Excavation Techniques in Historical Archaeology

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This paper discusses the development of excavation techniques in England and their application to historical archaeology in Australia. Edward Higginbotham, a consultant archaeologist in Sydney, applies his experience of excavations in both countries to a critical analysis of various excavation methods, including test-pits, trial-trenches, the grid method, and area excavation. The advantages, efficiency, technical limitations and sample bias of each are compared, and the use of the grid method is questioned. The author argues that grid excavation resulted in serious misunderstanding of archaeological evidence in England, and gives two examples, one from the Romano-British, the other from the Anglo-Saxon period. The failure of the grid method was demonstrated only by improved excavation technique. The paper concludes with a discussion of the relationship of excavation to research design, the conservation of the archaeological resource, historical evidence and extant remains.

1. INTRODUCTION

In recent years there has been an increasing number of excavations on important historic sites in Australia. This has stimulated discussion on excavation technique and the methods appropriate for tackling each excavation problem.

All excavation technique in Australia ultimately derives from overseas, and predominantly from England, but there has been little attempt to develop or innovate upon this basis of acquired skill. This is not surprising, since the *trade* of excavation is not learnt from textbooks but from a long *apprenticeship* served on a number of excavations over several years. The difficulty of obtaining experience in the excavation of historic sites in Australia has hindered the development of excavation technique. Only with the recent large-scale or lengthy projects, such as Hyde Park Barracks and the Royal Mint, Sydney, First Government House, Sydney, and Port Arthur, Tasmania, has the opportunity arisen. As Philip Barker has pointed out, 'This continuous modification of techniques during the course of long-term excavations is one of the principal ways in which the science, or art, of excavation advances'.[1]

The experience of archaeologists in Europe is therefore relevant to historical archaeology in Australia. Although there are many differences between British archaeology and Australian historical archaeology, the principles of stratification, as they apply to archaeological deposits, are universal, so that the same range of techniques can be used to excavate an archaeological site wherever it occurs. This argument is supported by many archaeologists including Wheeler and Barker.[2] However, in historical archaeology there are important factors which influence excavation, the most obvious being research design but also the detail of historical documentation and the study of extant structures, in relation to the sampling of archaeological sites.

This paper therefore sets out to discuss first the development of excavation techniques in England, and second the use of these techniques in historical archaeology in Australia.

2. THE DEVELOPMENT OF ARCHAEOLOGICAL EXCAVATION TECHNIQUES IN ENGLAND

> 'There is no right way of digging but there are many wrong ways' (Wheeler).[3]

Many archaeologists have made important contributions to writings about the history and development of archaeology in England, but few have attempted to explain why excavation technique has advanced in one particular way rather than another. No strict historical approach to this topic will be used here, instead the following discussion will trace the logical development of excavation technique from the recognition of geological and then archaeological stratification to the present day. The approach may appear to be an oversimplification but before discounting it, it should be noted that the basic principles of excavation are simple and rely upon sometimes obvious and mundane observation. Without this logical approach, archaeologists would not be excavating today to such a high scientific standard. It is hoped that the following discussion will set the development of excavation technique in a more universal context, rather than merely in its usual regional or national framework.

Geologists understood the principles of stratification long before archaeologists observed their application to archaeological sites. The discovery of the full significance of stratification in terms of relative chronology is attributed to Steno, Smith and Lyell during the seventeenth to nineteenth centuries.[4] The simplest and most labour-efficient method of observing stratification is by cutting a narrow trench or by digging a small pit. It is for this reason that much early excavation was undertaken on this basis: trial-trenches and test-pits became the order of the day. The questions asked of the archaeological site related only to chronology and sequence. In other words the investigations concentrated on the third and fourth dimensions of depth and time. One is reminded of Sir Mortimer Wheeler's analogy of trains and time-tables:

> 'Vertical excavation alone, whilst supplying a key to the length of an occupation, to its continuity or intermittency, and to some part of its cultural equipment, cannot be expected to reveal save in the most scrappy fashion the significant environment—economic, religious, administrative—of a human society. In other words, it leaves us in the dark as to those very factors which fit a past culture or civilization into the story of human endeavour and so make its recovery worth while. It is the railway time-table without a train.'[5]

Wheeler's use of the term *vertical excavation* in this quotation, and elsewhere in conjunction with the term *horizontal*

excavation, requires some explanation. He defined the terms as follows:

> 'From time to time the question arises: shall stress be laid (in some particular programme of work) upon horizontal or upon vertical excavation? By 'horizontal excavation' is meant the uncovering of the whole or a large part of a specific phase in the occupation of an ancient site, in order to reveal fully its layout and function . . . By 'vertical excavation' is meant the excavation of a restricted area *in depth*, with a view to ascertaining the succession of cultures or of phases and so producing a time-scale or culture-scale for the site. The two procedures are of course complementary, not antagonistic . . .'[6]

Immediately the archaeologist wished to ask questions about the layout and function of the archaeological site, then several options were available. In many cases, additional trial-trenches or test-pits were excavated, thus still concentrating on vertical excavation. Alternatively the emphasis could be changed to horizontal excavation. On deeply stratified sites in South-West Asia, with upwards of 10 metres of archaeological deposits, trenches remained the only viable option for investigating the deepest levels. However, Wheeler was highly critical of those archaeologists who still preferred trenches and pits on those sites which required horizontal excavation.[7]

In spite of an early concentration on vertical excavation, horizontal excavation did form a significant proportion of early archaeological investigations. Some notable early examples include the meticulous excavations undertaken by Pitt Rivers at Cranborne Chase between 1881 and 1896[8] and the near total excavation of the Glastonbury Lake Village by Bulleid and Gray between 1892 and 1907.[9] Gray had in fact assisted Pitt Rivers at Cranborne Chase. The contribution made by these archaeologists to excavation technique in England was not recognised, nor their example followed, until well into the twentieth century. Similarly, the role played by Van Giffen, Hatt, Steensberg, and Bersu, in the development of the techniques of horizontal excavation in Europe from the 1920s to the 1960s, has long been underestimated.[10] However, in England in the 1930s horizontal excavations, unencumbered with a grid layout of baulks and sections, were being successfully undertaken (for example, the excavations at Richborough by Bushe-Fox, cited by Wheeler[11]). Thus by the 1950s, when Wheeler was writing *Archaeology from the earth*, the whole range of available excavation techniques had been well tested: including trial-trenches, test-pits, and horizontal excavation without intervening baulks or sections, and finally, Wheeler had perfected his technique of horizontal excavation by squares on a grid layout.

2.1 The grid layout

The term *area excavation* may now be substituted for horizontal excavation. The proponent of area excavation may be surprised to learn that Wheeler termed the grid layout an area excavation. This was, nevertheless, the case. However, for the purposes of this paper the term *area excavation* will be used to describe excavations without an intervening grid of baulks and sections, the term *grid layout* being reserved solely for Wheeler's method of area excavation.

In common with other archaeologists, Wheeler realised that equal emphasis should be given in excavation to the horizontal as well as the vertical record. But the question remained of how to reconcile the importance of the third and fourth dimensions of depth and time with excavation predominantly in the first and second dimensions. Wheeler's response to this question was to develop the grid layout or grid method of excavation. He argued that:

> 'An area-excavation must be:
> (a) conveniently and clearly subdivisible for record and control;
> (b) capable of easy, progressive expansion in any direction without breaking down or impairing the preliminary datum-lines;
> (c) capable of preserving for constant reference at a maximum number of points complete vertical sections until the last phase of the excavation;
> (d) capable, ultimately, of easy integration into a continuously exposed regional excavation;
> (e) readily accessible to all points for the removal of soil, without hindrance from intervening cuttings or traffic across excavated surfaces; and
> (f) sufficiently open to the sky to ensure the easy inspection of well-lighted sections at all required depths.
>
> Only one type of layout normally supplies all these needs: namely, a layout based upon a *square* . . . A series of squares, a grid, dug so that a balk [*sic*] is left between each pair of adjacent squares until the extreme end of the work, supplies all the six prerequisites.'[12]

Wheeler would probably have conceded now that the grid layout was not the only alternative, but it is this method of excavation that played a major role in British archaeology until the 1960s, and still remains important in Australian historical archaeology. It is for this reason that some of the consequences of the grid method for British archaeology will be considered.

2.2 The consequences of the grid method of excavation

> 'There is, to repeat, no objective truth buried in the ground waiting to be revealed by the archaeologist: he and his results are creatures of himself, his times and his techniques.' (Fowler)[13]

Wheeler considered the size of the grid square to be very important. He stipulated that the sides of the square should be of equal or greater length than the expected depth of stratification. As a minimum he advocated squares with sides 10 feet in length (3 metres approximately)[14] and yet many archaeologists who have used the grid method subsequently have resorted to smaller squares. As will be discussed below the use of a grid of less than 3 metres substantially increases the shortcomings of this technique. Barker has the following to say:

> 'Sir Mortimer [Wheeler], like many innovators, transcended the limitations of his innovations. This is perhaps because he worked on a grand scale, and because he was aware of the need to see the evidence horizontally as well as vertically . . ., so that he usually finished up with a large open area. His followers—that is, nearly all excavators working in Britain between the 1930s and 1960s—usually worked on a much smaller scale. As a result the *sample* was too small, often no more than one or two trenches or a small grid of boxes, even, on occasions, tiny trenches leap-frogging in a line across large and complex sites.'[15]

One of the most significant consequences of the grid method was that it prohibited the full interpretation of timber buildings. This is very important to the situation in Australia, because in England the failure of the grid method was recognised only with a substantial development of excavation technique. Area excavation by the grid method alone cannot reveal that an important proportion of the evidence is not being fully recognised, or fully interpreted (refer to Figure 3.6, Diagram 6 in G. Webster's *Practical archaeology* for an effective illustration of this argument[16]).

As a result of the general adoption of the grid method in England, the archaeology of the Roman and Post-Roman (Anglo-Saxon) periods suffered several misconceptions. For

example, the plan of Roman towns obtained by grid excavation revealed a regular layout of *insulae* or blocks with stone buildings covering a proportion of each block (for example Caerwent, South Wales). It has only since been realised that not all the blank spaces are yards and precincts, but frequently unrecognised timber buildings. Consider, therefore, the consequent re-appraisal of urban life in Roman Britain. Another important example is found in the Anglo-Saxon period: until area excavation demonstrated otherwise, it was generally accepted that between the Roman period and the Norman Conquest people lived in pit-dwellings—the Dark Ages were truly upon us! It is now realised that this misconception was caused simply by the shortcomings of grid excavation. Two important area excavations in the 1950s and 1960s finally dispelled the myth: these were both excavations on the sites of Anglo-Saxon timber palaces, namely at Yeavering between 1953 and 1958[17] and at Cheddar between 1960 and 1962.[18] The pattern of the post-holes of these buildings was only recognised by area excavation.

Those examples given above are extreme cases. In historical archaeology in Australia it is unlikely that misconceptions of this magnitude are possible, given the availability of detailed historical documentation. But it is the detail of the archaeological evidence recovered from an area excavation that is unlikely to be recoverable using the grid method. For example, see the plan of insubstantial remains recovered by Barker at Hen Domen, Montgomery,[19] or that of the evidence of rectangular buildings excavated by Guilbert at Moel Y Gaer, Clwyd.[20] G. Webster, one of the greatest proponents of grid excavation, summed up the situation in the following manner:

> 'The old-fashioned method of setting the site out on a grid and excavating in squares does not allow a proper excavation of the structures in their entirety. One needs to examine the contemporary occupation of a whole building or substantial part of a building. It is impossible to do this if there are baulks and the building is deep. On a 3 m (10 ft) square grid the baulks can occupy at least a third of the area investigated, but they have their uses. They preserve the vertical stratification and provide ways across the site without walking over the excavated areas. It may be desirable at the beginning to leave some baulks, which can be removed later when they interfere with the study of the structures.'[21]

This is an important concession to area excavation from an archaeologist obviously very reluctant to discard the well-tried methods of the past.

2.3 Area excavation

> 'One of the greatest difficulties with horizontal excavation is to reconcile the need for a constant overall view of the excavated surfaces with the need for sections.' (Barker)[22]

It was on those sites where all the archaeological stratigraphy cut into the surface of the subsoil or bedrock and was revealed simply by the removal of topsoil, that the advantages of area excavation without an intervening grid of baulks was recognised. On a grid excavation, if one section recorded only the depth of topsoil, and every other section that same information, then all but one section was soon found to be redundant and was removed or not strung out in the first place. With the removal of unnecessary baulks, one of the main advantages of area excavation immediately became apparent, namely that the overall layout of the site was clearly visible. In England the recognition in the 1960s of the massive threat posed to sites of this type by developments such as motorway construction, new towns, and deep ploughing, dealt a substantial blow to excavation by the grid method.

The adoption of area excavation on sites with shallow stratification was a natural step. However, for deeply stratified sites the case is very different. To illustrate this point, the dichotomy in stratigraphic terms of archaeological sites becomes important. P. Barker put the case very simply, and explained the consequences for excavation:

> 'There is, of course, a fundamental difference between those excavations in which the sole evidence consists of horizontal changes in the colour and texture of the soil and those where there are superimposed levels, complicated by the presence of vestigial stone walls, pebble surfaces and other fragments of structures. The latter type of site is immeasurably more complicated to dig, especially if the superimposed layers are very thin, and if subsequent structures have removed parts of even these thin layers, their discontinuity making them yet more difficult to trace and interpret.'[23]

The recognition of the advantages of area excavation on shallow or simply stratified sites in England led to an important question: could the same techniques be applied to complex and deeply stratified sites? In order to answer this question it is necessary to look first at the purpose of the section and secondly to discuss some of the other ways in which the vertical evidence may be recorded.

The use of the section to record the third and fourth dimensions of depth and time—Wheeler's 'railway timetable'—has already been noted. The section records two types of information, the first being stratigraphic relationships, and the second, evidence complementary to drawn plans to allow for the complete reconstruction of an archaeological site at least on paper. It may be argued that since all excavation destroys the evidence being recorded, the record should be as complete and as thorough as possible. This includes sufficient evidence to reconstruct the site in three dimensions.

With these two requirements in mind, namely the record of the stratigraphic relationship, and three dimensional reconstruction, the various ways of obtaining such evidence can be considered. The section or baulk is the traditional method, and Wheeler's grid layout fulfilled also the reconstruction requirement. Other methods include contour surveys or levelling, cumulative sections, and network analysis (the Harris Matrix). These methods have long been available, but only recently have they been applied consistently to archaeological excavations. For example, as long ago as the 1920s Hatt pioneered in Europe the detailed levelling of archaeological sites during excavation, so that sections could be later drawn along any chosen line.[24]

The Harris Matrix, or as it was earlier known, the Harris-Winchester Matrix, was developed for use on archaeological sites in Winchester, Hampshire, between 1967 and 1971.[25] It has become an essential method on deeply stratified sites for correlating archaeological deposits and understanding stratigraphic relationships. As Harris has pointed out:

> 'On these complex sites, few sections can give a representative view of the stratigraphic sequence of a site. It is also extremely difficult on such complex sites to choose beforehand a line for a section which would give a "representative vertical view" of the stratification as the orientation of features on the surface may not be that of those underground. Sections moreover only record the physical relationships of the stratification at a given point. Away from the section face, different relationships are often found and sections therefore will give a simplistic, rather than representative, view of the stratification or the stratigraphic sequence of a complex site. The Lower Brook Street excavations at Winchester, for example, produced over ten thousand units of stratification . . . from an area about 20 × 30 × 2 metres. With such complex strati-

fication from such urban sites, it would be difficult to obtain a section which would be representative of little more than the section itself.'[26]

On large area excavations many small features are not easily related to the major sections surrounding a trench, by using the conventional graphic or written records. The Harris Matrix fills this gap by allowing all units of stratification to be interrelated.

The modifications proposed to the Harris Matrix by Barker should be noted, especially for Australian sites. He stated that:

'If the boxes for feature/context numbers were square the forms would be more flexible, since large horizontal excavations need many numbers written across the page but comparatively few downwards. In practice also, it is common to construct the matrix in rough before transferring it to the printed form, a process which often involves much crossing out and rearrangement. A board, fitted with rows of slots, made either of bands of cloth or metal, so that numbered cards could be slotted into them, or, alternatively, a peg-board with a series of movable numbers, would save time and aid clear thinking.'[27]

On many small excavations with few contexts to deal with, the time and effort required to construct a matrix diagram may be unwarranted. On more complex sites the time-consuming alterations and rearrangements may be overcome using computer programmes to sort out and display stratigraphic relationships. For example, such a programme has been used by the Central Excavation Unit in England since its establishment in 1975.

With the recognition of the disadvantages of the traditional baulk and section, area excavation has concentrated on developing the other available methods, but not to the point of totally excluding the older established techniques. Half sections and other vertical sections are still in common usage but are usually confined to individual contexts rather than across the whole site. Using this broader range of techniques, area excavation has been applied successfully to deeply stratified sites in Europe.

3. CRITICAL ANALYSIS OF EXCAVATION TECHNIQUES

'One of the major technical advances of recent years has been to develop excavation and recording procedures entirely meeting the needs of the stratigraphic principle, while giving much greater flexibility to respond during the excavation to the archaeological needs of the site rather than the clerical needs of the archaeologist.' (Fowler)[28]

Most textbooks on excavation technique contain lists of the shortcomings of various excavation methods, accompanied by brief discussion of selected points. A similar approach will be used here, but with the discussion centred on issues relevant to historical archaeology in Australia.

3.1 Trial-trenching and test-pits

Trial-trenching and test-pits have received the greatest amount of criticism for their misuse. Wheeler's assertion that 'trial-trenches rarely prove anything, save of the most general kind' still rings true.[29] Wheeler stated that trial-trenches:

1. 'mess up' a site,
2. 'are liable at any considerable depth to become excessively confined and difficult to work in',
3. do not allow their stratigraphy to 'be viewed comprehensively and at adequate range',
4. cannot be laterally enlarged without complications endangering accuracy.[30]

Wheeler's first point requires little more comment other than to state that:

'Only an excavator who has dug on a site already riddled with trial trenches from previous excavations will know how almost inevitably these trenches destroy areas of vital evidence; sometimes in the only places where relationships between structures can be tested.' (Barker)[31]

It must be recognised by all archaeologists that the dimensions of the trench ultimately determine the efficiency and safety of work. In England archaeologists have been killed by sections collapsing in deep trenches. The old rule should not be forgotten that the width of a trench should be equal to or greater than its depth. Otherwise the trench should be shored up or timbered, which by obscuring the sections makes interpretation difficult.

With regard to efficiency during an excavation it may be necessary at some point to remove a layer using a pick, shovel and wheelbarrow. (Naturally consideration should be given in these cases to the thickness of the layer involved, the source of the material, and the likelihood of discovering important artifacts, before resort is made to wholesale and insensitive methods of excavation.) Both pick and shovel are approximately one metre in length, so to have a trench with a width less than this measurement will mean that these tools cannot be used efficiently. Where both the length and width of a trench are restricted, as in test-pits, the problem becomes more acute. Only small hand tools can be used, and in addition it is difficult not to trample on already cleaned surfaces. As a result it takes much longer to excavate a given number of contexts in a test-trench or trial-trench, than it does in a larger excavation. The same problem arises when the excavation of a context is impeded by baulks and sections.

However, by far the more important criticism of test-pits and trial-trenches is the difficulty in recognising archaeological features. The slight differences in soil composition which denote the presence of archaeological features will either be difficult to recognise or partly obscured by sections. So before even considering the problems of sample bias inherent in small trenches (see below), the failure to fully recognise deposits compounds the limitations of such excavation.

The obvious answer is of course to dig wider trial-trenches, perhaps between 2 and 3 metres wide, and certainly not less than 1 metre wide. Techniques such as augering may provide more information than small test-pits, and are certainly less destructive.

Wheeler's fourth criticism is a reflection of the recording techniques of the day. These are not described here, but are explained in full by Wheeler and others.[32] Modern recording techniques overcome the problems of extending archaeological excavations: while today a single numerical sequence is used to record all contexts on the whole site, in the past recording was divided up into several sequences. Each square or trench would be identified, and then a separate sequence of numbers would be used for layers, sometimes also for pits, post-holes and possibly other categories in each square. Naturally such a system would lead to complication if a trench was extended.

Most archaeologists now accept that trial-trenches or test-pits are of limited use. They should be confined to the cross-sectioning of linear features or the preliminary location of archaeological sites.[33] However, even with linear features most authors point out the need to excavate a substantial length in order to pick up changes in construction, intermittent features, or longitudinal variation.

3.2 The grid method

The unsuitability of employing the grid method to excavate timber buildings has already been noted. Contrary to trial-trenches where the failure to recognise archaeological features is explained in terms of sample bias, the failure of the grid method is more obviously due to technical problems. Various authors have listed these problems, the list published by Browne being representative:

1. separate squares have differing rates of progress, so that the excavation does not remain in phase,
2. baulks obscure evidence,
3. baulks have fixed positions, some of which prove to be incorrectly placed,
4. there is a lack of co-ordination between squares.[34]

One could also add to this list the loss of efficiency when the use of appropriate tools is impeded by limited space confined by sections and baulks.

The reasons why the grid method has failed to fully interpret timber and other insubstantial structures require some explanation. Referring back to Webster's comments on the grid method, he states that at least a third of a site may be obscured by baulks.[35] It is not surprising that a proportion of the post-holes forming a timber building will be located under baulks. Nor is it unreasonable to suggest the same for pebble floors, walls or any other structural elements. Unless all baulks are removed at the end of the excavation, there is a strong possibility that the archaeological remains will not be fully recognised or fully interpreted. If the baulks are removed at a late stage, their excavation will also be totally out of phase with the remainder of the site. It will thus be very difficult to obtain a photograph of the complete floor plan of any structure, especially if it appears high up in the stratigraphy of a site. Furthermore, the excavation of a baulk is similar to a trial-trench, where the greatest care has to be taken to recognise, record, plan, and correlate each context with what has already been excavated. In practice, however, when baulks are removed late in an excavation, they are often removed in a piecemeal and hasty fashion.

The grid system will provide a large number of baulks which record redundant information, or which are in the wrong position. The most surprising response to the incorrect positioning of baulks using the grid layout was by Wheeler himself, where one grid was placed diagonally within the original grid, so that triangles and slit-trenches had to be excavated.[36] Wheeler's intention was of course to record features running diagonally to the original grid, but his excavation problems in this case must have been severely complicated.

It will not be unreasonable to suspect that a grid layout of baulks will record some stratigraphic relationships repeatedly, so that some sections may not even require recording, even though the baulks may have obscured important information while they have been left in place. Furthermore, the most representative and accurate sections are obtained by cutting features at right angles to their main axis, by half-sectioning or quadrants. To section a feature diagonally distorts one dimension at least. However, this state of affairs has to be accepted with the grid method unless numerous separate sections are to be excavated and recorded.

In areas subjected to torrential rainfall, the presence of vertical sections should be minimised. How often have archaeologists seen collapsed sections, eroded surfaces, and streams of silt and mud across areas crucial to the understanding of stratigraphic relationships!

The use of a mechanical excavator to remove overburden is prohibited by the use of the grid method. To mechanically excavate a site and then to impose a grid upon it inherits all the technical difficulties of the grid system, and none of the advantages. As noted above, Wheeler's grid system had the advantage of recording the overall contour of layers on a site, thus allowing it to be reconstructed on paper in three dimensions. This ability is frustrated by the prior use of the mechanical excavator, unless a contour survey or other more appropriate technique is used initially.

The lack of co-ordination between squares, noted by Browne, refers to recording techniques. Even using modern pro-forma recording sheets, the recording of the grid excavation has complications. One of the basic principles of recording is that each context receives a unique identification number. Unless two contexts can be demonstrated to be the same then they should be given two separate numbers. The inefficiency of the grid method for recording can then be perceived. For example, if a single layer covers the whole site, and the grid excavation is divided into a number of squares, then unless a stratigraphic equivalence can be demonstrated, that single layer must be recorded as many times as there are squares. The excess of paperwork in both recording and planning not only diminishes the efficiency of the excavation, but makes post-excavation work extremely complicated and burdensome.

What can be done to minimise the shortcomings and sample bias and improve the technical efficiency of the grid method? In effect the main culprit is the grid of fixed baulks and not the section. No archaeologist can argue that it is unnecessary to record the vertical evidence, but the proponents of area excavation would point out that there are other ways of recording the information that do not require baulks. However, if baulks are still to remain, then a grid of large squares will minimise the disadvantages of this method, but a grid of small squares will increase them, so that at some point the squares become no more than a series of test-pits. Note that Wheeler recommended squares with sides of 10 feet (3 metres) as a minimum, but advocated measurements up to 30 feet (9 metres) or more.[37]

3.3 Area excavation

Area excavation, having dispensed with the grid of baulks altogether, removes many of the problems encountered by the grid method, but introduces others. These may be listed as follows:

1. there is no constant reference to a full series of vertical sections,
2. the survey grid may have to be placed directly onto the excavated surface,
3. the disposal of spoil requires traffic across the excavated surface,
4. there is an absence of clear divisions for supervision and control.

As already noted, area excavation utilises a series of methods to record the vertical evidence, including the traditional section, but the proponents of the technique see no need to maintain sections for permanent reference. If one looks closely at the reasons why Wheeler regarded sections as so important, one can perceive that he was working in conditions totally different from those now existing either in England or Australia. Wheeler's early excavations relied upon a well-trained director, a few experienced staff, and a large untrained team. It is little wonder that Wheeler and others saw the need for constant reference to permanent sections, or for a *control-pit* in the corner of each square. Wheeler's comments on the use of a control-pit are very informative, but to preface this quotation it should be noted that the trained teams available for excavation today render the control-pit redundant.

> 'In the actual digging of a square, a principle of universal application in archaeological excavation may be stressed: namely, the use of the *control-pit*. This is the supervisor's own special charge, and upon it the accuracy of the general digging in large measure depends. It is a small cutting, about 2½ feet square, cut by the supervisor

himself or by a trained man under his eye, to a depth of 1½–2 feet lower than the average level of the work. Its purpose is to enable the supervisor, with a minimum disturbance of the strata, to anticipate the nature and probable vertical extent of the layers which are being cleared by his main gang. It is a glimpse into the future of his stratigraphical work. Without it, neither the supervisor nor his diggers, working blindly from the top, can avoid the confusion of the lower part of one stratum with the upper part of the next below it.'[38]

Most archaeologists would undoubtedly take exception to the last sentence in this quotation: trained archaeologists should of course be able to distinguish between even the slightest changes in soils. But it is important to note that Wheeler was relying heavily on 'his main gang' of labourers for the bulk of his excavation, and not on the trained volunteers of today.

The other criticisms of area excavation may be briefly discussed. If the area excavation is large, for example more than 10 metres wide, it is sometimes necessary to place the survey grid directly onto the excavated surface. In practice this is not destructive, since pegs need not be placed in sensitive areas, and may be removed and replaced accurately without undue difficulties. As for traffic across excavated surfaces to spoil tips, scaffolding planks have been found suitable for barrow runs on even the softest of soils, including waterlogged peat. Finally, it is no more difficult to supervise and control an area excavation than a grid excavation: supervision or the division of the site for recording is easily achieved using the survey grid.

The disadvantages of area excavation are vastly outweighed by its advantages. The ability to see immediately the layout and distribution of features over the whole site cannot be overestimated. Not only does this simplify interpretation, recording, planning and photography, but it is also much easier to communicate the importance and nature of the site to others. The first thing that a visitor sees on a grid excavation are the baulks, while on an area excavation it is the archaeological features themselves.

The absence of extensive baulks is also highly conducive to the understanding and full interpretation of even the slightest traces. As Browne expresses it:

'Therefore the only proper way to dig an extensive site with many timber buildings is to strip by hand large continuous areas, plotting the distribution of all artifacts and other patterned features immediately below the topsoil. The work can be monotonous and psychologically depressing because of its apparent lack of readily discernible results, but the archaeological rewards are great. It is not the sort of method that an amateur could be expected to deal with and, indeed, the lessons of the work should show up the increasing irrelevance of the small-scale excavation and its possible dangers.'[39]

One could also point out that it is not only timber buildings that leave insubstantial traces: even masonry structures are often accompanied by the most informative but fragile deposits, which cannot be understood without efficient and careful excavation.

4. EXCAVATION TECHNIQUES IN HISTORICAL ARCHAEOLOGY

'We must be patient and work for the future, so that we do not leave our prospective colleagues a legacy of mutilated indecipherable monuments.' (Barker)[40]

With any excavation it is the responsibility of the archaeologist to be objective, to work efficiently, and to conserve the archaeological resource. Excavation and the conservation of the archaeological resource may appear at first to be incompatible: after all, all excavation is totally destructive. There will only be one opportunity to excavate a series of contexts, and the only records of that excavation are the field records kept as work is progressing. The quality of those records depends upon the thoroughness and excellence of the plans, notes, and photographs obtained. If excavations are to be undertaken at all, then the efficient use of that diminishing archaeological resource must be guaranteed. By efficient use is meant the full interpretation of all that is excavated, and the excavation of sufficient evidence to arrive at the correct conclusions. To excavate a site partially, hoping thereby to conserve a proportion of the archaeological resource, but to be as a result unable to interpret it fully, is unethical. If, in the interpretation of a site, a post-hole remains a post-hole, rather than a gate-post, verandah-post, fence-post, or corner-post of a barn, then the archaeologist has not done his or her job. In the words of Sir Mortimer Wheeler, we are left 'in the dark as to those very factors which fit a past culture or civilization into the story of human endeavour and so make its recovery worth while.'[41]

Apart from being very cautious about squandering the archaeological resource without full interpretation, it is also the responsibility of the archaeologist to excavate efficiently. The inefficiency of the grid method both in technique and difficulties of full interpretation has already been noted. The remaining decision concerns the choice of the most appropriate method of excavation to best answer the questions asked by the archaeologist. It is these questions, arranged into a research design, which establish the fundamental differences between the archaeology of each period, culture, civilisation or nation. The research design determines the type and extent of excavation which is required, but it may also direct the archaeologist away from excavation to field survey or historical research as more beneficial avenues of inquiry.

For historical archaeology in Australia it is the abundance of historical documentation and the frequency of extant remains, which diminish the need to answer questions by excavation. However, the advantages and disadvantages of each excavation technique still remain. It is still appropriate only to use trial-trenches to section linear features or for preliminary investigations. A trial-trench may be all that is required, since historical documentation may answer all but the most simple questions, such as the precise location of a structure or roadway. However, there are often other methods of investigation which may also be considered, for example augering or geotechnical survey. Barker asserts that: 'if possible trenches should not be dug below the surface of the first archaeological layer encountered, that is the latest occupation layer',[42] so that subsequent excavation will not be hampered by the destruction caused by preliminary investigations. If for some reason trial-trenching is the only possible form of excavation that can be undertaken, then as Barker says:

. . . the recording must be especially rigorous. Only if each surface, layer or feature is precisely levelled and drawn with an accuracy of ± 1 cm. will it be possible for a subsequent excavator to be certain of correlating his results with those from the trial trench.'[43]

One could also add to this the need to record the geological description of soils more objectively than as a 'grey gritty layer' or 'red clay dump'.

Under normal circumstances and if the research strategy demands it, more extensive excavation can be undertaken. It is here that one must consider sample bias. The detail of historical documentation and extant remains may substantially diminish this factor, but it is often not fully considered. To give one example, a trial-trench across a roadway may also uncover a single post-hole. The excavated sample is not large

enough to fully interpret that post-hole. An important decision must be made. The least destructive approach would be to record the presence of that post-hole without further excavation. This would allow subsequent more extensive excavation the best chance of fully interpreting the evidence. The most destructive approach is to continue excavation within the bounds of the trench, a response which demands the most accurate records be kept to lessen the impact of that destruction. In order to fully understand and interpret this post-hole, it is necessary to excavate a more extensive area to ascertain whether it is related to other contexts forming a larger structure. The choice made in this case will depend on several circumstances not the least of which are funding and deadlines. The example above highlights the dangers of trial-trenches as they frequently meet with such complications.

To avoid sample bias, the size of an excavation must bear some relationship to the contexts being investigated. This relationship will be unique for each site, and will vary according to the detail of historical documentation, or the completeness of extant remains. Where a site is invisible above ground or where the documentation is minimal, a greater sample of the site may need to be excavated to arrive at a clear and objective interpretation.

The importance of a fully considered research design cannot be overestimated. However, problem-orientated excavation needs also to take into account evidence that is *historically invisible* or unrecorded by documentation. For example, the excavation strategy for a farmhouse must allow for the unexpected discovery of Aboriginal dwellings or insubstantial structures. These may have been erected as temporary shelter for landholders and staff during the construction of that farmhouse and its outbuildings. The possibilities are endless, but these items will not be found unless research designs are flexible, or the excavation technically suitable for their discovery. To refer back to the earlier example, the archaeologist's response to that one post-hole in that trial-trench across a roadway is therefore very important.

5. CONCLUSION

It is appropriate to conclude this paper with a quotation from Sir Mortimer Wheeler's *Archaeology from the earth*:

> 'An ill-considered excavation is liable to develop into a chaos of pits and trenches, difficult to supervise and record, and often embarrassed by intrusive spoil-tips that eventually either control the work or are in a constant and costly process of secondary removal. On approaching an excavation the trained observer can at a glance evaluate its efficiency. It is an axiom that an untidy excavation is a bad one, whether the untidiness reside in the general layout or in detailed execution. The guiding principles are not difficult: they are "Have a plan", a carefully thought-out scheme, and execute it in orderly fashion.'[44]

NOTES

1. Barker 1982: 21.
2. Wheeler 1956: 36; Barker 1982: 55. Note that Wheeler first published *Archaeology from the earth* in 1954, however, pagination is given from the first Penguin edition of 1956.
3. Wheeler 1956: 15.
4. Harris 1979: 3–5.
5. Wheeler 1956: 149.
6. ibid.
7. ibid.: 81–2.
8. Pitt Rivers 1887–1898.
9. Bulleid and Gray 1911 and 1917.
10. Barker 1982: 16–20.
11. Wheeler 1956: 100, Pl. 9a.
12. ibid.: 82–3.
13. Fowler 1977: 95.
14. Wheeler 1956: 83.
15. Barker 1982: 15.
16. Webster 1974: 96–7.
17. Hope-Taylor 1977.
18. Rahtz 1964 and forthcoming.
19. Barker 1982: 246.
20. Guilbert 1974: 113–15.
21. Webster 1974: 76.
22. Barker 1982: 82.
23. ibid.: 20.
24. ibid.
25. Harris 1975: 113, 119.
26. Harris 1979: 51.
27. Barker 1982: 203.
28. Fowler 1977: 98.
29. Wheeler 1956: 80.
30. ibid.: 81.
31. Barker 1982: 50.
32. Wheeler 1956: 84–90; Webster 1974: 82–3.
33. Wheeler 1956: 82; Webster 1974: 63–4; Browne 1975: 58; Barker 1982: 52.
34. Browne 1975: 60.
35. Webster 1974: 76.
36. Wheeler 1956: 80, Pl. 4b.
37. ibid.: 83.
38. ibid.: 85.
39. Browne 1975: 103.
40. Barker 1982: 44.
41. Wheeler 1956: 149.
42. Barker 1982: 50.
43. ibid.: 43.
44. Wheeler 1956: 80.

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