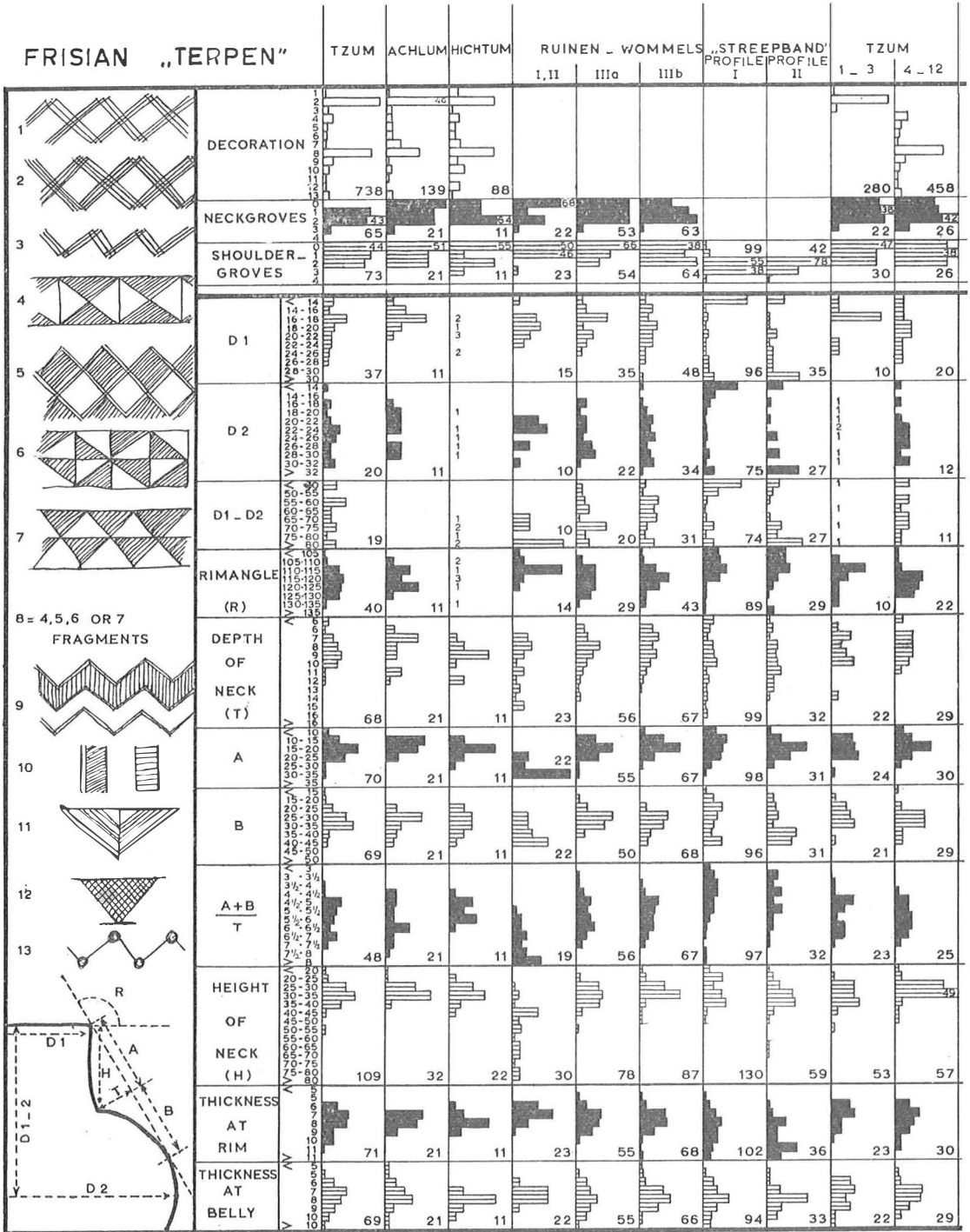


Fig. 10. Histograms of potsherds of some Frisian 'terpen' in the Netherlands.

rial of the 'terpen' of Tzum, Achlum and Hichtum. It is, however, impossible to draw conclusions from this, because this material per 'terp' is too heterogeneous.

The diagram of the Danubian links up with the statistics of the potsherds of the same find-spots published in *Palaeohistoria* VI–VII. The potsherds of the collections of Geleen and Sittard were too fragmentary to lend themselves to measuring. Only the types of ornament of these find-spots have been counted. They have been subdivided into three groups. For this purpose the percentages have been calculated separately. These three groups are: 1. ornamentation of the rim; 2. the general type of ornament on the belly of the pot, and 3. the type of the bands and the groups of grooves or groups of impressions covering the pot. In the legenda to the table *sp.* stands for spatula impressions. The separate ornament often appearing between the bigger groups of ornament of the bands have been left out. Through this subdivision and simplification it is possible to present a not too intricate and yet exact objective statistic of this motif pattern, which is so very difficult to describe.

Only from Stein was there in the collection a number of considerably large potsherds that permitted measurement according to the same principle as that applied to the potsherds from the Iron Age of the Frisian 'terpen'. When we compare the measures of these two groups we see how very different they are.

By way of example *D 1* of the Danubian begins with 100° and *D 1* of the Iron Age with 140° , and the rim angle of the Bandkeramik with 100° and that of the Iron Age with 105° . For every large culture special groups of ornaments will have to be chosen.

When we compare the histograms of the indicated levels and findspots in the South of the province of Limburg we see that they clearly differ as regards the deeper and higher levels. Geleen shows typologically the oldest phase with hardly any rim ornamentation. Sittard *2a* and *2b* have sometimes no rim ornamentation, sometimes the ornamentation of type 2, Sittard *2a* having more often type 1 and less often type 2, and Sittard *2b* having less often type 1 and more often type 2. At Sittard *3a* all rims are decorated, and ornamentations of type 5 and 6 also occur. Stein, which is mixed, but which also shows the youngest combination, has all types of rim ornamentation.

The ornament types found at Geleen and at Sittard *2a* and *2b* are mainly 7 and 8.

At Sittard *2b* 8 is more frequent; at Sittard *3a* and in Stein 9 also occurs. Besides, we find at Stein types 11 and 12.

Of the band-type we find the simple types 13 and 14 at Geleen mainly; 13 becomes less frequent towards *3a*. At Stein it turns up for a moment, probably caused by older influences. Type 16 occurs very frequently in Sittard *2a* and *2b*. Type 18 occurs less frequently as one goes from older to younger finds. Types 19, 22, 23 and 25 are almost exclusively represented in the youngest phase.

A more or less clear development from old to young or vice versa we find in the histograms for the types 1, 7, 8, 12, and 18. Further, among the younger groups we only find the types 5, 6, 9, 11, 12, 19, 22, 23, and 25.

For the Danubian this method gives very quickly an insight into the development of the ornament in a certain region and it also gives a number of indications of possible mixtures, as appears from the above.

One may work upon the same principle if one wants to study statistically the potsherds of find-spots of other cultures. The Funnel Beaker culture for example, lends itself admirably to this purpose, as a preliminary study has shown. The potsherds of very young, medieval groups as the 'kogelpot'-group also lend themselves to a quick and exact description and comparison.

Finally I would like to express my thanks to Prof. Dr. H. Tj. Waterbolk, who made me familiar with the Iron Age material of Friesland; to Dr. J. Wassenberg and G. Elzinga, who kindly put at my disposal the material of the Frisian Museum; to Dr. Beckers at Beek who gave me the opportunity to study his collection; to J. de Vries who assisted me in devising the various instruments and in measuring a part of the Frisian material and of the material from Stein; and to Dr. J. J. Butler who translated the manuscript.