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TWO USEFUL PARAMETERS FOR POTTERY RESEARCH

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Introduction

Since the need to quantify large assemblages has been generally accepted, several measures of the quanitity of pottery have been proposed. The most common are weight, vessel-equivalents, vessels represented, with surface area and displacement volume being less frequent suggestions. Attempts have been made to assess the relative merits of different measures (Glover 1972: 92 6; Hinton 1977; Millet 1980; Orton 1975; 1982), but with the widely differing uses to which pottery statistics can be put, and the varying degrees of emotional attachment to chosen measures shown by archaeologists, a concensus is slow to emerge. Indeed, it is sometimes recommended that the pottery researcher should quantify pottery by more than one measure, in order to satisfy the needs of others as well as their own (Young 1980: 5; Blake & Davey 1983).

Given that many archives will contain information on pottery quantified by more than one measure, it seems possible that extra information can be obtained, at relatively little extra cost, by comparing two or more measures. There is really nothing new in this. For example, Solheim (1960) used comparison of weight and sherd count, average weight of a sherd, to derive information about the nature of the stratigraphy at two sites. A more recent example is the work of Bradley and Fulford (1980).

The aims of this paper are to present two slightly less obvious parameters, which are not new but are newly-christened: brokenness and completeness. To examine some of their properties and to present a case-study in which they made a significant contribution to the understanding of a site.

Assessment of brokennes and completeness

The brokenness of an assemblage, which is defined as the ratio of sherd count to vessel equivalent, that is the average number of sherds into which each pot in the assemblage has been broken, even though not all of those sherds form part of the assemblage. As a rule, it cannot be measured directly but must be estimated since, except under very unusual circumstances, vessel-equivalents cannot be measured directly, but must be estimated as EVEs (estimated vesssel-equivalents, see Orton 1975). We can therefore estimate brokenness by sherds/EVEs.

The completeness of an assemblage, which is defined as the ratio of vessel-equivalents to vessels represented, that is the average proportion of each vessel which is present in the assemblage. Like brokenness it cannot be measured but must be estimated: because neither of its components can be measured directly. It must therefore be estimated, for example by EVEs/EVREPs (estimated vessel represented), an abbreviation newly coined here.

In principle, there are values of brokenness and completeness for each pot in an assemblage, and given sufficient resources they could all be calculated. The resulting frequency distributions would give us all the available information about these parameters. However, this approach does not appear to be practicable in most circumstances. In this paper we shall look only at the average values for an assemblage, as defined above.

How do these parameters behave? The value of brokenness can vary from 1 (a complete pot) upwards, with theoretically no upper limit. In practice, an upper limit is likely to be imposed by the difficulty of finding very small sherds. If we model the post-depositional history of an assemblage as a series of events, in which its context is disturbed in some way, separated by periods in which nothing happens (Orton 1982: 4), we can see that at each event brokenness will increase or stay the same, but never decrease. In principle, the value of brokenness should tell us something about the post-depositional history of the context containing the assemblage. Primary deposits should have a lower value than secondary deposits, which should have lower value than tertiary ones, and so on. Unfortunately, life is not so simple, because brokenness depends on the type (fabric and form) of the pottery, as well as the nature of the deposit in which it is found. Common sense would lead us to expect that, other things being equal, pots in friable fabrics will break into more fragments than those in less friable fragments and large vessels into more fragments than smaller ones. For example, in the assemblage which will be used in the case study below, the overall estimate of brokenness for samian pottery is 32 sherds/EVEs, against a comparable figure of about 110 sherds/EVEs for Roman coarse wares: a ratio of roughly 1:3. This dependence of brokenness on type means that if two contexts contain assemblages composed of different proportions of different types of pottery, a comparison between them may reflect the difference in fabric composition, rather than differences between the contexts as such. However, a valid comparison can be made by comparing values for individual types, or by standardising both assemblages to a chosen composition.

By contrast, the possible values of completeness vary from 1 (a complete pot) down to, literally, next to nothing. The lower limit is likely to be determined by the smallest size of sherd that can be found. The completeness of an assemblage can only decrease or stay the same at each event so that, obviously, the completeness in a primary deposit should be greater than that in a secondary deposit, and so on. The end of the line being exemplified by a field scatter, which might well have a value of 1% or less. The main advantage of completeness over brokenness is that it does not depend on the type of pottery. Within an assemblage, completeness should be roughly the same for all types present. A comparison between two assemblages should therefore reflect genuine differences between their contexts, with no need for standardisation. However, as if to compensate for this benefit, completeness is more difficult to estimate, since it depends on the estimation of vessels represented, which is the most difficult of the commonly used measures to estimate. There are various formulae for this estimation (Orton 1982: 1) but even psychological differences between researchers may lead to different estimates. Principally the difference lies between lumpers who tend to assign sherds to the same pot unless there is strong evidence to the contrary and splitters who tend to assign sherds to different pots unless there is positive evidence that they belong to the same one. In the example below I have tried to avoid this problem by estimating the vessels represented from rim and base sherds only, since it is straightforward in the pottery studied here to determine whether two rim sherds belong to the same vessel and fairly so to determine whether a rim and a base sherd do. In effect, the analysis of completeness is based on rim and base sherds only, since EVEs are also calculated from rim and base sherds. The important point seems to be to ensure consistency of treatment between the groups being compared.

It is worth noting that these two parameters are negatively correlated algebraically, since one has vessel-equivalents as its numerator and the other uses this as its denominator. In fact, the product of the two parameters, that is sherds per vessel represented, gives a third parameter which seems to be less useful than the other two.

The size of assemblage needed to yield reliable estimates of these parameters is an important question. A theoretical examination has yet to be carried out, but observations on the assemblages described below suggest that the minimum useful assemblage size is quite small perhaps 100 sherds, or even 50 can be used with caution. If an assemblage is to be broken down into sub-groups which are to be studied separately, this minimum number would have to be applied to each sub-group. This assessment, being based on only one site, should not be used as a general rule of thumb until pottery from a range of periods and sites has been similarly studied.

Case Study

The pottery that formed the basis of this study, and gave the impetus to the development of the theory, came from the eastern terminal of the Devil's Ditch, one of the large linear earthworks in the Chichester area of Sussex. This feature was excavated in 1982 by the Sussex Archaeological Field Unit as part of the Boxgrove Roman villa excavations. The pottery from the terminal and a related but smaller ditch were written up by the author in 1982-3 (Bedwin and Orton 1984). The purpose of this part of the excavation was to try to establish the date of the earthwork, which in earlier excavations had yielded contradictory evidence: small quantites of Iron Age pottery from one site and medieval pottery from another (Bedwin 1982). In this it was successful, yielding just over 1000 sherds (10 EVEs) of early Roman pottery from the fill of the terminal. Not an enormous amount, but far more than from any of the previous excavations. It put a firm early Roman/pre-Flavian date on the main filling of the terminal. The question of the date of the digging of the Devil's Ditch is still unresolved, and probably can only be answered by future excavation of its associated bank (Bedwin and Orton 1984: 69).

However, the terminal itself had 10 separate contexts containing pottery, as well as a number of sterile silting layers. The related ditch, which was at right angles to the Devil's Ditch and cut by it, produced a further 5 contexts containing pottery (135 sherds, 1.8 EVEs). To understand the history of this part of the site, it was necessary to concentrate as much information as possible on the question of the relative and absolute dating of these two sequences. A detailed study has been published in the microfiche to Bedwin and Orton (1984), based on:

- stratigraphic evidence
- percentages of each fabric group in each context
- brokenness and completeness of the pottery
- incidence of conjoining sherds from different contexts
- density of the pottery (sherds or EVEs per volume of context excavated)

Here we shall just look at the evidence provided by brokenness and completeness. How it was used in the assessment of three hypotheses concerning the filling of the terminal. The behaviour of each class of evidence was predicted for each hypothesis:

successive phases of silting and/or deliberate filling

phases of silting and/or deliberate filling, separated by phases of recutting or cleaning

simultaneous filling, presumed deliberate

Table 1: Numbers of sherds from Devil's Ditch, by fabric and context

contexts	Roman coarse ware fabrics A	B	C	D	E	M	all	samian	other fine wares	all Roman
161	3						3		1	4
155	11		3	1	1	1	17	16	22	55
152	81	14	54	14	27	2	192	7	32	231
129	87	5	29	3	13	2	139	17	45	201
191	39	11	19	3			72	2	39	113
140	10		12	1	1	2	26	2	2	30
132	19		6	1	4	1	31		3	34
192	8	1				1	10			10
131	37	5	18	13	14	14	101	5	4	110
130	5	5	14		6	1	31		1	32
subtotal	300	41	155	36	66	24	622	49	149	820
30 + 7	41	1	26	8	53	53	182	10	10	202
total	341	42	181	44	119	67	804	59	159	1022

Table 2: Numbers of EVEs of pottery from Devil's Ditch, by context and fabric group.

contexts	Roman coarse ware fabrics A	B	C	D	E	M	all	samian	other fine wares	all Roman
161										
155	0.02		0.08				0.10	0.65	0.08	0.83
152	0.78	0.06	0.46	0.50	0.21		2.02	0.09	0.23	2.32
129	1.41		0.22		0.15		1.79	0.91	0.72	3.42
191	0.45	0.08	0.46	0.04			1.03		0.21	1.24
140			0.10				0.10	0.04		0.14
132	0.22						0.22			0.22
192	0.06						0.06			0.06
131	0.16	0.06	0.10	0.20	0.12	0.04	0.68	0.08	0.08	0.84
130	0.05						0.05		0.07	0.12
subtotal	3.15	0.20	1.42	0.74	0.48	0.04	6.05	1.77	1.39	9.19
30 + 7	0.18		0.42	0.33	0.23	0.17	1.32	0.11	0.05	1.48
total	3.33	0.20	1.84	1.07	0.71	0.21	7.37	1.88	0.44	10.67

The data are given in Table 1 which shows the numbers of sherds and Table 2 which shows the number of EVEs of Roman pottery, by context and by fabric group. Five Roman coarse-wear fabrics were recognised: A, C and E are romanised sandy fabrics. B is a BB type fabric which may have Iron Age origins, and D is a finer but still sandy fabric in mainly fineware forms. In addition, there was a M(iscellaneous) category. Finewares were divided into samian and other fine wares: Terra Nigra, Terra Rubra, and imitations thereof. These figures are converted into brokenness in Table 3 and into completeness in Table 4, by context and by fabric group separately. The groups were not big enough to break down by context and fabric group simultaneously.

Table 3: Brokenness of the pottery sherds from the Devil's Ditch, expressed in terms of sherds/EVEs. * = more reliable figures.

	sherds/EVEs	
context	all pottery	Roman coarse wares
161	n/a	n/a
155	67	170
152	101*	94*
129	59*	78*
191	92*	74*
140	224	260
132	164	141
192	167	167
131	131*	149*
130	283	620
30 + 7	140*	138*
all	97*	111*
fabrics		
A		103*
B		210
C		98*
D		41
E		168*
M		318
all		111*
samian	32	
other	113*	

Looking first at the fabrics, we can see that the values of brokenness for A and C are similar: 103 and 98. While that for E is higher: 168, this can be accounted for by its predominance in later contexts, especially 30 + 7. Compared context by context, it is very similar to A and C. Although based on small goups, the different values for B: 210 and D: 41 do appear to be significant. Fabric B really does occur in smaller sherds. Is it residual? While fabric D generally comes from smaller vessels, which break into fewer pieces. The high figure for M probably reflects a high proportion of unidentified body sherds. As already remarked, samian has a very low value: 32. In this feature it was mainly present in the form of small vessels: cups. Dr 24/25 and 27. Other fine wares (113) do not differ noticeably from coarse wares. here relatively large vessels. platters. flagons. butt beakers. are involved. The value of completeness was not calculated for individual coarseware fabrics. Table 4 shows that the values for samian: 0.12 and other fine wares: 0.13 were rather higher than for coarse wares: 0.09. This may perhaps reflect the relative ease of distinguishing samian: red. and other fine wares: red. black. white. from the greyish or brownish coarse wares. when excavated from a yellowish soil.

Table 4: Completeness of pottery from the Devil's Ditch. expressed as EVE/vessel represented.

context	EVEs/vessels	
	all pottery	Roman coarse wares
161	n/a	n/a
155	0.10	0.03
152	0.09	0.09
129	0.12	0.11
191	0.12	0.13
140	0.05	0.05
132	0.04	0.04
192	0.06	0.06
131	0.05	0.05
130	0.04	0.02
30 + 7	0.05	0.05
all	0.10	0.09

If we turn to the contexts. we see a general increase in brokenness through the sequence. with a group of low values: contexts 155-191. followed by a group of high values: contexts 140-30 + 7. The erratic values belong to very small groups of pottery. The pattern is perhaps clearer in Table 4. where we can be confident that different proportions of different wares have not distorted the figures. Here a break between contexts 191 and 140 is very apparent. Before it we have values in the range 9-12% and after it values in the range 4 6%. This evidence divides the fill into two reasonably distinct groups.

The other sources of evidence either confirmed this division or were neutral to it. In the final interpretation based on all the evidence. contexts 155-191 were seen as a primary fill. 140-130 as a secondary fill following recutting of the Ditch and 30 + 7 as a final fill. perhaps after the earlier fills had settled. The evidence of brokenness and completeness was a useful addition to other sources of evidence. For example. conventional analysis based on form and fabric would probably date 30 + 7 later than the other contexts. but would not have distinguished between the two earlier events. the primary and secondary fills. which were probably separated by too short a time interval for pottery types to have changed significantly. The main values of these parameters may therefore lie in giving supporting evidence to stratigraphic interpretation in situations where the stratigraphy developed rapidly or pottery types changed slowly.

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