1. Introduction

Textiles have been the subject of archaeological studies for several decades. These remains of garments, household furnishings, but also sails, have been preserved in fragments of varying sizes as well as in mineralized state. The pioneering textile specialists were mainly preoccupied with the study of prehistoric and early medieval fabrics. Fragments of prehistoric textiles were regularly found in bogs in Scandinavia and Germany and, in lesser amounts, also in the Netherlands. Eventually these fragments were all documented by Hald and Schlabow, and later re-assessed by Van der Sanden.[1] The textiles from early medieval settlements and cemeteries also drew the attention of several researchers. These early studies were however to a large extent descriptive and dedicated to the reconstruction of models and used techniques. In the last years, with the establishment of the Centre for Textile Research in Copenhagen, more attention is given to natural scientific, theoretical and experimental approaches.[2] Additionally, we see a (renewed) shift towards the study of prehistoric and Roman remnants of textile.[3]

The focus on early medieval textiles in northwestern Europe resulted in a considerable number of site-reports. For Scandinavia these are for instance the works by Bender Jørgensen, Geijer, Hald, Hougen, Hägg, Ingstad, Mannering, Østergård and Nockert.[4] In Germany H.-J. Hundt published the textile remains from a large number of Alamannic, Frankish and Saxon cemeteries and from the *terpen* settlement of Elisenhof,[5] while Tidow, Ullemeyer and Schlabow mainly focussed on the textiles from the settlements from northern Germany and the Netherlands.[6] For Great Britain and Ireland G. M. Crowfoot, E. Crowfoot, F. Pritchard and P. Walton (Rogers) have produced a great number of publications on the study of early medieval textiles.

The last 25 years saw the appearance of overviews in which textiles from different sites and regions were put together. Well-known examples of these are the studies by Bender Jørgensen and Tidow[7] on textiles from the North Sea region. Walton Rogers and Owen-Crocker did similar work reconstructing the use of cloth and clothing in early medieval Britain, while Harrington has examined textiles and textile tools from Kent and compared them with finds from Germany and Norway. Swift has examined the role of dress accessories as expression of identity in late Roman Europe.[8] Many recent studies cover various aspects of early medieval fabrics. Rast-Eicher for instance published detailed accounts of the technical characteristics and the use of textiles from different sites in Switzerland, and (with Desrosiers) France,[9] while various authors such as Banck-Burgess, Siegmüller, Peek and Haas-Gebhart have studied individual sites from Germany.[10] In Belgium the cemetery of Broechem yielded a large amount of textiles as well.[11]

---

1. Hald 1950/1980, Schlabow 1976, Van der Sanden 1996.
2. For publications regarding provenance studies see Frei 2013; theoretical approaches see Andersson 2007, Experimental approaches: Andersson Strand 2010, Hammarlund (various articles).
3. Gleba & Pásztókai-Szeoke, 2013; Nosch 2012; Gleba & Mannering 2012.
4. Bender Jørgensen 1986; Geijer 1938, Hald 1950/1980, Hougen 1935, Hägg 1984, 1991, Ingstad 1982, 2006, Mannering 1997, Nockert 1991, Østergård 1991.
5. Hundt 1966, 1972, 1981 and many others.
6. Tidow 1990, 1995, Ullemeyer & Tidow 1981, Tidow & Schmid 1979, Schlabow 1953, 1974.
7. Bender Jørgensen 1991, 1992; Tidow 1995.
8. Walton Rogers 2007; Owen-Crocker 2004, Harrington 2007, 2008, Swift 2004.
9. Rast-Eicher 2010, 2012; Desrosiers & Rast-Eicher 2012, and many more.
10. For Hessens see Siegmüller 2010, 183-202; Unterhaching has been published by Haas-Gebhard 2013 and some preliminary results from Dunum are presented by Fischer, Peek & Siegmüller 2012. The textiles from the cemetery of Lauchheim (1300 graves) are currently under analysis by the Landesamt für Denkmalpflege im Regierungspräsidium Stuttgart. Banck-Burgess (Banck 1998), Gauβ, Peek & Scheschkewitz 2013 published some preliminary results of this site.
11. For a preliminary report see Annaert 2012, Annaert & Ervynck 2013.

In this PhD-thesis the textile remains from early medieval settlements and cemeteries in the Netherlands will be discussed. The aim of the research is to reconstruct the use of cloth and clothing from cemeteries and settlements from the period 400-1000 AD in the area that is now defined as the Netherlands. In this respect the study aims to be a first step towards an up-to-date overview of different aspects of early medieval textiles, which further research can use as a starting point and continue to expand. However, creating an overview of the technical aspects of the fabrics that were used in this period is not enough. We are always trying to come to terms with the human aspects of the objects we analyse: how did early medieval men, women and children use these textiles, what did they mean to them and how do we explain the variability we perceive in the textiles? Therefore the research should also ascertain changes in the use of textiles throughout time and between different groups and contribute to the understanding of (changing) social structures in this period. In the fourth to seventh centuries, the Netherlands lies in the frontier zone of several spheres of influence. In the south was the Roman Empire and later the Frankish realm, while the Frisian north and west bordered on the North Sea area and the people living in this region had contacts with the Scandinavian and Anglo-Saxon worlds. During the period of research the entire region became part of the Frankish kingdom. The organisation and social stratification within the different areas of the region, which we now call the Netherlands, is subject to an ongoing debate. Since textiles and clothing are pre-eminently used to express identity (among which status), a basic knowledge of the variation of fabrics that were used in this period in different areas of the country will prove valuable.

This dissertation is not the first publication dealing with early medieval textiles from the Netherlands. In the past various authors have published textile finds from this region. These will be briefly summarised since they provide the background for the current research. Several museums and regional depots of archaeological finds in the Netherlands contain rich collections of textiles from the early Middle Ages. Parts of these collections were published by Schlabow, who described a considerable number of the textiles present in the Groninger and Drents museum[12] and by Bender Jørgensen, who made an inventory of textiles present in the Fries Museum in Leeuwarden, the Groninger Museum, Drents museum in Assen and the National Museum of Antiquities in Leiden.[13] The last decades witnessed the publication of several books and articles in which textiles have been described in more or less detail as well. A well-known example is the work by Vons-Comis who was the first textile researcher in the Netherlands to look further than the technical aspects of textiles in her reanalysis and reconstruction of the garments of the so-called Princess of Zweelo.[14] Other examples of textile publications discuss the sites of Dorestad and Middelburg.[15] Mineralized remains of fabrics have also been found in cemeteries but only few of these had been published before, mainly by J. Ypey.[16] Recently the catalogue of the cemetery of Rhenen has been published which includes a detailed inventory of the textiles by J. Ypey.[17]

Looking back at the research that has been conducted so far we must however conclude that early medieval textiles have been a somewhat neglected issue in Dutch archaeology. Where the surrounding countries have witnessed a development in which textile archaeology has become a fundamental part of archaeological site reports and many theoretical and comparative studies, a similar development has been lacking in the Netherlands. As a result our knowledge of the production and use of textiles and aspects relating to these subjects is mainly derived from the surrounding countries, where more textile research has been carried out.

This thesis is the final assemblage of several articles that have been published as individual articles or chapters in journals and books. To avoid overlapping descriptions of theory and questions, the original articles were modified and information was condensed. In the case study of Maastricht new

12. Schlabow 1974.
13. Bender Jørgensen 1992.
14. Vons-Comis 1988.
15. Miedema 1980; Leene 1964; Zimmermann 2005/2006; Zimmermann 2009.
16. Van Es & Ypey 1977; Ypey 1963/1964.
17. Wagner & Ypey 2012.

information was added in footnotes and figures. The case study of Nijmegen has never been published before and is a new addition to the data.

The final result of assembling all previously published articles has led to the following structure of this publication: the first chapter is an introduction and presents a general description of the research and its historical, theoretical and methodological framework. The following chapters describe the data of six case studies that were carried out. The thesis is concluded by a last chapter, which brings all data together and summarises the main conclusions.

1.2 RESEARCH QUESTIONS

This study aims to answer the following questions:

1. What textiles and clothing did people use during the early Middle Ages (400–1000 AD) in the area now called the Netherlands?

2. When we look at the distribution of the textiles: Which differences and changes are visible in the area and period under investigation? Are differences visible between sex and age groups, types of settlements, different types of cemeteries (such as rural, urban, rich and relatively poor)?

3. How may the differences observed in the textiles be explained?

4. Which spheres of influence are visible in clothing and textiles in comparison to the surrounding countries?

1.3 HISTORICAL AND THEORETICAL BACKGROUND

Textile research is closely related to other artefact-based studies and theoretical models. The historical and socio-political background of the area have to be taken into account to put the data into perspective. In the following paragraph a short introduction to the Netherlands during the early Middle Ages is presented to illustrate the framework in which the studied textile fragments were used and produced. In addition several theoretical models, which have been applied in this dissertation are described.

1.3.1 A short historical framework

Following the fall of the Roman Empire major changes took place in parts of the Netherlands. Although no demographic data are available to sustain the picture presented below, historical sources testify that Germanic people, who had hitherto lived north of the Rhine, moved south and colonised the arable lands that were abandoned during and after the unstable final stages of the Roman reign. In the course of the sixth century the Merovingian kings who's territory in the end consisted of large parts of France, Germany, Belgium and the southern parts of the Netherlands extended their reach northward. It is however unknown whether these political changes actually had demographical consequences. Archaeological evidence sustains the assumption that new settlements were created in this period in the south, allowing models of immigration or colonisation.[18] The north of the country saw different changes. Habitation of the raised mounds (*terpen*) in the northern coastal area was given up at the end of the third century. It is assumed that the Frisians living here migrated south and were incorporated in the northern Roman provinces. After the fifth century population increased again and the *terpen* were gradually reoccupied – presumably by Scandinavian and Saxon immigrants - and raised to meet the never-ending threat of the seawater.[19] The centre of the country and the higher grounds in the north show a much more stable habitation pattern. The changes over time in the western coastal areas are not easily explained. The discontinuity of habitation between the third and the fifth century is also observed here. In the fifth century new elements are introduced into the material culture but these changes occur not only locally and fit into a larger pattern that covers the coastal areas of England and Scandinavia. Influences from these areas are to be expected since the western (and northern) coast of the Netherlands was easily

18. Theuws 1999, 340; Theuws 2009, 309; Theuws & Van Haperen 2012, 10.
19. Gerrets 2011, 196.

accessed from these countries through the trade-networks over sea. Understanding the nature of the movement of people from this is however not easy. Dijkstra states that the changes in material culture observed in the western coastal areas, showing evidently Anglo-Saxon influences, may have been caused by small groups of immigrants but may also be the result of the entrée of foreign brides or merely of trade networks.[20] In the middle of the eighth century the central and northern parts of the Netherlands (Frisia) were incorporated into the Frankish realm, which may have resulted in more south eastern oriented influences.

Although settlements from the early Middle Ages are numerous, these are generally small and presumably of rural nature. Central places are scarce in the Merovingian period. From the fourth century onwards Maastricht developed into an important centre, becoming the administrative, commercial and religious centre of the area. The location of the old Roman castellum Traiectum in current day Utrecht shows signs of habitation during the fifth and sixth century and historical sources inform us of a church on this site in the seventh century. From this period onwards Utrecht developed into the religious centre of the area.[21] Dorestad (nowadays Wijk bij Duurstede) became an important centre in the early eighth century, but coins show that habitation already occurred as early as the sixth century. Other centres, such as Nijmegen, Deventer and Tiel developed later.[22]

It is assumed that Christianity did not spread evenly and at a regular pace throughout this region. Maastricht was an early religious centre in the area from the late Roman period onwards, while in Nijmegen Christian symbols have been found which date from the third to fifth century as well. In other places there is no proof for Christianisation earlier than the seventh and eighth centuries. The church in Utrecht for instance was founded around 630 AD and most cemeteries do not show any signs of Christian burial customs before the eighth century. This does however not need to imply that there were no Christians around: the heathen burial custom may have long been practiced while in other aspects the population acted as Christians.[23]

Discussing objects from early medieval contexts is directly related to discussing the matter of social organisation. Textiles are in many ways associated with the concepts of status and identity. They can be used to express a social position or vertical status of an individual or groups of people (see below). They were also part of a network of trade. The production of textiles was labour intensive and time-consuming, something that meant that textile production and the organisation of it was firmly embedded in the subsistence economy of the society in which it takes place. As Andersson Strand e.a. have described it : *"A textile is not simply a binary system of spun, twisted, or spliced fibres, but first and foremost a result of complex interactions between resources, technology, and society. The catalysts for this interaction are the needs, desires, and choices of any society, which in turn influence the exploitation of resources and development of technology. Conversely, the availability of resources and the state of technology condition the choices of individuals and society. The totality of these interactions is expressed during textile production."*[24] Therefore the different ideas regarding the way society was organized during this period will be briefly discussed here.

The Frankish realm is generally characterized as highly hierarchical with a substantial group of aristocrats at the top and several layers of social groups underneath. There may however have been local differences in the degree of social stratification in the periphery of the Frankish world. This model greatly contrasts with the picture often given of the Frisians living in the northern and western part of the Netherlands. The Frisians are described as tribal, more or less egalitarian, self-sufficient

20. Dijkstra 2011, 354.
21. Van Rooijen 2010, 158.
22. Nijmegen continued to be habituated from the Roman period onwards and became a Frankish administrative centre in the second half of the eighth century; Deventer developed into a town in the middle of the 9th century and Tiel became a city of trade from 900 AD onwards (Oudhof e.a. 2013, 133-134).
23. Willemsen 2014, 139 ff.
24. Andersson Strand e.a. 2010, 150.

farmers.[25] Local elites would not have greatly stood out from the rest of the population and would have secured their positions by providing gifts to their subordinates. Gerrets however states that the new Frisians that inhabited the northern part of the Netherlands from the fifth century onwards were of Saxon and Scandinavian origin and had a long tradition of complex social structures, including an aristocratic elite layer and hierarchically organized groups beneath. The differences between Frisian and Frankish social organisation may therefore have been smaller than generally assumed.[26] The concept of gifts being distributed by the aristocratic elite has been subject to debate as well. Traditionally it is assumed that the top layer of early medieval society controlled the distribution of tradable goods. They secured their power and the relations with their subordinates by providing desirable, exotic or luxurious goods.[27] This concept has been disputed lately. Theuws for example argues that the amount of luxurious objects found in rural cemeteries is too large to be merely the result of aristocratic control and gift giving and suggests that local peasants must have had direct access to exchange or trade networks.[28] Textile research can contribute to our understanding of the degree of vertical social stratification and the degree in which people had access to luxurious objects such as fabrics.

1.3.2 Theoretical framework

1.3.2.1 The social and symbolic dimensions of dress in early medieval society

Textile historians nowadays commonly accept the idea, that clothing is not merely 'practical' in function, but holds a social dimension as well. These social aspects of dress did however not receive much attention by dress historians well into the 20th century as is vividly pointed out by Taylor in her overview of dress history publications.[29] Stone made an important early contribution to the debate on the social role of clothing in 1962. He stated that the appearance of an individual is at least as essential for the establishment, maintenance and alterations of his identity as language.[30] Appearance, of which clothing is an important part, is therefore to be considered a form of communication. Many authors have developed this concept further, among which Barnes and Eicher have played an important role. In their 1991 article they state that *"On basis of ....visual impact and what we know of communication, we can expect dress to precede verbal communication in establishing an individual's gendered identity as well as expectations for other types of behaviour (social roles) based on this identity."*[31] They also posed a new definition of dress that not only included clothing but also body modifications (such as hair style) and body supplements (such as jewellery), which are equally if not more important ways to express gender roles as clothing.

Roach-Higgings and Eicher have furthermore pointed out that dress may express all sorts of identities: "*...individuals acquire identities through social interaction in various social, physical and biological settings. Identities are communicated by dress as it announces social positions of wearer to the observer...*" These social positions may arise by kinship, economic, religious and political activities.[32] In its simplest form, dress, textiles and dress accessories can be used to denote the identity of groups of people, or the position of an individual within a group. Bazelmans however was one of the first to stress that one should not only try to interpret dress in terms of social-political terms. Objects such as weapons and clothing do not merely reflect the position of their owner. He states that objects and the person wearing them are intertwined to such an extent that they influence each other's value. The image of a person thus creates his identity. In other words: a noble man may wear certain weapons

25. See Gerrets 2011, 198-199; Dijkstra 2011, 321, based on Wickham 2005, 542-545.
26. Gerrets 2011, 196 & 198-199.
27. Bazelmans 1999 (111-114, fig. 6.1); Bazelmans 2002, 80.
28. Theuws 2010, 58; Theuws 2014, 8.
29. Taylor 2004, 61.
30. Stone 1995 (1962), 19.
31. Barnes & Eicher, 1991, 17.
32. Roach-Higgings & Eicher 1995, 12-13.

and dress befitting his status, while the fact that he wears them will - in the eyes of his surroundings - automatically transform him into a noble man.[33] We should be careful not to mix up this concept with the modern concept of fashion, which is an economically stimulated construct based on mass production and the demand of individuals. Wilson and De la Haye for instance have pointed out that with the development of mass production fashionable clothing has become part of a mass culture whereby individuals express themselves and construct identities.[34] In the 1980's it was thought that dress could only become fashion (i.e. an instrument to create identities) in western capitalist societies, but this idea has been challenged since. Dress has been subject to change in non-capitalist societies as well so we can assume that not only modern fashion enables an individual to create his identity, but that the same processes could have taken place in earlier era's. Through its ever-changing nature however fashion probably does not have the same meaning as clothing did in the past.

In the past, differences in grave-inventories have often been explained in terms of ethnic identity.[35] Most recent publications on mortuary archaeology of the Merovingian period however have dismissed this line of interpretation.[36] There are several reasons to regard ethnic identity as an unlikely explanation for differences in textiles in Merovingian burials. Firstly, the mobility of goods (through trade) in this period was an equally important phenomenon as the mobility of people. Changes in textiles, therefore, are not automatically a reflection of migration of ethnic groups. Secondly, written sources and ethnographic research have demonstrated that dress generally serves as a vertical social marker instead of a horizontal one.[37] Pohl has pointed out that certain early medieval textual examples demonstrate that costume as an ethnic marker was not unknown, although its role in marking social distinctions such as age, gender or status was probably far greater.[38] We need to keep in mind that our ideas regarding horizontal group affiliation and clothing have been influenced to a large extent by the concept of national costumes and village costumes, of which we still see relics in our times. This however is a fairly modern phenomenon, created in the 19th century, where we see a (constructed) group affiliation reflected in the way people dressed, without there being an ethnic difference between the groups.[39] Nevertheless there are differences between archaeological sites and one can identify small (horizontal) regional groups based on their material culture (such as clothing).[40] Group affiliation in small regional groups may therefore be visible in the archaeological record but there are more ways to explain these than the ethnicity of the members of the group. Lastly, ethnic groups are generally ascribed to larger regions. The larger regional groups or material cultures that can be identified (often only by using statistical methods) do however not correspond to known ethnic units or their individual characteristics are so subtle that they may not have been recognised as such by the people involved.[41]

---

33. Bazelmans 2002, 79-81. The relation between dress and personhood has not been further elaborated in this thesis.
34. De la Haye & Wilson 1999, 1.
35. Summarized by Effros 2003, 101-108 and discussed by Theuws 2009, 288-293. See for examples the various contributions of Böhme 1974, 1996, Härke 1990, Koch 1998. Regarding costume reconstructions (based on the configuration of dress accessories) of the 'Franks' and other contemporary ethnic groups see for examples the contributions by Zeller, Vallet, Siegmund, Perin & Kazanski in Die Franken – Wegbereiter Europas 1996.
36. Theuws 2009, 288-290. Although Williams in his review-article of 2005 attentively states that no critical evaluation of this model has been carried out yet and that the current view on the role and symbolic use of Merovingian grave objects may just as well be a product of the political and social background of modern-day archaeologists as the ethnicity-model was of those in the past (Williams 2005, 200).
37. See for example Raudszus 1985, 183-194; Schubert 1993, 9-17, 61-69.
38. Pohl 2006, 137.
39. Schubert 1993, 9-17.
40. Schubert 1993, 12.
41. Pohl uses the example of the transition of the peplos towards the tunic to illustrate this point. This transition took place in the fourth/fifth century in several historically known tribes and from this we can conclude that there probably was no ethnic issue behind this change in dress. Pohl 2006, 136 & 141.

1.3.2.2 Mortuary practice as a social display and ritual performance[42]

The concepts described above may be true for the living population, but when dealing with the dead, it becomes even more complex. The Merovingian funerary ritual was not merely used by the living to express the identity, status or wealth of the deceased individual during his lifetime. It is also likely that the burial was instrumental in the creation of an identity, reflecting the aspired identity or status of the deceased or his/her descendants and expressing their own aspired relations with a leader or association with a specific group (of which they were or were not yet part).[43] This view is (partly) based on contemporary anthropological research pointing out that the dead were often presented with many extraneous objects in their graves, showing burial witnesses the wealth the heirs could afford.[44] Exotic objects were purchased exclusively to play a role in the burial ritual,[45] and old objects, having passed from one generation to another, were interred. Most likely, this was also the case during early medieval funerary rituals. It is assumed that many burials were adorned with additional grave goods that were not directly associated with the body of the deceased[46] and probably also with textiles more rich than usual, including shrouds or death robes made especially for burial. Some of these objects may have been circulated and used by the living (including the deceased or his ancestors) long before they were buried in the grave.[47] In this line of interpretation, the numerous goods and clothing deposited in graves may represent a competitive display of resources[48] or be laden with symbolic or amuletic meaning specific to the context of the funerary ritual.[49] It is often assumed that the textiles found in graves represent the daily clothing of the deceased, and therefore reflect the identity and social status of his life.[50] Following the concepts above it is possible to take a different view wherein the clothes themselves have been chosen in accordance with the social and symbolic function of the early medieval burial rituals. Resulting from the debate, grave objects and clothing are now considered to be symbolic for the social status, age or gender of the deceased and/or the mourners and as such played a role in the grave ritual. They were used to confirm or create the identity of the people involved in the burial ritual or social categories in general.

1.3.2.3 Perception of textiles and their qualities

Following the model of the burial as a stage in which all sorts of meaning may be attached to the grave inventory, the logical step forward is to try to grasp the differences between graves. Here we have to focus inevitably on the part of the burial ritual that we can still see: the visual aspects of the grave inventory, while other equally important aspects of the burial ritual, such as sounds, smells, presence and movement[51] are forever beyond our grasp. Defining differences between textiles often involves an assessment of quality. Textile quality can be determined by many factors such as the shape, drape, colour, pattern and texture of a fabric. These aspects are visible and recognisable with the naked eye and will have determined the way people perceived and valued these fabrics. In most textile studies however the quality of textiles is measured in numbers of

42. This section has been published previously in Brandenburgh 2012a, 126-127 (chapter 2) and is therefore removed from chapter 2.
43. Halsall 1995, 245-248; Effros 2003, 124-128; Cohen 1985 shows how symbols have different meanings for different groups and can change over time, enabling people to (re) create the boundaries of their social group, p. 16 & 50.
44. It is also possible that objects were brought by funeral attendees.
45. Effros 2002b, 69-91.
46. Evidence from burials in southern Germany from this period shows how the dead not only received objects in their graves, but also that these objects were wrapped in textiles or leather cases; Bartel 2003.
47. Kars 2012, 115-116; 125-127.
48. Pader 1982, 18ff.
49. Effros 2002a, 7; Coon 1997, 52-70 shows how the use of specific types of clothing plays an important role in the creation of archetypical roles in early Christian context.
50. Walton Rogers 2007, p. 245-246, for example, on the basis of the numerous repairs and wear on garments and dress accessories in Anglo-Saxon graves, concludes that the objects and garments in those graves had been used for a considerable time, and were not made especially for the grave. This is seen as evidence that most people were buried in their daily clothes and is contrasted to the royal burials, such as Sutton Hoo, where the grave goods were more numerous, and probably served as a public display.
51. Williams 2005, 208.

threads per cm and thread thickness; an analysis that requires a microscope. This is a somewhat technical and limited approach towards textile quality for early medieval people did not have to use a magnifying glass to assess the quality of a fabric and neither do we nowadays. In this study both methods will be explored: textile quality is assessed using both characteristics that can be observed by the naked eye as well as the microscopically measurable number of threads/cm.

Textile quality based on visible characteristics

The macroscopic characteristics of a fabric are often still discernible in early medieval textiles. Nevertheless, it is still difficult to attach meaning to them because we only have a generalized concept of the value people attached to objects, including their dress. In order to understand and measure these factors we will first have to understand how people in the past actually experienced what they saw. Wells argues that people in the past had a different frame of reference (cognitive map), causing them to see things differently than we do nowadays.[52] In other words: what people saw depended upon the cultural and historical circumstances in which they lived.[53] People in the past possessed fewer objects than we do nowadays and consequently these objects may have meant more to a person in history than in present times. Moreover, objects had greater significance to people who did not possess a system of writing, because they were means of communicating a whole range of information that is communicated in writing today.[54] It will therefore be impossible for us to perceive our archaeological objects the way people did in the early Middle Ages. Fortunately however, the way our eyes perceive information in general has not changed over time, and what we see is often determined by the fact that we unconsciously focus on a single aspect or pattern.[55] Wells study is based on this assumption and provides us with some useful tools to look at grave objects in a different way than we normally would. He discerns the following aspects that influence the way we see the characteristics of objects.[56] The size and texture of surfaces attract the eye, just as colour, decoration and glitter. *'Textured surfaces, whatever the nature of the texture, are visually more challenging and therefore hold our attention. It is the different ways in which differently textured surfaces reflect light that gives them their distinctive visual properties.'*[57] Although no written sources are available to help us understand the meaning attached to certain colours there is no doubt that from the Palaeolithic onwards colours were used in a symbolic way to express some sort of message.[58] The places best suited for decoration on the body are the region around the face, the upper half of the body (which is an ideal large and flat surface, blank except for colour and texture), the area of the belt and the wrists and feet.[59] Lastly, the way we see objects, depends on how they are lighted, and changes in lighting can greatly affect how they appear. Here Wells makes a connection between lighting and movement and states that objects are better visible when moving (for example in funeral procession).[60] Based on this study we may conclude that colour and decoration, preferably with contrasting coloured or shiny yarns (such as gold thread) and applied on certain areas of the body, are important aspects of garments that must have drawn the eye of the observer. Furthermore, as Wells and textile scholar and hand weaver Hammarlund both have pointed out, the appearance of the textiles – its texture or surface - may also have been of significance because it can be just as important in signalling social status as the form or shape of a garment.[61] Harris stresses that not

52. Wells 2008, 2012.
53. Wells 2008, 15 & 59; Wells 2012, 13.
54. Wells 2012, 8-9.
55. Wells 2008, 35.
56. Wells 2008, 43-47. In several examples Wells shows that these concepts are applied lavishly in rich burial contexts. Here many objects were used that visually made most impression on the people watching the burial: there are many visually complex objects and different colours in textiles. In ordinary burials generally no or very few visually complex objects are present.
57. Wells 2012, 29.
58. Scarre 2002, 230. In the early medieval period some colours were easily obtained while others required raw materials that were scarce or expensive. To wear them was thus a social signal to the wearer's contemporaries, that they could afford this level of luxury (Hedeager Krag 1993). However there may have been a whole range of other meanings attached to the use of colours in this period.
59. Wells 2008, 65-68.
60. Wells 2012, 156-157.
61. Hammarlund et al. 2008, 69.

only the surface and structure, but also the drape, properties of cloth types when used (warm, cool, soft etc.) and sometimes even their smell will determine how people experienced and valued fabrics.[62]

As mentioned above, textile analysis generally focuses on weave and number of threads/cm - two important characteristics of a fabric that contribute to the texture. However these are certainly not the only factors that determine the structure of a textile. For example, a fabric woven in tabby can be thin and delicate, using thin threads and open spaces between the threads, or coarse and densely woven, using thick threads. The eye perceives these differences but judging by the standard analytical methods for archaeological textiles, which uses thread count and weave, these differences are not so easily discernible.[63] Hammarlund has stated that aspects that determine the structure of textiles are the spacing of the threads (densely packed or loosely woven with open spaces between the threads), the regularity of the fabric and the thickness and degree of twist of the yarns in combination with the thread count. To measure or quantify this, we need to take into account the regularity and density of the woven fabric and the thickness and degree of twist of the threads.[64]

Textile quality based on thread count

A useful tool to analyse any type of production, including textile production, is the concept of *chaîne opératoire,* which considers a production process as a sequence of (interrelated) actions, influenced by technical possibilities, access to raw materials and personal, social and cultural choices and conditions.[65] Olaussen discussed the various types of production and the degree of specialisation one can achieve by using this model of *chaîne d'opératoire.* She states that the time and effort spent and the degree of specialisation needed for the production of specific objects can determine the value adhered to these objects.[66] Andersson adopted Olaussen's model for archaeological textiles.[67] She proposed that textile production on a household level required easy access to raw materials and widespread knowledge of the techniques needed to produce cloth, whereas specialized production involved the production of luxurious products, the investment of more time and required higher technical ability.[68] Following the assumption that invested time (partly) defines the value of the finished product, a fabric that required more time to produce would qualify as being of higher value.[69] Thread count and the quality of spinning (thread thickness) are easy ways to measure the time and effort involved in producing textiles for one may assume that weaving a fabric out of thin threads requires more time than coarser fabrics. It is however not evident that spinning thin threads required more time than needed to produce thick threads. Systematic spinning experiments have provided information on the types of threads one could make and the variation in required time connected to the use of different spinning whorls.[70] Kania concluded from these experiments that the used tools affect the quality and speed of production in only a limited degree. The person doing the work is a far more important factor in the outcome of the spinning process and experienced spinners could just as easily produce thinner threads as thick ones.[71] However, weaving a fabric out of thin threads generally requires more meters of thread, which means that altogether more time was needed for spinning before one could weave such a fabric and that more time was needed to weave as well. In this line of thought an assessment of the value of textiles recovered from settlements in the Netherlands has been published previously (see also chapter 6).[72]

62. Harris 2008, 82; Harris 2010, 105, 109.
63. Hammarlund 2005, 88.
64. Hammarlund 2005, 106-107; Hammarlund & Vestergaard Petersen 2007, 213; Hammarlund et al. 2008, 71-75.
65. Skibo & Schiffer 2008.
66. Olaussen 1997.
67. Andersson 2003 & 2007.
68. Andersson 2007, 151-152.
69. Brandenburgh 2010a, 54.
70. Andersson et al. 2008, Kania 2013.
71. Kania 2013, 24-26.
72. Brandenburgh 2010, 46-48.

1.4 DATASET

This study focuses on textile remains from nine cemeteries from the centre and south of the Netherlands (table 1.1). In addition textiles from 31 different settlements have been analysed, mainly from the north of the country (table 1.2). These finds are in many respects complementary: not only by their find context but also by their date and use (Merovingian cemeteries versus Karolingian settlements). The different cemeteries will be briefly described below, followed by a general overview of the settlement sites, including a reference to the case studies in chapter 2-7 where these sites are discussed in more detail. This section ends with some comments on taphonomy, quality and limitations of the dataset.

1.4.1 The cemeteries

1.4.1.1 The cemetery of Bergeijk (chapter 2)[73]

The cemetery of Bergeijk was excavated in 1957 and 1959, and was provisionally published by Verwers and recently in full by Theuws & Van Haperen.[74] With 126 graves it is the largest cemetery in the region and it has yielded several rich burials containing unique and exotic objects. The site is part of a small and spatially isolated cluster of cemeteries in the Kempen region north of Maastricht. The Kempen region is characterised by brook valleys, large areas of unfertile land and relatively small spots of fertile land. On these fertile patches several (presumably rural) settlements and cemeteries have been found. The area seems to have been colonised later in the sixth century and developed into the core of the pagus Taxandria. Within this core Bergeijk (together with Lommel) seems to take a central position. The cemetery was in use from the later sixth until the eighth century.

Fig. 1.1. Location of the cemeteries discussed in this study: 1. Maastricht, 2. Posterholt, 3. Bergeijk, 4. Wijchen, 5. Lent-Lentseveld, 6. Rhenen, 7. Leusden. Map: E.Gehring.

1.4.1.2 Posterholt (chapter 3)[75]

The cemetery of Posterholt is situated northeast of Maastricht. The site lies close to two important Roman roads: the road coming from Maastricht over Heerlen leading north along the eastern bank of the Meuse and another secondary road following the bank of the river Roer. The settlement that was originally associated with this cemetery has not been found. The area in the immediate vicinity is rich in archaeological finds from the Roman period and the early Middle Ages. The cemetery was discovered

73. Theuws & Van Haperen 2012, 11-16.
74. Verwers 1998; Theuws & Van Haperen 2012. The textiles from this cemetery were published in this volume, see Brandenburgh 2012a. This publication is one of the results of the Anastasis-project.

75. De Haas & Theuws 2013, 10-23.

in 1953. The 80 graves – dating from the period 510-750 - were excavated in 1983-1984 and were published by De Haas & Theuws as part of the Anastasis-project.[76]

1.4.1.3 The cemeteries of Maastricht: Sint-Servaas church, Vrijthof and Pandhof (chapter 4)[77]

During the Roman period Maastricht was a central place of administration and a wealthy centre of trade for the surrounding area. The Roman road from Tongres, the urban capital of the district, to Cologne passed through the town, crossing the Meuse with a bridge. Along this road numerous funerary monuments were erected.[78] Around 270 AD the vicus of Maastricht was (partly) demolished but after several decades intensive building activities and an increase in population give evidence of a renewed Late Roman habitation in Maastricht. During the fourth and fifth century Tongres declined in both size and population, while Maastricht only experienced an increase. Somewhere in this period Maastricht took over the role of Tongres as administrative and commercial centre of the area. The city was also a centre in religious terms. Gregory of Tours mentions the city in the sixth century. He describes how Servatius, a fourth-century bishop of the diocese, died in Maastricht and was buried in a cemetery along the Roman road. Whether Servatius was actually buried in Maastricht remains unclear. It has been argued that the tale of the burial may have been a construct of Gregory of Tours, who was a contemporary of bishop Monulphus, to legitimate and encourage the building of the new and big Sint-Servaas church in Maastricht.[79] The people buried in this Sint-Servaas church and in the cemeteries around the church are considered to be representatives of the higher social circles of society. Evidence supporting this assumption can be found in the many stone sarcophagi, the luxurious grave goods and the physical anthropological data of the human remains.[80]

Extensive archaeological research in and around the Sint-Servaas church has uncovered the remains of (predecessors of) the church and other religious buildings surrounding the church such as a monastery and chapel. Large areas within the church, monastery, chapel and outside the buildings were used as burial ground. These cemeteries have been excavated in 1953/1954 (Pandhof), 1969/1970 (Vrijthof) and 1980/1981 and 1985 (Sint-Servaas church)[81] resulting in the documentation of nearly 1700 graves.[82] Recently the objects from the Vrijthof and Pandhof cemeteries have been published by Kars.[83] Publications on the spatial aspects of these cemeteries and the finds and chronology of the cemetery of St. Servaas church are being prepared.[84]

1.4.1.4 Lent-Lentseveld (chapter 5)[85]

The cemetery of Lent-Lentseveld was found during large-scale building activities on the northern bank of the river Waal in the east of the country. The site was excavated completely in 2011 and consists of 50 inhumation graves with well-preserved human remains and 20 cremation graves. The first burials in the cemetery are from the period 475-500 AD but may be even older (>425 AD). The cemetery remained in use until the end of the sixth century. Lent-Lentseveld is situated in a landscape with a rich habitation history going back to the Bronze

76. De Haas & Theuws 2013.
77. The following paragraph has also been published in Brandenburgh 2015.
78. The remains of these funerary monuments have been documented and published by T. Panhuysen 1996.
79. Theuws 2001, 170-171; 2003, 12-13.
80. Kars 2011, 10; Panhuysen 2005, 37, 230 & 235 (regarding the Late Roman period), 241-242 & 249 (regarding the sixth & seventh century).
81. Panhuysen 1991.
82. Panhuysen 2005, 52 & 65-66.
83. Kars 2011.
84. These publications are the results of the Sint-Servatius- and Anastasis-project of the University of Amsterdam (since January 2012 this project has moved its base to the University of Leiden). These projects received large grants, making it possible to catalogue and analyse several cemeteries in the south of the country that were excavated in times when financial limitations prevented the analysis and publication. This project incorporates the spatial analysis of the graves, the human remains and the analysis of all the grave inventories. See Theuws & Kars in press for the Vrijthof cemetery.
85. Hendriks 2013.

Age. Evidence for habitation during the early Middle Ages is found 500 m southeast of the cemetery. Also known in the vicinity is another early medieval cemetery (Lent-Azaleastraat), situated 600 m east of Lent-Lentseveld and excavated in the seventies of the previous century. This cemetery consists of 120 graves dated to the seventh-eighth centuries and is therefore not contemporary to the cemetery of Lent-Lentseveld.

1.4.1.5 Wijchen (chapter 5)

The cemetery of Wijchen is situated approximately 10 km southeast of Lent-Lentseveld. The results of the excavations of this site (from 1991, 1992 and 1996) have recently been published, including a catalogue of the excavated textile fragments.[86] This cemetery has been in use for a longer period, starting around 350 AD and ending in the second half of the seventh century. Nearly 350 graves of which 309 were inhumation graves were excavated. Soil conditions were not as favourable as in Lent: the skeletal remains have sparsely survived and reconstructions of the burial population in this cemetery are therefore based on the gender-associated objects found in the graves.

1.4.1.6 Leusden

The cemetery of Leusden is situated on the border of the Gelderse vallei and the Utrechtse Heuvelrug in the province of Utrecht. It lies on a sandy slope that rose several meters above the surrounding landscape. The site was discovered in 1925 and excavated in 1983-1984 during the construction of a new motorway. During this excavation approximately 175 inhumation graves were documented.[87] This is probably not the whole cemetery; the northern boundaries of the burial ground have not been documented within the trajectory of the motorway. The cemetery was in use between the end of the fifth century and the middle of the eighth century.[88]

1.4.1.7 Rhenen[89]

The cemetery of Rhenen is situated in the centre of the country, on the slope of the Donderberg, overlooking the Rhine valley. The cemetery was excavated in 1951, bringing to light more than 1100 graves (including both cremations and inhumation graves). Only recently a catalogue of the grave inventories was published.[90] The cemetery was in use from the late fourth century AD to approximately 750 AD. Rhenen is generally considered a wealthy burial place but there are considerable differences between graves. Based on burial size (coffin versus chamber), the presence of horse burials and horse harnesses and the quality and quantity of the objects deposited in the graves, there obviously is a cluster of rich graves present, but the majority of the graves is far more modest in terms of deposited grave goods.

This is also the case in the burial grounds in the vicinity of the cemetery of Rhenen such as Wageningen, Leersum, Ermelo, Garderen and Putten. In these cemeteries a wagon grave and several other rich graves have been found.[91] The wealth of the cemetery of Rhenen is therefore not unusual in this region, but it does stand out by its sheer size. The large amount of cemeteries in a relatively small area indicates that every village had its own cemetery and that there are differences within the buried population regarding the wealth in which they were buried. At the end of the seventh century the area around Rhenen was lying in the frontier zone between the Frisian and Frankish spheres of influence. From historical sources we can gain an impression of the struggle between Frisian and Frankish elites over the control of this important central part of the country. Influences from both the north and the south may therefore be reflected in the graves.

86. Heeren & Hazenberg 2010; Brandenburgh 2010b.
87. Van Tent 1985 & 1988.
88. The cemetery was reanalysed as part of the Anastasis-project. The author thanks M. de Haas and M. van Haperen who made their documentation and results available.
89. Huiskes 2011.
90. Wagner & Ypey 2012. Unfortunately this catalogue does not include the dates of the individual graves.
91. Remains of a wagon have been found in a grave on the Koerheuvel, north of Rhenen (Huiskes 2011, 17).

Site	n inhumation graves	n graves containing textiles	N textiles	Period which cemetery was in use	Date of the textiles
					400 500 600 700
Bergeijk	126	17	40	(565) 590 - 730/40	
Lent-Lentseveld	50	21	44	(425) 475 - 600	
Maastricht - Vrijhof	456	10	11	400 - >750	
Maastricht -Pandhof	830	26	25	510/20 - > 725	
Maastricht - St. Servaas Church	385	21	59	400 - >750	
Oud-Leusden	175	17	22	460 - 750	
Posterholt	80	15	22	510/20 - 750	
Rhenen	820	157	306	375 - 750	
Wijchen	309	45	87	(300) 350 - >640	
		329	616		

Table 1.1. Cemeteries discussed in this study; including the amount of graves containing textiles, the number of textile fragments per cemetery and the period in which the cemetery was in use.

1.4.2 The settlements (chapter 6 & 7)[92]

Most of the settlement textiles analysed in this study were uncovered in the dwelling-mounds (or *terpen*) in the north of the country.[93] The habitation of the earliest *terpen* dates back to ca. 600 BC. Textiles from the *terpen* are often broadly dated due to the way they were recovered. At the end of the nineteenth century the soil that had accumulated for centuries had been discovered as a valuable fertilizer and therefore groups of diggers methodically dug away large parts of the mounds. These people sometimes had an eye for antiquities but as they dug straight from the top down, they could collect objects dating over 1000 years apart in one single day. As a result there may be textiles in the dataset spanning approximately the period from 500 BC to 1500 AD. Other sites have a shorter habitation history and the textiles from these sites have been assigned to these habitation phases. A small percentage was found in large settlements of a different character, such as Dorestad and Middelburg. The textiles from these sites are dated to shorter periods. Other textiles have been dated using radiocarbon analysis, while one find complex was found in association with a hoard of coins and could consequently be dated precisely.[94]

92. The following paragraph is based on Brandenburgh 2010a.
93. The textiles from the settlements in the Netherlands have been published in Brandenburgh 2010a, 2012b & 2012c.
94. Brandenburgh 2012b.

Site	N individual woven textiles	N individual cords, ropes and braids	Habitation period of site	Date of the textiles 300 400 500 600 700 800 900 1000
Aalsum	6	0	300-900	
Anjum	1	0	700-1400	
Beetgum	1	0	350-900	
Blija	1	1	600 BC-900 AD	
Cornjum Dekema-/ stoomterp	3	1	400 BC-900 AD	
Cornwerd	0	2	475-725	
Dokkum, Berg Sion	77	2	500-900	
Dorestad, Wijk bij Duurstede	3	3	600-900	
Emmer-Erfscheidenveen	6	0	unknown	
Ferwerd Burmaniaterp	12	3	200 BC-900 AD	← 200 BC
Ferwerd Burmaniaterp II	1	0	400 BC-900 AD	← 400 BC
Foswerd	4	0	350-900	
Holwerd, dorpsterp	0	1	350-900	
Hoogebeintum	5	1	350-900	
Jouwswier	0	1	350-900	
Kimswerd	1	0	300-900	

Table 1.2. Settlements discussed in this book; including the number of textiles per site and the period in which the settlement was in use and the date of the textiles within this habitation period.

1.4.3 Taphonomy, quality and limitations of the dataset

1.4.3.1 Cemetery textiles

Research of burial textiles has many advantages over the study of settlement related textile fragments. Cemetery finds are often reasonably well dated. The fine chronology of the metal objects offers the possibility of creating a detailed typology of the associated textiles used throughout the Merovingian period in different areas of the country. Furthermore, the sex and age of the deceased and the position of the textiles in the grave and in relation to the body are often known. Research of cemetery textiles therefore offers many chances for reconstructing the clothing of the deceased and the way the graves were furbished in the Merovingian period. After the Merovingian period the burial tradition changed. The contents of the graves from this later period are more sober for they lacked the grave goods that were deposited in the previous period. Unfortunately, the decrease in number of grave objects over time leaves us with fewer textiles, which makes it increasingly difficult to reconstruct burial clothing in this later period. Textiles found in Dutch settlements may give insight into these later periods while many of these finds are dated up to 900 AD. The context and use of these textiles is however so different from the cemetery-finds that a real comparison is not feasible (see below).

Site	N individual woven textiles	N individual cords, ropes and braids	Habitation period of site	Date of textiles: 300 400 500 600 700 800 900 1000
Kloosterwijtwerd	4	0	0-900	
Leens	42	10	600-900	
Leeuwarden hoogterp	7	2	350-900	
Menaldum	1	2	unknown	
Middelburg	12	0	875-1600	
Oosterwijtwerd	2	0	350-900	
Oostrum, Mellemastate	4	0	500-900	
Rasquert hat	1	0	350-900	
Rasquert other finds	4	0	350-900	
Sellingen/ Zuidveld	2	0	350-900	
Teerns	1	1	200 BC-900 AD	← 200 BC
Ulrum	1	0	600-800	
Westeremden	26	1	500-1000	
Wetzens	0	5	350-900	
Wierhuizen	1	0	250 BC - 1300 AD	← 250 BC; 1300 AD →
Wijnaldum	5	3	100-1000	← 100 BC
unknown, prov. Groningen	1	0	unknown	
Total	235	39		

There are several limitations of the dataset from the cemeteries. The most important one is the fragmentary character of the textile remnants. Due to the soil conditions in burials organic substances such as leather and textile are generally only preserved in a mineralized form resulting from direct contact with metal artefacts. This process of mineralization occurred in the first months after burial and was influenced by factors such as moisture, acidity, soil type and temperature. For a detailed description of the process and speed of decay and mineralization of textiles in burials see chapter 4 (section 4.4). Textiles that were not in contact with metal decayed in the years afterwards. Consequently we only find remains of cloths or other grave furnishings in graves that contain metal dress accessories. Many graves however lack metal objects which means that the persons buried here were dressed or shrouded differently: either without dress accessories at all, or with objects made out of other materials such as bone or wood. One could argue that the people who could afford metal artefacts were only a small or upper part of society and that the textiles excavated in cemeteries are those from the upper part of Merovingian society, but this is not likely. The amount of luxurious or exotic objects in Dutch cemeteries is simply too large to be reserved for the elite only.[95] We more and more get the impression that luxurious objects were within reach of many layers of Merovingian society and that the variation observed between rich and

95. Theuws 2010, 58; Theuws 2014, 7.

less rich graves within the cemeteries reflects other social processes or structures present at that time or different ritual repertoires. This does however not automatically mean that the buried population is an exact mirror of the living population. Some of the graves with few or without metal objects may have belonged to the poorer part of the population, but on the other hand, objects made out of organic materials could have been equally precious and been worn with luxurious garments as well. Moreover the deposition of objects in graves gradually disappears in the course of the later seventh century in the south of the Netherlands and in the eighth century in the central and northern parts. Since no textiles are available from these 'empty' graves it is difficult to determine whether the excavated textile fragments are a realistic mirror of the type and quality of clothing in this period or of a small percentage of the population.[96] The expected increase of the dataset may however solve this problem in the future.

Another problem textile research faces is the fact that many graves have been reopened in the period the cemetery was in use or shortly after that period. This act was in most cases not economically motivated (grave robbery), but was probably part of the complex process of treatment of the dead.[97] During the reopening of the graves the objects were often removed or at best displaced, resulting in a decrease in metal objects and, as a result in fewer textile finds.

Information was not only lost during the period that the textiles were buried. After excavation many metal objects underwent restoration, which often included the complete removal of all organic materials. Consequently many of the important objects from the graves, such as weapons and brooches are lacking all traces of textiles. In some cases, such as Maastricht and Rhenen, the restorer took care to document the textiles that were to be removed.[98] The author gratefully included this information in the database, but unfortunately this documentation is far from complete. Only the objects not suitable for exhibition purposes were left in their original state, leaving the mineralized remains of textiles preserved on these objects. After restoration however, the non-conserved objects, including the textiles adhered to them, have deteriorated further resulting in worn down and indeterminate fragments of textiles and damaged fibres. Due to these poor conditions it was often not possible to determine the weave, thread thickness, spin or fibre type. The preservation of the fabrics from recently excavated sites is in general higher than those of cemeteries that were excavated 20 years ago or earlier. As a result, there are biases and gaps in the dataset, which makes a comparison between different cemeteries somewhat cumbersome.

The fine chronology of the cemetery finds has been praised above as one of the qualities of the textile dataset. Some critical remarks regarding this chronology are necessary as well. Kars has pointed out that chronological seriation which is the basis for dating early medieval cemetery-finds overlooks the fact that there is considerable variation in grave inventories caused by social processes. Differences between gender and age can result in different grave assemblages within contemporary graves.[99] Moreover objects may have had a longer pre-burial circulation than we expect or objects have been included in the grave that are not contemporary, but heirlooms, saved for the special occasion of the burial.[100] These circumstances disturb the chronological framework and should be considered as a warning against using a too detailed chronology. Another problem arises when we try to compare the textiles from different periods. Textiles have been assigned to specific phases, which often overlap each other. As a result making a chronology with well-defined boundaries automatically becomes artificial.

1.4.3.2 Settlement textiles

Preservation of non-mineralized textiles is determined by many factors such as acidity, presence of micro-organisms and oxidization. For a detailed description of degradation and preservation of different fibre

96. Theuws en Van Haperen 2012, 150.
97. Van Haperen 2010.
98. P.A. Rossel documented the textiles from Maastricht - Sint-Servaas church; those from Rhenen were documented by J. Ypey.
99. Kars 2012, 111
100. Kars 2012, 115-116; 125-127.

types see chapter 6 (section 6.2.2.1). Soil conditions in the settlements were favourable for fabrics made out of animal fibres (such as wool) but not for plant fibres resulting in a well documented but incomplete dataset.[101] Textiles from settlements are dealt with separately for several reasons. One is geography. Most textiles were recovered from the *terpen* sites in the north of the country setting them apart spatially from the cemeteries found in the centre and south of the Netherlands. Furthermore, as mentioned above, they are generally poorly dated. This makes it impossible to combine the datasets from these two types of sites to create a chronological framework for textiles in the early Middle Ages. We should also consider that the use of textiles found in settlements was probably different from those in cemeteries. The textile remnants found in 'refuse' layers in settlements are likely to have been garbage, while burial textiles as argued earlier represent part of the funeral display. The fragments from settlements are generally heavily worn, re-used and finally discarded as rags, which makes it difficult to ascertain their original function. The textiles from the settlements do however have considerable qualities as well. These textiles are often preserved in much larger pieces giving ample opportunity to study the woven patterns and traces of sewing and to reconstruct the cut and shape of some garments.

1.5 METHODS

The analysis of the textiles comprised two phases:

1. A technical analysis of the finds from individual cemeteries to present an overview of the range of textiles used in each site.

2. A spatial and chronological analysis to reconstruct the use of the textiles in the burials, distinguish developments over time and differences between cemeteries or groups of burials within the cemeteries on the basis of textiles.

101. Huisman 2009, Brandenburgh 2010a, 45.

1.5.1 Technical analysis

The cemetery textiles have been analysed using a stereo-microscope (magnification 6-40x). The analysis comprised identification and description of several aspects of the fabric, including yarn type, twist and thickness, weave type, density and quality of the fabric. There are several reference works for describing archaeological textiles.[102] In this study the publications of Walton & Eastwood and Burnham have been used to describe and categorise the character of the yarns and the fabrics types. Quality of textiles has been assessed measuring thread thickness and thread count (number of threads/cm). There are several systems in use that categorise groups of textiles according to thread counts.[103] In this study textiles have been divided into quality groups using the categories defined by Tidow.[104] The density of the fabric has been assessed as dense where a fabric showed no spaces between the threads, or open where there were spaces between the threads. Warp and weft could generally not be identified since starting borders and selvedges are often lacking in the dataset. In many cases the system with the highest thread count may be considered the warp, but since there are exceptions to this rule the terms warp and weft have been avoided and replaced by 'system X' and 'Y'.

102. Emery 1980, Burnham 1980, Walton Rogers & Eastwood 1988. The Textillexikon by Diehl, De Graaf & De Jonghe 1991 is – like Burnham 1980 - based on the standardized glossary of the Centre International d'Etude des Textiles Anciens (CIETA, Lyon).

103. Grömer 2010, 120; Tidow 1995. Tidow 1995 has published several contemporary textile assemblages from Germany. He assessed the quality of these textiles by measuring the number of threads per 2 cm's. When we apply this to the current methods of measuring threads/1 cm Tidow discerns the following quality groups: Very coarse: <5threads/cm; Coarse : 5-7,5 threads/cm; Medium fine:7,5-12,5 threads/cm; Medium fine to fine:10-15 threads/cm; Fine:>15 threads/cm. Grömer uses the same methods for assessing the quality of the prehistoric textiles from Austria but uses slightly different names and boundaries between the quality groups, Grömer 2010, 120.

104. Tidow's scheme has been slightly modified to avoid the overlapping categories 'medium fine' and 'medium fine to fine': Very coarse: < 5 threads/cm; coarse: 6-9 threads/cm; medium fine:10-15 threads/cm; fine: >15 threads/cm. The term 'very fine' is also used in the text for textiles finer than 20 threads/cm.

Fibre identification of the textiles was conducted using an optical metallographic microscope Nikon optiphot 2 (magnification 200x or 400x, camera Nikon DXM 1200). Fibres were identified as either wool or plant fibres.[105] In many cases however the fibres were damaged to such an extent that fibre analysis was not possible. Dye analysis has only been conducted in a few cases. Reconstructing the dyes that were used is often difficult. Natural dye materials deteriorate over time and may have disappeared entirely during the period the textile was buried. Consequently a negative result in dye analyses does not necessarily mean that a fabric was not originally dyed. Many dyes that were locally available, like the brown colours from nuts and bark, would be hard to detect as well. It is generally difficult to discern the chemical signature from these dyes from those naturally present in the soil because of their similarity to material found in the natural environment. Furthermore objects may have been contaminated during the period they were buried. In those cases the chemical signature of those contaminations may be detected which could be mistaken for original dyes. As a result the outcome of both fibre analysis and dye analysis may give an indication but may not be considered as reliable evidence. The results of the technical analysis have been recorded in a database that has been kindly made available by English Heritage.[106] Also recorded are the position of the textile on the metal object and the position of the object in the burial. Using this information it may be possible to distinguish certain groups of textiles associated with specific objects in the graves. This provides information on the types of textiles placed or worn on different parts of the body.

The stratigraphy of the textiles has been recorded using the methods and colour coding applied in the cemetery of Unterhaching (fig. 1.2; methods developed by the Bayerischen Landesamte für Denkmalpflege).[107]

The textiles from the cemetery of Rhenen have not been analysed by the author. Information regarding the textiles has been derived from the publication of Wagner & Ypey.[108] J. Ypey was a restorer who had a thorough knowledge of textile techniques and who systematically documented the organic remains before cleaning and restoring the metal objects that past his laboratory. Although his recordings are not complete and may need correction on minor details, his observations are in general good.

1.5.2 Spatial and chronological analysis

A spatial and chronological analysis of the cemetery finds was made to reconstruct the use of the textiles in the burials, distinguish developments over time and differences between cemeteries or groups of burials within the cemeteries on the basis of textiles. The association of textiles with object types could be ascertained, although in many cases these objects were no longer in their original position. This provided information regarding the types of textiles placed or worn on different parts of the body, enabling us to gain a generalized picture of the use of the textiles in the grave. This picture can be complemented using the data derived from the settlement textiles.

Groups within the cemeteries could be defined on the basis of the chronology of the cemetery, but have furthermore been defined in terms of gender/sex[109] and (where possible) age.

Statistical analyses of the dataset have not been conducted for two reasons. Firstly, the number of textiles in the dataset is not large enough and the timeframe in which they occurred is too wide to allow that kind of statistical use. Secondly, trends and distribution patterns of information gathered under

105. Appleyard 1978; Catling & Grayson 1982. Preservation of the textiles from Sint-Servaas church and Vrijthof was very poor and it proved impossible to identify fibres from these textiles. Plant fibres were not further identified into species.
106. The full database is available through Leiden University institutional repository.
107. Nowak-Böck 2013, Nowak-Böck & Van Looz 2013.
108. Wagner & Ypey 2012.
109. The quality of the human remains in the cemeteries varied considerably. Due to the excellent state of preservation and the advanced methods of excavation all textiles of Lent-Lentseveld can be associated with men, women, children of different age groups. The textiles from the other cemeteries have been assigned to gender, which was based on the presumed gender associations of the objects present in the graves.

a microscope and that are statistically observed are unlikely to have been perceived as such by the people who made and used the textiles.[110] Therefore the technological data provided by textile analyses have only been used to sketch trends and developments on a larger scale.

A comparison between the (distribution and quality of the) textiles and similar information from the other grave objects has not been made because the analyses of the grave objects of several cemeteries were not yet completed and this information was not available yet. Moreover, it has been a deliberate choice to carry out the textile analyses as an independent discipline first before starting a comparison with other types of finds. This will allow for an objective assessment of the characteristics of the textiles.

Lastly, no mention will be made in this dissertation of the reliquary textiles from Sint-Servaas church[111] because these textiles more often than not come from other locations and the origin of these textiles cannot be traced back to specific burials. Neither will the Maaseik textiles be discussed because they lie beyond the geographical reach of this study.

1.6 TEXTILE PRODUCTION, TECHNOLOGY AND TERMINOLOGY

In the early Middle Ages textiles were made in various ways. In the following section the production process of textiles in this period is discussed, including the terminology, which has been used throughout this thesis.

1.6.1 Textile production in the early Middle Ages

Textile production was a long and elaborate process in which fibres were produced, harvested, processed, spun into yarns and woven into pieces of fabric.[112] The first step in the process is the procurement and processing of fibres. Early medieval textiles were made of fibres from plants such as flax, hemp and nettle, or from animal fibres such as sheep's wool, and in small quantities silk. Fabrics in which fibres from goat, beaver or rabbit were used have been known in this period as well,[113] although these are rare and not observed in Dutch cemeteries. After shearing, sheep's wool needed to be sorted into different categories, washed, dried and perhaps dyed, and impregnated with oil. Prior to spinning the wool was further prepared by combing, thus aligning the fibres in the same direction and/or separating the long hairs of the outer fleece from the soft and short fibres from the inner fleece of the sheep. Plant fibres from flax and hemp needed several steps to acquire. After harvesting the plant, the stems were gathered in bundles and these were combed – a process called rippling – to remove the pods from the upper stems. After this the stems were retted, i.e. left to rot for several weeks in a pond or stream in order to break down the stems. These retted stems were dried again and pounded – presumably with a wooden object - to break up the stem further. Then comes the step called scotching which involved swiping of all loose fragments with a wooden blade resulting in clean fibres. These fibres are still in their natural bundles, which need to be split into single fibres during a process called heckling. In this final stage the bundles of fibres are hackled, or combed using a wooden board with a dense amount of metal spikes sticking out.

Gold thread was used to embellish certain areas of the clothes. There are several ways gold thread was produced during the early Middle Ages. It could either be drawn by pulling small rods of gold through diminishing holes in a so-called drawing plate, or it could be cut from a thin sheet of hammered gold foil into flat thin strips (so-called lahn). Lahn could be further processed by wrapping (or spinning) it around a core of silk, wool or linen.[114] Gold thread could either have been embroidered onto the cloth (gold appliqué) or worked into a pattern in tablet woven bands (also called gold braids or brocading). The latter technique generally resulted in narrow bands up to a cm wide but gold thread could also

110. Pohl 2006, 136.
111. Stauffer 1991.
112. For an overview see Walton Rogers 2007, chapter 2; Grömer 2010, 43-220.
113. Owen-Crocker 2004, 182.
114. Reifahrt 2013, 60-61, 75.

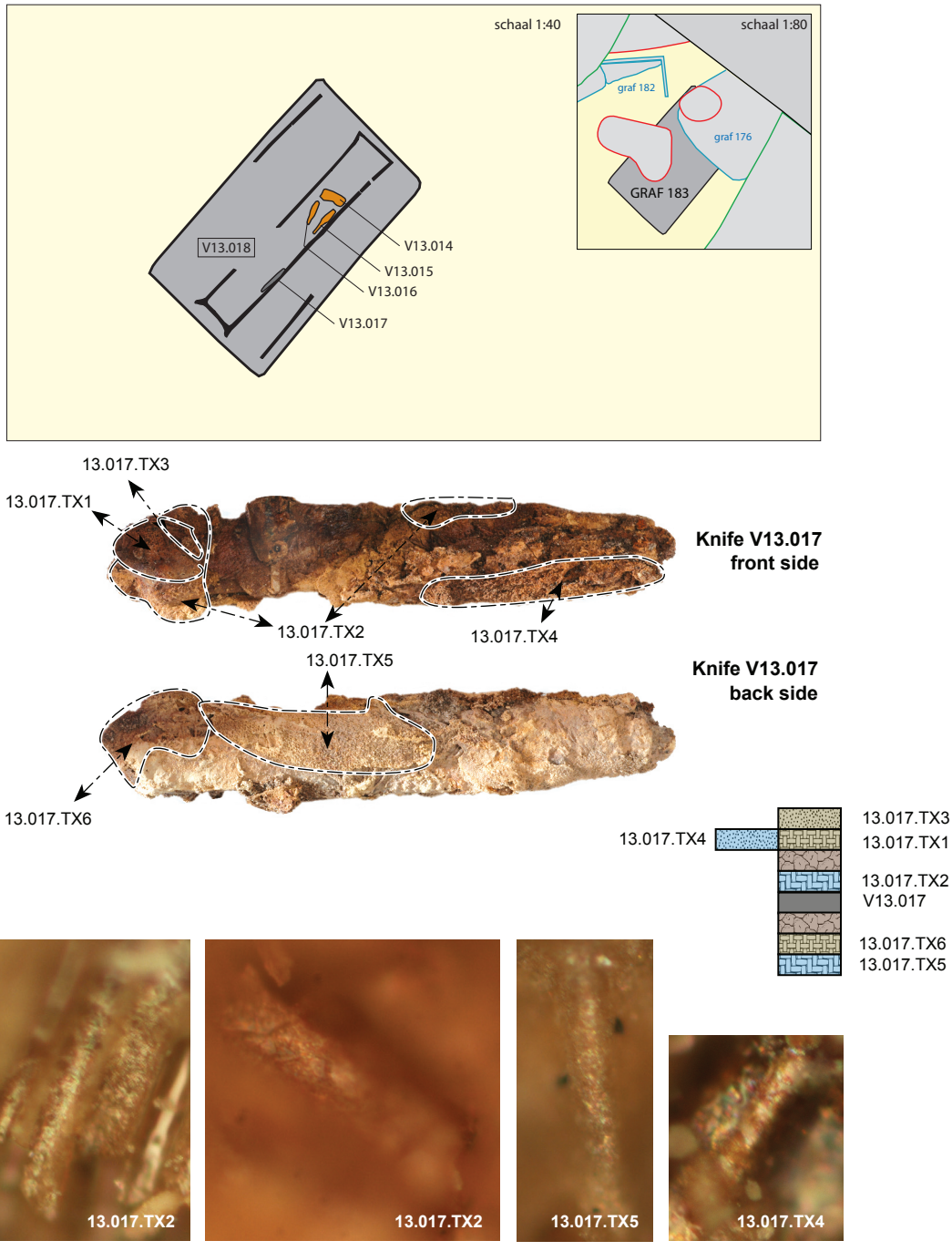

Fig. 1.2. Example of the way textiles have been recorded in the cemeteries. The location of the textile in the grave and on the object has been documented. Technical aspects of the fabric have been analysed. Where possible the fibres have been identified and recorded on photograph. Lastly the stratigraphy of the objects and the textiles has been recorded using the methods and colour coding applied in the cemetery of Unterhaching (methods developed by the Bayerischen Landesamte für Denkmalpflege, Nowak-Böck 2013).

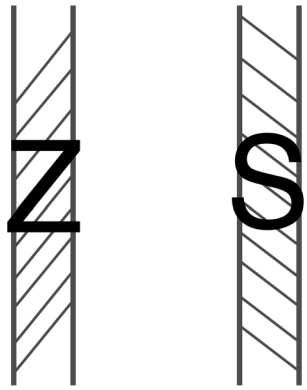

Fig. 1.3. The direction of the twist of a yarn is indicated as z or s.

Fig. 1.4. Small ball of wool found in the settlement of Teerns. Photo: M. Schouten.

have been incorporated into wider bands of several centimetres.[115]

Spinning yarns from wool or plant fibres is generally done using a spindle. Depending on the direction the spindle rotated, the threads were twisted either clockwise or anticlockwise, resulting in z- or s-spun thread (fig. 1.3). To produce a thicker or stronger yarn, string or rope, two or more threads were plied together. The produced yarns were wound into balls or skeins (fig. 1.4).

Dying was a process that could be done at several moments in the textile production process: in the wool, i.e. before spinning; yarn-dyed, after spinning, or piece-dyed after weaving. In early historic times many dyes were used.[116] A red colour was obtained from dye material extracted from different species of dyer's madder (*rubiaceae*). Red could also be obtained from Kermes insect or from insects of the *Porphyrophora* species. Blue colours were obtained from woad (*Isatis tinctoria L.*).[117] Yellow dyes were extracted from weld (*Reseda luteola L.*), which was widespread in western Europe.[118] Another source for yellow dye materials is the plant Dyer's broom, which has been identified in nineth century finds form York.[119] Purple was obtained from lichens of the genera *Ochrolechia* and *Umbilicaria*. Different hues of brown would have been obtained using natural dyes from bark and nuts that were readily available in any wooded area.

The process of weaving large pieces of cloth was generally conducted on a loom.[120] At least two types of looms are known from this period: the warp-weighted loom and the two-beam vertical loom. Finds of loom weights in settlements from this period in the Netherlands suggest that the warp-weighted loom (fig. 1.5) was used here.[121] This type of loom would

115. The use of gold thread in woven bands (gold-brocading) is discussed by Crowfoot & Hawkes 1967, 43; Walton Rogers 2007, 96-97; Owen Crocker 2004, 283-285. See also section 4.5.2.
116. For an overview see Cardon 2007; Brandenburgh 2010 54-56 summarises the use of dyes in textiles from the Netherlands.
117. Cappers 1994.
118. Cardon 2007, 170.
119. Cardon 2007, 177.
120. Walton Rogers 2007, 28.
121. The two-beam loom was entirely made out of organic materials and consequently archaeological remains of this loom type are very rare. Since no parts of the two-beam loom have been found in the Netherlands it is not certain whether this type was in use in the area.

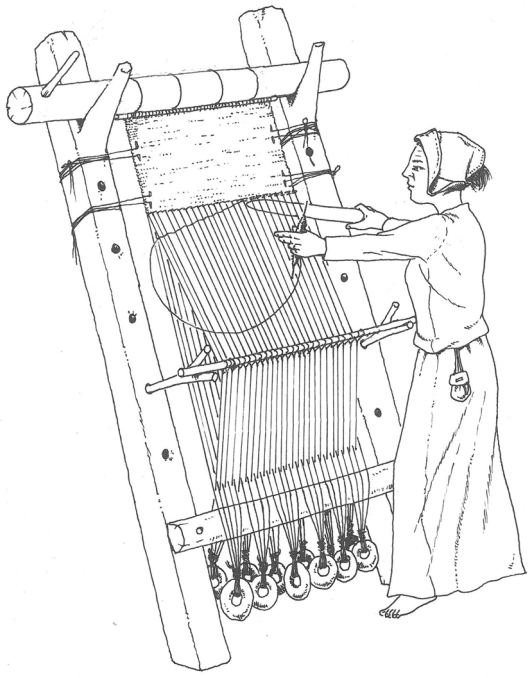

Fig. 1.5. Reconstruction of a warp-weighted loom. Drawing: C. van Hees.

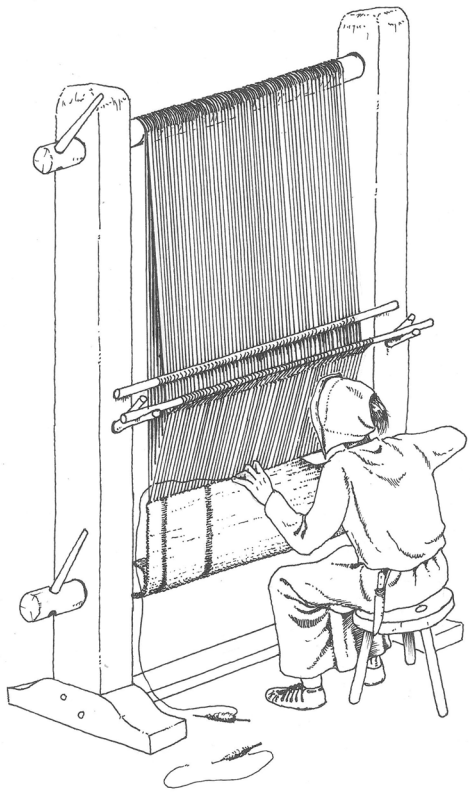

Fig. 1.6. Reconstruction of a two-beam vertical loom. Drawing: C. van Hees.

have stood slightly at an angle against the wall of a building. The vertical threads of the fabric, the warp, were hung onto the upper crossbeam of the loom and put under tension by attaching loom weights. The two-beam vertical loom (fig. 1.6) was used during Roman times and must have remained in use in parts of France during the Merovingian and Carolingian period, re-emerging in more widespread use around the end of the 9th century.[122] Henry associates the change of loom with a predominance of a weave-type, which hitherto had not been very popular, the 2/1 twill.[123] Moreover the shift from one loom type to the other may be related to a change in the organisation of textile production from a domestic basis to a more organized and centrally controlled production.[124] If and when this loom type was actually in use in the Netherlands is not certain. From the 10th century onwards historical texts mention a third loom type: the horizontal treadle loom (fig. 1.7).[125] The oldest finds in northwest Europe associated with this loom type are dated in the 10th century.[126]

122. Henry 1998; Henry 2005.
123. Henry 1998, 159.
124. Henry 2005.
125. Cardon 1999, 412.
126. See for a detailed discussion of these loom types Brandenburgh 2010a, 56-58 (case study 5).

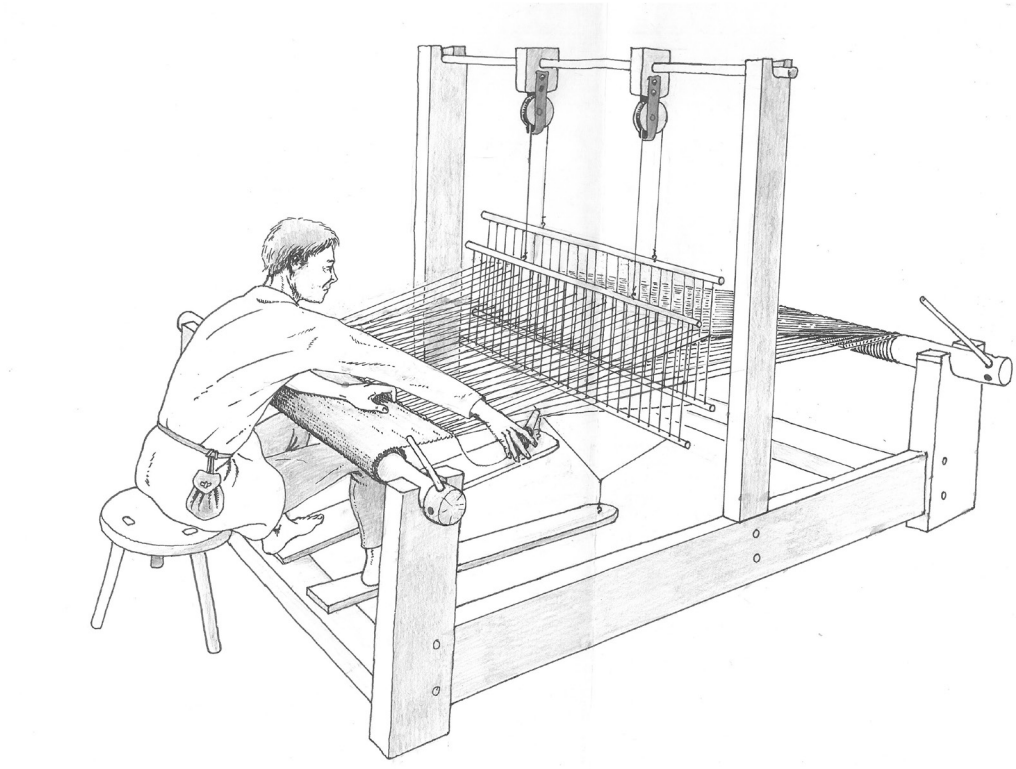

Fig. 1.7. Reconstruction of a horizontal treadle loom. Drawing C. van Hees.

Smaller bands or ribbons could be woven with a band loom (rigid heddle) or in the technique called tablet-weaving (fig. 1.8). Tablet weave (or card weave) is a band-weaving technique made with a number of tablets with four (or two) holes through which the warp threads are threaded. The spacing between the holes of the cards creates a shed through which the weft thread is woven. By turning the cards the warp threads are twisted around each other and a new shed appears. The resulting band has the appearance of several cords (weft threads twisted around each other), parallel to each other and held in place by the weft threads. The end product of this weaving technique is a strong band, which could be sewn onto cloths as decoration or reinforcement.

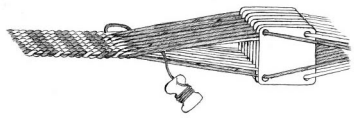

Fig. 1.8. Tablet weaving.

Weaving was not the last step in the process of textile production. Linen fabrics were often washed and bleached to achieve a white colour. Woollen fabrics would be wetted, brushed and in some cases be felted (fulled) in order to make them more dense and waterproof.

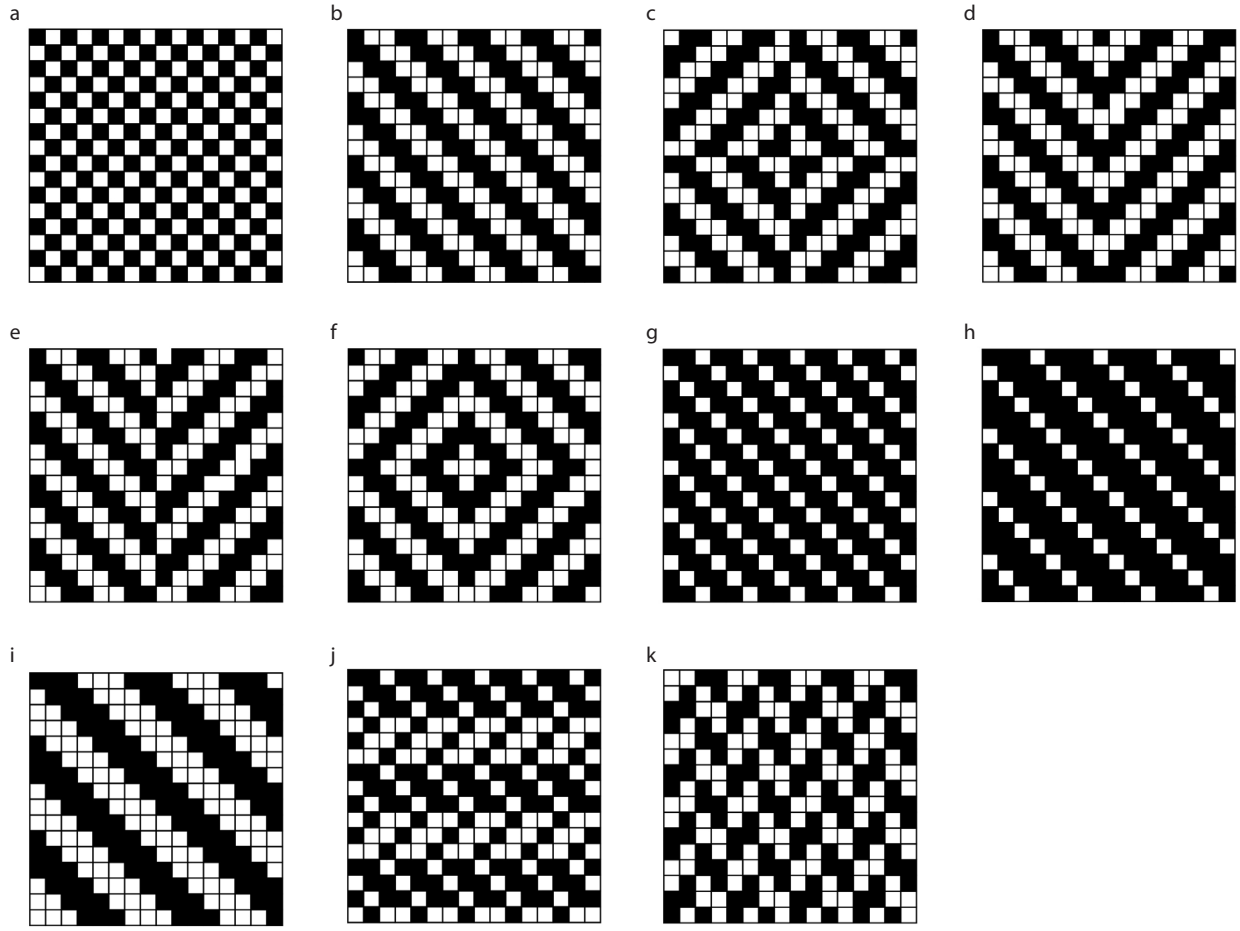

Fig. 1.9 Fabric types documented in the Netherlands (in cemeteries and settlements).
a. tabby, b. 2/2 plain twill, c. 2/2 broken diamond twill, d. chevron twill, e. herringbone twill, f. lozenge twill, g. 2/1 twill, h. 3/1 twill, i. 3/3 twill, j. Rippenköper, k. cross twill.

1.6.2 Terminology

The appearance of a fabric is determined by the way the horizontal weft threads were woven into the vertical warp threads. During the early Middle Ages, several types of weaves were in use. In the cemeteries and settlements of the Netherlands fabrics were generally woven in tabby or 2/2 twill. Variations of 2/2 twill such as broken diamond twill, and other types of twill (2/1 twill, 3/1 twill, 3/3 twill, chevron twill and Rippenköper) were also observed in small quantities. Tablet weave has only been documented twice. Some textiles were decayed to such an extent that identification of weave was not possible.

1.6.2.1 Tabby weaves

In a tabby weave, the weft threads regularly pass over and under each warp thread. A tabby can be balanced with (more or less) equal numbers of threads/cm in warp and weft. Where one system has more than twice the amount of threads/cm than the other it creates a very dense fabric called a repp weave. Since starting borders and selvedges are generally lacking in archaeological finds it is impossible to tell which thread system is warp and which is weft.

1.6.2.2 2/2 twills

In 2/2 plain twills, the weft thread passes over two and under two warp threads, creating a diagonal woven pattern. 2/2 broken diamond twills are 2/2 twills in which the weave is reversed in both systems, resulting in a diamond shaped pattern. The size of the diamond (or the pattern repeat) may vary, depending on the amount of warp and weft threads used during each reversal. When the pattern reverses in only one system we speak of chevron or herringbone twill

1.6.2.3 2/1 twills

In 2/1 twills, the weft thread passes over 2 and under 1 warp threads, creating a diagonal pattern. If the weft passes over 1 and under 2 warp threads the term 1/2 twill is used.

Rippenköper is a kind of 2/1 twill where the pattern is reversed to 1/2 twill after three weft threads. The term was introduced by H.-J. Hundt (1966).

1.6.2.4 3/1 twill and 3/3 twill

3/1 twills are twills in which the weft thread passes over 3 and under 1 warp thread. In 3/3 twills the weft thread passes over 3 and under 3 warp threads.[127] Both fabrics create a diagonal pattern.

127. This fabric type has been documented by J. Ypey in the cemetery of Rhenen. It is very unusual in this period. Unfortunately this observation could not be checked by the author.