10 Conclusion: the cycles of pottery

The relationships between pottery making, its function and use, and the cultural context were studied in three main steps. First, the fabrics were analyzed from the perspective that the composition refers to the potter's awareness of fabric properties in relation to vessel use. The analyses in chapter 4-7 were aimed at the definition of these properties, independent of form, using a variety of methods. The second part (chapter 8) concerned the study of morphological properties, together with that of use residues. Despite the limited database and the rather restricted differentiation in pottery forms, it was possible to define five groups and their subgroups by the associations between size and shape (fig. 8.25), surface and rim treatment and firing method. The same pottery groups are present in the samples of both sites, sharing the general characteristics. They also share a rather high variability for individual vessels, within these general trends. Some general functions could be ascribed to the different formal groups by combining all available evidence (fig. 8.31). In the third step the relations between fabrics, pottery groups, and functional categories were examined (chapter 9). Although there is some association between these visible properties with the invisible paste and fabric composition, the link is not very distinctive, but rather a matter of slight variations in a basic recipe. The previous chapter also included the evaluation of methods used for both parts of the study.

The results of all previous analyses are now summarized, answering the research questions formulated in chapter 1 and 2. The most important interpretations are repeated at a slightly more abstract level, starting with the cultural taxonomy for categories of form, or more general appearance, and use.

All data point to a limited degree of differentiation in functions, as expressed in the fabric composition and/or morphology. While this 'underdetermination' of functions through technical properties fits the research model and also corresponds with the actual use residues, it makes the step from 'fabric and form' to 'function' a difficult and uncertain one. The functions as proposed here should be studied in more pottery assemblages from the same region and period, in order to establish a firmer basis for further interpretations. Especially the role of pottery in food-processing deserves more attention.

At the same time, the significant trends towards specific combinations of size, shape and modes of surface treatment *at the sample level* must certainly refer to basic categories as distinguished within the communities concerned. What was learned through the pottery analysis and from the context analysis for Schagen about the cultural framework is that the primary means by which distinctions in basic categories of pottery were expressed are the surface and rim treatment and the firing method, in association with a few major distinctions in size and shape. The two most important categories defined through these variables are ceremonial ware and household ware. The former is most clearly represented by the black polished surfaces of vessels, *i.e.* by surface treatment and firing method. The evidence from Schagen shows that these features had an independent, highly symbolic content. No other subgroup shows as clearly as this group the intertwining of technical details of the construction with cultural images and meanings, and the interdependency of the process of making and using pottery. In Schagen, vessels are to some extent only a carrier for such meanings; their size and shape had become relatively unimportant, except for the jars. In the pottery of Uitgeest the same symbols were mainly attached to specific shapes. All other pottery, made primarily for regular use in a household inventory, shows a much more fluid association of variables and a limited degree of differentiation in visual characteristics. The main distinction is that in the surface treatment of small and large pottery. Even additional features such as handles are not strictly bound to shape, size or surface features. It is argued here that use purposes were defined in general terms and categories as well. All of the categories and their definitions formed the basis for the potters, who transformed them into sets of characteristics with predefined levels of articulation.

The interpretation of the forms and functions presented in the previous chapters is the starting point for the following parts. First, the relation between technology, form, and function is summarized from the potter's cultural point of view, beginning with the image of the product(s) she is going to make: the definition of the function(s) and the concomitant vessel properties, following the operational sequence outlined in fig. 2.1. For each of the steps in the

production cycle, the main choices and actions involved are summarized, while the diagrams of fig. 10.1 to 10.3 present the primary categorizations of form and function established in the analyses. Secondly, some conclusions about the actual use and the depositional practices, and the consequences for sample composition and pottery research, are drawn, followed by a summary discussion of the cultural significance of all pottery aspects together. Most of the conclusions, whether about the data or the methods, are at the same time suggestions for further research.

10.1 Making the pottery

1 Selection and preparation of clay

The definition of the raw material composition is hampered by the fact that all clays are secondary deposits which lack a clear 'fingerprint' to define them by. There is no chemical or other analytical method that can distinguish between primary composition and the secondary changes that took place after burying. Despite these limitations, the overall characteristics of the clay types could be established by a comparison with local test clays from the settlement areas. The composition of the test clays indicates that the pottery clays were selected from specific layers or locations in the immediate surroundings of the settlements. Within each site, all fabrics are quite similar and even between the fabrics of both settlements the variation is limited. The overall similarities of the fabrics therefore point to a conscious selection of the clay type by the potters. It can even be questioned whether the distinctions made here between clay types 1 and 2 were at all recognized by or important to the potters.

One of the main criteria for their choice was a low amount of finer quartz particles and a virtual absence of coarser fractions. A second was the amount of calcium (compounds), probably in relation to the amount of iron. Iron-rich or calcium-poor clays were used for most of the pottery and for all functions. A clay with a higher Ca-content was used for a minority of vessels, mainly for those interpreted as medium to large cooking vessels in the sample of Uitgeest. The fabrics have a higher apparent porosity and contain more and coarser temper. As far as could be determined, chronological factors did not play any role in the clay choices in Uitgeest. As the pottery from this site represents circa three centuries of occupation, it is unlikely that all clays were collected from the same layer or location. Yet there are no indications for a change in preferences. In the pottery from Schagen, representing a very short period, a similar distinction in two slightly different clays is present as well. This type of clay was seen more often in pottery in the ritual pits, but this may be due to a lesser influence of secondary iron infiltration. There is no consistent link with a specific pottery group here.

No indications were found that the clays had been treated in any manner before being used. In the Schagen sample, the texture and structure of the clays is extremely fine and homogeneous which might have been interpreted as resulting from pre-treatment but for the availability of clay samples for comparison. The main difference with the test clays is the presence of often large amounts of inclusions in the pottery fabrics. Although alternative explanations can be put forward (chapter 5), it is possible that clay pellets were added to the paste on purpose, to improve its workability and/or to influence the firing properties.

2 Temper

The analyses of the vegetable temper have rendered very good results, also helped by the experiments with different types and quantities of organic material. For both sites it can be concluded that the potters had indeed at least one *basic standard* for the amount of temper and this standard was probably instigated by the function of cooking. The fabric of vessels interpreted as cooking pots contained more temper than that of pottery with other functions. This is also the case in part of the vessels which may have been used for cooking and/or storage (pottery group 4). Despite the large variation in amounts within these groups, there is a clear preference for 15-25 vol% or 40-80 %AD as counted in the sample of Uitgeest. On average, less temper was used for the other functional groups. In the fabrics of Schagen, the standard amount is mostly between 7.5-15 vol% or 25-50 %AD for all pottery. Possibly, a lower amount was added to the utilitarian ware because of the many inclusions in the clay, which must have led to a relatively high fabric porosity. Surprisingly enough, the well-made vessels associated with ritual use contain slightly more temper, the meaning of which is not clear.

The samples from both sites show the same pattern for the *variation* in the amount of temper between vessels in the same functional group. The most extreme variation is seen in the fabrics of the smallest vessels, but it becomes progressively lower with increasing vessel size. Several reasons for this pattern were suggested in chapter 8.15. Certainly, the precision with which the amount of temper was measured was low. The experiments made clear that such an imprecision is to some extent inherent to the nature of the organic material. Even with modern equipment it is very difficult to obtain equal volumes because of difference in fibre sizes and the amount of 'dust' from this material. The same 'cupful', even if measured carefully, will also have resulted in some variation in the original practices. A factor causing variation in the *measurements* is the construction technique. The coiling method causes variation in density. As the size of the coils is smaller in smaller pottery, it is possible that the densities within a sherd of

3 × 3 cm vary more than in large vessels. This could indeed explain the larger variability seen in the smaller vessels in both samples, although it does not explain the on average lower amounts compared to larger vessels.
The experiments with the organic tempering materials also demonstrated the difficulty of obtaining a restricted *range of fibre size* for all types used here. In comparison, the size variation in the pottery fabrics is rather limited, even more than in the specially prepared fibres used in the test tablets of set C. Fine dust and fibres up to 3 mm are always present, fibres larger than 3 mm do occur in some of the pottery, but always in small amounts. It is therefore plausible that some form of pre-treatment of the material did take place. Alternatively, the restricted range may point to the use of digested material, *in casu* dung. If dung was used, it was certainly not from sheep or horses. Because the composition of modern cow dung cannot be compared to that of their prehistoric sisters, it was not used in the experiments, but this omission should be remedied in future research[1].

3 Paste preparation
As mentioned above, the variation in measurements of the %AD are in part the result of both the nature of the temper and the construction method, which together influenced the counting method. Yet another possible explanation is that different ways of paste preparation were used. Theoretically it can be argued that the smaller the size of the clay lump is, to which temper is added, the more variation will occur in the actual amount between different units after mixing, for the simple reason that smaller amounts of temper will tend to vary more around the 'standard' amount. Despite the very careful volume measurements, this effect also took place in the test tablets. If correct, this explanation could indicate that the potters added the temper only at the last minute, after setting apart the amount of clay needed for one specific vessel. It would also explain the diminishing variation in the larger vessels. For the cooking vessels, two methods of paste preparation seem equally feasible. If cooking pots were made more often, the potters probably made several at the same time and either prepared the paste for all of them simultaneously, or added the temper at the last moment to the clay set aside for each vessel. The first method will result in only small variations in the fabrics of one production session. The second would result in differences even within one production by one potter. If the fabrics from Schagen can be taken as an indication, the first method seems the more likely, at least for the 'normally' constructed cooking and storage vessels.

4 Construction: size and shape
All pottery was built up from coils, starting with the disc forming the base. The process shows little to no variation and is truly a standard technique used for all assemblages in North-Holland, known by the author. It is not discussed here.
The morphological analyses convincingly showed that the potter started the construction with a rather undifferentiated image of vessel forms, limited to a few, rather vaguely defined, size and shape variations. The main distinction in shape is that between the jars and all other vessels. In the latter, several distinctions were made in size, associated with minor differences in shape, but with major ones in the finishing treatments of the exterior surfaces including the rims. One clearly defined size group is the 'small' vessel (smaller than 19 cm). 'Large(r)' vessels (19-35 cm) form a continuum in size, with some variation in the relative width of the opening and the proportion of the upper to the lower wall. In the largest vessels (>35 cm), the shape variation clearly represents two different forms, one comparable to the main shape (shape 1) and one with a restricted opening. For the smaller vessels (<25 cm), the distinction between two shapes of the upper wall seems to be less meaningful, although there is some connection with fabric composition and surface finishing.
The most difficult to interpret is the pottery with a size between 19 and 25 cm. It shows the largest variation in morphological features, which was one of the reasons to interpret this group as an 'intermediate' and multi-purpose group. The interpretation is to some extent supported by the Schagen evidence, where this group included several unique forms and formed a higher percentage of the sample, especially of the vessels found as ritual depositions. Future research should aim at a more detailed formal analysis of this group and its various uses in ritual and utilitarian contexts, to provide better criteria for distinctions.

5 Finishing treatment and additions
The relationships between the size and shape groups and surface treatment were discussed in detail in chapter 8. As mentioned, the most important conclusion is that the treatment of surface and rim was the main criterion by which pottery of different size, shape, and function was distinguished. For the overall treatment of interior and exterior surfaces, a combination of three techniques were used in most of the pottery. First, surplus clay was removed from both surfaces by manual smoothing and/or scraping. This way the wall thickness was reduced as well. The exterior surface was then smoothed over, sometimes manually but more often with a tool, to create an even, smooth surface without large pores or cracks. The localized and rough polishing was often the last treatment and may have been directed especially at places where the surface was damaged during the first treatment. It could also be followed by a more intense polishing of the—upper—wall.

Basically all grades between a few smoothing strokes and a complete polishing are represented in the vessels of both sites. The distinction is one of degree, rather than kind, but the intensity of polishing is indeed associated with different groups of pottery. The finest polishing of the whole exterior surface was reserved for 'special' vessels that were reduced (see below). The treatment of the interior surfaces is much more standardized: the last treatment usually consists of manual smoothing from the base to the maximum or minimum diameter. Part of the upper wall and all of the rim are often roughly polished, sometimes scraped. The treatment may be interpreted as mainly technical, to reduce the permeability of the surface.
The relation between surface and rim treatment and pottery groups is visible most clearly at the level of distinction between cooking (and/or storage) and other functions. Between the cooking and *large* storage vessels the differences are minimal. For both groups, there is a preference for a 'besmeten' (intentionally roughened) lower wall, a scraped to roughly polished upper wall and a 'decorated' rim, *i.e.*, finishing the rim by manual smoothing and (im)pressing. The smaller the cooking vessel, the lower the percentage of both treatments is, being replaced by more intensive polishing of both upper and lower wall and smoothed rims. As mentioned, these 'rules' were not strict, considering the variations within the group of cooking vessels. Moreover, 'besmeten' surfaces are also found on some of the vessels for storing liquids and the smaller containers. It is not clear why some vessels and not others with the same size and shape were given such a lower wall surface. If, as concluded in chapter 8, this treatment is meant to improve thermal strength as well as providing a better grip, it explains only part of the variation. Other than technological reasons may have played a role, and the same applies to the two distinct ways of rim treatment. Possibly the clay applice marked a distinction in function within a size and shape group, for example for the cooking or storage of specific materials, or the difference between liquids and more solid contents, like porridge or stews. It was suggested for both types of treatment that they may be related to the way the contents of the vessels were consumed: the difference between pouring it into another 'container' or by spooning straight from the vessel. The lack of clearly defined eating bowls, at least ceramics ones, together with the size of vessels with a 'decorated' rim, makes the latter a viable option for the larger vessels. In view of the 'fuzziness' of the associations, it is most likely that the combination of all elements is behind the observed variation.
Two or three handles were added mainly to jars and incidentally to a smaller cooking vessel, while a few small special purpose vessels had one handle attached to it.
Another form present mainly in Uitgeest is the extended or labial rim: the clay of the last roll was shaped into a lip in three places. Handles are interpreted in this study as referring to the function of containers for fluids. Yet, only part of the jars associated with this function have handles. As there are no other distinctive features, the meaning of the difference is not clear at present, but may refer to carrying or hanging the vessel as opposed to holding it to drink. Considering the evidence from Schagen, it is questionable whether a jar was a standard element in an inventory. A mainly ceremonial function for this type of vessel, perhaps in association with drinking or feasting, should certainly not be discarded at present.
In conclusion, for most 'utilitarian' ware, the potters started out making a vessel with a standard shape, which was either 'small', 'large' or 'very large', or they made a 'jar', and for each the image included certain standards for shape, rim- and surface treatment. None of these image associations were strictly applied, at least not at the sample level. Each individual vessel can have its own specific combinations of -visible- characteristics. As there are no clear indications for a chronological explanantion, the variations point to a high degree of freedom for individual potters. As a hypothesis for further research it can be argued that each potter may have made their own specific standard or preferences for each functional category, which marked their products, but clearly variations between them were acceptable. This level of analysis, of the products of one potter, has only been touched upon in this study, but deserves further attention. These conclusions are also a strong argument in favour of household production. For the making of pottery for ritual occasions or use the rules were, however, much more strict.

6 *'Special' construction and treatment*

The black-polished pottery is present in all settlements in the western and northern Netherlands. The fabric and construction of this pottery is in no way different from the rest, but the meaning of the black, shiny surface was highly symbolic. Vessels of this type seem to have been a standard part of the assemblages and perhaps of household inventories during the Roman period. In Schagen, many of such vessels of various sizes and forms were present. The context of deposition and the lack of any sign of actual use indicate that some of them were made specifically for ceremonial use in ritual deposition. The clearest example is the vessel placed in pit 79 (fig. 8.24; nr 79-8). In this vessel many significant elements are combined, a very fine polish, handles, reduced firing, as well as a finely textured extra clay layer with a decoration[2].
The making of the 'rough' pottery, as found in Schagen, also is basically the same as that of the other pottery. The construction is seemingly 'careless' because the coils and joints are hardly smoothed over and/or scraped; consequently the wall is thick and irregular and

STANDARD PASTE PREPARATION	
CLAY + TEMPER	One standard clay type Preparation or selection of organic matter with restricted size range Standard around 20 volume % with normal variation of 5 volume%
Variation	Special clay with higher porosity; more or coarser temper
STANDARD CONSTRUCTION	
COILING	Building the vessel from the base upwards. The base is a flat disc of clay; its size is roughly estimated in relation to the overall size and shape of the vessel
SIZE + SHAPE	Defined as a range between 20-40 cm, with a standard of 25-35 cm and a distinction in small/medium/large sizes Maximum diameter: height /: rim diameter is 1.0-1.2 Individual variation in each vessel
Variation	Slightly more restricted opening and/or longer upper wall
STANDARD EXTERIOR SURFACE TREATMENTS	
RIM	Finished by folding the last roll and (a) impressing with fingertips or (b) smoothed by tooling The larger the vessel, the more usual it is to finish the rim by finger-impressions. The decision may be individual or functional
UPPER WALL	Scraping, followed by a rough polishing, usually not covering all traces of previous treatment.
LOWER WALL	The larger the vessel the more often thick lumps of clay are added on to the surface (‘besmeten') If no extra clay is put on, the surface is finished in the same manner as the upper wall.
Variation	Rim: Tooling into one or more facets Upper wall: Finer polishing Lower wall: Decoration in the extra clay layer
STANDARD FIRING METHOD	
	Neutral to incomplete oxidization in bonfires. The firing is stopped when the exterior surface is beginning to get oxidized.
Variation	More oxidation related to specific clays and/or functions

Fig. 10.1 Cooking vessels

STANDARD PASTE PREPARATION	ALL FUNCTIONS
CLAY + TEMPER	Standard clay Less temper than cooking vessels, but more variable amounts, except in the storage vessels
Variation	Clay with slightly lower porosity
STANDARD CONSTRUCTION	ALL FUNCTIONS, as cooking vessels
STANDARD SIZE, SHAPE + SURFACE TREATMENT	
JARS	
SIZE/SHAPE	Standardized; clearly defined by Gd:Rd:Htot
SURFACE	Rim is always smoothed Exterior surface: any combination is possible
SMALL CONTAINER FOR SPECIAL (NON-EDIBLE) SUBSTANCES	
SIZE/SHAPE	Clearly defined: <19 cm; mostly shape 2
SURFACE	The surfaces are superficially smoothed or (intensely) scraped, otherwise untreated
SMALL CONTAINER FOR STORAGE (MULTI-PURPOSE AND/OR FLUIDS?)	
SIZE/SHAPE	Size 18 to 25 cm. The shape is comparable to cooking vessels, but with a slightly more restricted opening.
SURFACE	Finer polishing of upper and lower wall, tooled rims or Comparable to cooking vessels
Variation	One or two handles or extended rims
STORAGE VESSELS	
SIZE/SHAPE	Vessels larger than 35 cm, with a slightly restricted opening and large-sized upper wall
SURFACE	Intentionally roughened ('besmeten') lower walls and finger- impressed rims
STANDARD FIRING METHOD	
ALL FUNCTIONS	Standard firing, as cooking vessels
Variation	Jars and storage vessels can be fired in a more oxidizing atmosphere

Fig. 10.2 Pottery with other than cooking functions

PASTE	
	Standard clay and temper; variable amounts of temper Possibly addition of (iron) inclusions in Schagen
CONSTRUCTION	
Schagen Uitgeest	Intentionally well-made or intentionally careless construction Well-made or standard construction
1 SPECIFIC SHAPE, SIZE AND SURFACE TREATMENT FOR WELL-MADE OR STANDARD POTTERY	
SHAPE/SIZE	Jar or jar-like shape. Standard or extra large size Vessels with a limited height and a wide opening, mostly smaller than 20 cm. Bowls with a specific foot
RIM	Tooled, often facetted
SURFACE	Very finely polished exterior surface and a polished interior surface (in the smaller vessels)
FIRING METHOD	Reduction at the end of a 'normal' firing process
Variation	One or two handles Three round impressions in the upper wall (?) Extra clay layer on lower wall, more carefully applied Decoration in the extra clay layer (?)
Schagen:	Vessels from other categories with the same combination of features
2 SPECIFIC SHAPE, SIZE AND SURFACE TREATMENT FOR CARELESSLY MADE POTTERY	
SHAPE/SIZE	Mainly jars and jar-like shapes
SURFACE	Treatment is virtually absent, except some rough scraping or smoothing over of coils
FIRING METHOD	More intensely oxidized; yellow to red surfaces
Variation (mainly Schagen)	Vessels from other categories with the same combination of features
3 SPECIFIC SURFACE TREATMENT	
PIGMENT	Applied to vessels selected for ritual deposition Probably selected out of the household inventory: Uitgeest: cooking vessels Schagen: more categories, including jar-like shapes

Fig. 10.3 Vessels for ceremonial use

most of the vessels are lopsided. Most are fired to a higher degree of oxidation than other vessels. The main shape made this way is the jar or a shape that looks like a jar. As the 'rough' pottery occurs side by side with the 'fine', its visible characteristics were obviously created intentionally. There seems to be a relation with liquid contents. The connection with ritual depositions is clear, but what these shapes and colours are symbolizing, is not.
For the roughly made vessels, very few parallels are known (or can be deduced from the literature) at present. It cannot be compared to the small containers for special, non-edible substances from Uitgeest. In hindsight, some of the jars from Uitgeest come close.

7 *Firing method*
The standard method was to fire the vessel(s) in a neutral to oxidizing atmosphere in an open fire. Only the exterior surfaces are lightly coloured, with colours varying from 'buff' to a yellow-grey and to a yellow-orange. Most interior surfaces are dark to light grey. The temperature of the firing process is unknown, but through comparison with the refired sherds and the test tablets, is estimated to have been within the range of 800-900 ^{0}C. Assuming that the firing temperatures were more or less the same, the thickness of the 'oxidized' surface may indicate the duration of firing. This layer is rather standard and restricted to a few mm. Organic temper is usually all burnt out in the surfaces and partially from the core. For the degree of combustion in the core, there may be a link with the amount and size of the temper, as was the case in the test tablets. The more temper and the coarser its size, the more of it is burnt out because the oxygen can easily penetrate into the core, while the CO_2 can easily escape. The firing duration was probably quite short, but it would be guessing to mention an exact time range. Most likely, the potters decided that a vessel was done by some feature, like the colour, of the exterior surface. This was also the moment that for the production of the black polished vessels the reduction process was started. Virtually all reduced vessels show remnants of the oxidized surface just underneath the reduced surface. This means that the duration of the reduction process was minimal, just long enough to obtain the effect of a black and shiny surface. Often, there are 'telling' patches on the surfaces, where the reduction was not complete. *The main firing process was therefore the same for all vessels, only the final stage was different.*
The firing atmosphere was used to emphasize symbolic categories through an opposition between light colours and black. Perhaps, the presence of the so-called 'double' surfaces, where the exterior surface consists of a yellow over a bright orange to red layer, should be interpreted in this light as well. By pure theoretical reasoning, its occurrence can only be explained as the recrystallisation of different elements in different layers, resulting from the clay composition together with the firing method. The microprobe analysis gave no conclusive results about the chemical composition. A longer firing time and a higher than normal supply of oxygen are probable causes, but this needs to be tested in further experiments.

8 The product
The overall fabric composition points to some awareness of the properties conducive to thermal strength. Clay and temper together resulted in vessels with a rather high porosity and heat conductivity[3]. In light of the experimental data and the proposed functions, the small differences in the amount of temper and clay type in cooking vessels compared to other functions are meaningful. The small group of pottery made of a slightly more calcareous clay with a high natural porosity, to which also more and coarser temper was added than to the other clays points in the same direction. Whether these vessels were used for cooking or storage of a special substance cannot be determined with the present data. The on average lower amount of temper in pottery with other functions, together with a slight preference for clays with a lower natural porosity, may be interpreted as a second recipe. The large variation in the amount of temper and the porosity alike indicates however, that both were simply of less importance.
Most vessels will have been highly permeable after firing. Additional measures must have been taken to make the vessels waterproof. Two possible methods are suggested; the first is to soak a vessel overnight in milk of any other solution containing fat (Olthof 1996), the second is to heat the vessel with fatty contents. In both cases the pores in the surfaces will clog up and leaking will stop.

10.2 Use and deposition

The analysis of actual use residues in pottery is a valuable addition to that of form and function and it is rather surprising that so little use has been made of this type of information in archaeological research. The condition for the survival of residues is the way pottery is treated during and after fieldwork. Since the time archaeologists less often clean the surfaces by scrubbing, use residues have been found in far greater numbers. Especially the residues that are caused by contact with a fire, soot and chars, have a good chance of surviving in any depositional context.

10.2.1 ACTUAL USE

In the pottery studied here, soot is present on many vessels from all pottery groups, except on the black polished ones. They indicate that many vessels were in contact with a fire on at least one occasion. The presence of charred residues on the interior surfaces, however, is more limited and indicates

that vessels in the size range of 25-35 cm are the main group used for cooking or heating food. That the chars in this group are indeed food residues is supported by the results of the pyrolysis / mass-spectrometry study. Although this study was limited to a small number of samples, the results are very encouraging, showing a distinction in composition between different types of residues. The chars in the small vessels with a roughened surface and crusts of soot and chars in the samples of Uitgeest had indeed a different 'fingerprint' and were probably used for heating non-edible substances.
The presence of soot on vessels interpreted as other than cooking vessels including those for liquids can be interpreted in two ways. It could point to the cleaning of vessels by burning off the use residues. This explanation is hardly satisfactory, because this way of cleaning would also and especially be carried out for cooking vessels. More likely, the soot indicates that the vessels were used for cooking or heating in actual practice, when the 'need' arose. The fabrics and the construction were no barrier to such uses. In other words, the low degree of differentiation in fabric and form, realized by the potters, was even less strictly applied in actual practice. The fact that soot is present more often than charred residues in each pottery group is most likely due to the way both are formed. The residue analysis for a large sample of bases for Uitgeest clearly showed that chars are formed and 'survive' closer to the bottom, while soot is formed especially around the maximum diameter. Because the samples consist mainly of incomplete profiles, with the base and part of the lower wall missing, the observations for chars are negatively influenced. This aspect certainly needs to be considered in further research of use residues.
Other specific types of use are shown by the presence of the cream-coloured residue and possibly also by the dark-brown staining, both formed by a liquid substance. For the origin of the first, milk does seem to be the most likely, despite the result of the chemical analysis. In the present samples, there is no convincing association with specific pottery types. The second 'residue' is probably not caused by actual use, but was applied to mark a vessel for special use and/or for deposition. In Uitgeest, mostly cooking vessels were marked this way, while in Schagen the range was larger.

10.2.2 END OF USE: BREAKING AND DEPOSITION

The relative frequencies of the pottery groups in the samples were used as a supportive argument for the definition of functions. The large amounts of sherds from vessels in the size range of 25-35 cm were taken as an indication of the use and/or break frequency and thus indirectly for their function. Clearly, this is close to a circular reasoning, yet the ethnographic data all point to precisely such a 'circular' connection between function, use, and discard quantities of sherds. The comparison with the sample composition for two other studies also showed a large similarity in relative frequencies of pottery groups, despite the fact that different selection criteria were used in each study. From this study alone, however, no firm conclusions can be drawn about the quantities of vessels in a 'standard' ceramic inventory.
As this study has demonstrated, the composition of an archaeological assemblage is not a straightforward result of use- and break- frequencies. It is mediated by several other factors, which were summarized in chapter 2, fig. 2.6. The comparison of the two settlements, Uitgeest and Schagen, highlights the importance of (a) the manner and context of deposition, (b) the distinction between sherds and vessels and (c) the excavation method for the sample composition and for any conclusion about the original inventory composition.
In Uitgeest, massive amounts of sherds were deposited in the creek and smaller amounts in some settlement features. In Schagen, large numbers of sherds were added to the layer covering the settlements features; the ditch surrounding the house also contained many sherds, while all other features mainly contained complete and large parts of vessels. From the assemblages of the *sherds* in both sites, very few could be fitted together into larger fragments. One reason is of course the sheer quantity, but it is also clear that sherds of broken vessels were not dumped straight away and/or together in one place. Another is that in both sites, broken vessels and sherds were re-used in hearths, floors and covering layers. Through these processes, sherds of all types of vessels became mixed to a high degree.
The many complete or nearly complete vessels from specific features in the Schagen settlement prove that the context is an essential part of the information on sample composition and pottery characteristics. Complete vessels were present in Uitgeest as well, but the very small number in the vast amount of pottery recovered in this settlement is due to the method of excavating in artificial levels. Layers of circa 10 cm were removed with a mechanical digger and sections through features were mainly carried out at the lowest artificial level, resulting in the destruction of any complete vessel larger than 10 cm. This is demonstrated by the much higher number of restorable profiles from trench 35, where the author was allowed to excavate some features in a different manner. Even more important is the destruction of context information and through this, the possibilities for structural interpretations of material culture. A large number of recent (Roman) Iron Age settlement excavations in the western Netherlands have made clear that special depositions of complete vessels are a normal feature. The Schagen settlement is probably not an exceptional site, just one in which the ritual aspects of the cultural framework were very much articulated, while the excavation techniques ensured the possibility of gathering this information.

It is therefore reasonable to suggest that for most pottery studies of that period the samples will contain the remains of many specially deposited vessels. Further research into the differences between the *vessel* assemblage and the *sherd* assemblage will no doubt support the conclusions drawn here and may allow further detailing of the ceremonial and daily use of pottery.

10.3 The social/cultural framework

That pottery making was a household affair is supported by the fact that each individual vessel is a unique combination of characteristics. A substantial part of the variability between vessels can no doubt be explained by this mode of production. For both sites it was observed, that some pots do share certain constructional details pointing to the same 'hand', and that the individual characteristics and perhaps the individual freedom or preferences contributed to the observed variation.

At the same time, the potters clearly shared the same basic rules and ideas about the technology, forms, and appearances for the whole range of pottery over quite a long period of time and throughout the West-Frisian culture region. All vessels are highly similar in the overall characteristics of the fabrics, the construction techniques, finishing treatments and firing process. The visible features and the basic distinctions in these features basically did not change during the first two to three centuries AD. The shared cultural framework may have included further distinctions in functions, expressed in the minor variations in the shape of the upper wall and surface treatment, especially within the large group of cooking vessels. The present data do not allow firm conclusions about these finer distinctions, but further study probably can.

The result of this study, that the most essential distinction is made between ceramics for daily use and for ceremonial use, also has important implications for stylistic typologies. These basic categories are not expressed in decoration or any other element, usually considered 'stylistic', but in surface treatment and firing methods, i.e., in aspects generally considered technical rather than stylistic. It is equally clear that *the stylistic variables used in (chrono-)typologies are related to specific classes of pottery, i.e., to functional groups*. Decoration is virtually lacking, the main form being the pattern of parallel lines in the extra clay layer on the lower wall; as the distinction in rim treatment, it is associated mainly with cooking vessels. Clearly, the distinction between style and function or technology cannot and should not be made, at least not a priori. They will be connected and intertwined in any culture, simply because the makers of an artefact are participants in the culture and its framework of values, norms and symbols. In this sense, technology is also style and style is technology. The nuances of this cultural interplay can be established only through a methodology that allows moving from one level of analysis to another. The methodology aplied here did indeed bring some of the local/regional articulation of these aspects to light. It also made the failure of the stylistic approach to define chronological changes for the pottery concerned more understandable. By using variables like the shape and treatment of the rim, the more important meanings embedded in other variables are missed. Moreover, the dissociation from the context clearly obstructs the recognition of those categories that represent(ed) 'stylistic' change. Contrary to the suggestion by Varien & Mills (1997), it is not likely, that the cooking vessel is such a category in the present case, but again further research into this aspect is needed.

The intricate network of feature contexts, spatial distributions and material contents is clearly demonstrated in the settlement of Schagen. Several types of features were used for the deposition of materials and goods that were either taken from the material culture-in-use or were specially made for deposition. Whatever interpretation one wants to give to these depositions, they clearly are more than just dumps or 'practical' solutions for keeping things. The ceremonial nature of the activities is visible in the spatial-material structure of the depositions in the settlement as a whole. Pottery is only one category involved in the ceremonial life in more than one way. Firstly, pottery carried or represented symbols that were used almost exclusively in 'ritual' contexts. Colour is one of the symbols and was used to create oppositions between the deposited vessels, while construction was another. Black as well as light yellow vessels were made especially and perhaps only for this purpose. The vessels are at the same time referring to the 'normal' household inventory and the functions in daily life. A second element, linking the utilitarian and ceremonial use of pottery, is the painting of some vessels in both sites. The suggestion was made that the paint consists of a solution based on iron oxides and blood.

Although the symbolic connotations of some features of the pottery are beyond doubt, their structural basis and content is another matter. The structured depositions and the choice of the materials certainly refer to the social-economic structure (Therkorn, forthcoming, see chapter 3, table 3), and most likely the pottery played a role in the distinction between livestock and agriculture (chapter 8, fig. 28). The symbolic connotation of the jar with its clearly defined shape may be the transformation of that distinction, referring to or symbolizing the importance of livestock. Another possible meaning is the use in the context of drinking/feasting. The cooking and larger storage vessel on the other hand are probably associated with the processing of agricultural produce; this may also include the brewing of beer. The fact

that most of the cooking vessels in the depositions are of standard construction, also emphasizes the distinction with the specially made and symbolically marked vessels. To make the link with basic gender categories seems a rather obvious step. As pottery is only on category in the network of material depositions, this step I will leave Therkorn (forthcoming) to take.

10.4 Pottery studies: looking back to the future

This study has shown that through the combination of different fields of pottery research, a much more comprehensive view of both meaning and use of pottery in the past can be obtained than is hitherto the case. The structural approach used here and the methods derived from this framework not only provide more insight into the meaning of different -kinds of- variables, be they technical/technological or referring to categories of function and use, but especially into that of their *recursive* relations. Trough this approach, attention is focussed on all possible variables and variations which can be recognized, *now as well as then*. It enables us to pay attention to both shared and unique properties of each individual vessel and especially to everything in between, without sacrificing one level of analysis and reality to another. Methodologically, the two should also be as close as possible; by avoiding a priori determined, closed categories, and instead using open and even 'fuzzy' sets, the latter *become* more and more defined through the proces of analysis itself. In other words, taking the fluidity of (time/space) levels in socio-cultural reality as a starting point, some articulation of these levels for the society concerned are the result of the analysis. This also requires working at different time/space and cultural scales: the larger cultural unity in time and space and the daily practice in a community or, as in the present case, household in which the basic cycle of use and replacement takes place. Through this use of cyclical, dialectic reasoning from one set of data to the next and back, and from one level of analysis to another, progressively reinforcing arguments can be derived from the mutual relations between such sets. In this manner, distinctions made by the potters as part of the existing templates for ceramic categories can be made at the level of the local assemblage as well as regionally shared cultural frameworks. Even within pottery samples as the ones studied here, with their limited technological and morphological distinctions, it was possible to establish some of these levels of articulation and definition for technology and form. The fact that there are no pottery groups with exclusive properties is then a positive information on the relation between the shared socio-cultural framework and the -local- types of distinctions, made by the original makers and users. The specific combinations of techniques and appearance express these categories which themselves are directly linked to the types of use and their recognition in the characteristics of each vessel. Moreover, the level of distinction and the strictness of adherence to structural categories in actual use are mutually related and these levels could be a fruitful focus for further research. In the present case, many vessels were probably used for all types of activities in actual practice. Only for the most explicitly defined vessels, reserved for ritual use, this is not the case. Further study of larger samples (and more nearly complete profiles) will enable a further and finer distinction in functional categories and/or in individual variations in the expressions of these categories between potters through time and space.

The data from the Schagen settlement show the overriding importance of the feature contexts in which specific material categories are found for any interpretation and explanation of their meaning. This aspect cannot be emphasized enough, as it directly involves excavation methods and techniques. The destructive methods, which we necessarily apply in excavations, are to be adapted. In this sense, a structural approach and a context analysis do, more than any other aproach, focus attention on the way the primary source of information is treated. The influence that distinct categories (of pottery) in structured depositions have on sample compositions has so far not been taken into account in pottery studies in the Netherlands, and neither has the effect this had and has on stylistic or technological research. The actual methods and techniques that were derived and constructed were evaluated in chapter 9. The most important conclusion is that rather simple, macro-level observations are to be preferred above ingeneous micro-analytical techniques which have no relationship with the reality of the potters' context and knowledge. The methods developed here can even be further simplified in future research, enabling large amounts of pottery to be processed in a fruitful way. The wider implications for future pottery research are comparability and through this a better insight into the manyfold *meanings* of pottery in prehistoric societies.

notes

1 Cow dung was found in massive quantities in Iron Age and Roman period sites in Midden-Delfland. Further study could provide new information about its composition (Abbink 1993).

2 The decoration consists of groups of two or three parallel lines, created by moving the fingertips through the wet clay applice (fig. 8.14 and 8.24).

3 as shown by the experiments. The measurements of the %AP of sherds from vessels is clearly influenced by use as well as by postdepositional changes, see chapter 7.5.