5

Research Methodology

> Rather than the properties of materials, technological processes and functional performance being seen as boring sidelines to the goal of social meanings, they need to be seen as crucial pathways towards this goal. Properties should be studied as essential information to be investigated with our senses and technologies in order to provide ideas about social contexts. Such knowledge and sensory experience can then inform an understanding of objects as individualised pieces as the material evidence of past concepts of materiality. (Hurcombe 2007:538)

The methodological approaches adopted for conducting this research are outlined in this chapter. Two separate sets of data are used in the analysis. The Research Database (R/DB) includes data gathered from 110 rock shelters recorded during 20 weeks of fieldwork undertaken for this research. The Illawarra Prehistory Group Database (IPG/DB) includes the remaining 700 open context and rock shelter sites in the Upper Nepean catchment. Throughout this monograph, it will always be made clear which of the databases is being referred to; although, it is noted that in some instances analyses are conducted on single data sets compiled from both sources. In this chapter, the selection of material for the databases is described and the basis on which this was made is outlined. The field-recording techniques and processes and post-fieldwork analytical techniques are described. The limitations and problems associated with the data and any identified biases are also discussed.

5.1 Illawarra Prehistory Group Database

Since 1970, the Illawarra Prehistory Group (IPG), a local interest group, led by archaeologist Caryll Sefton, has conducted a systematic and comprehensive survey of the Woronora Plateau, aimed at locating and recording the Aboriginal archaeological resource (Sefton 1988:2, 1989, 1990, 1991, 1994, 1995, 1996, 1997, 2000, 2003a, 2003b). More than 2,000 sites have been recorded. As indicated in Chapter 1, the sites in this database, and present in the Upper Nepean catchment, have not been subject to a detailed and comprehensive analysis.

The analyses conducted in this research, which are focused in part on distributional patterns in the landscape, are therefore contingent upon the nature of sample, which the IPG recordings comprise. The field survey methodology employed by the IPG is described in Sefton (1988:14) and can be considered to be systematic, as their aim and strategy has been to inspect *all* areas of land for archaeological evidence. Sefton (1988:16) documents a check of IPG survey coverage undertaken in the Georges River basin, the results of which generally confirmed the completeness of the earlier surveys. Accordingly, the IPG recording can be considered to be reasonably comprehensive and, on a practical level, fundamentally representative of site variability and distribution. More recent surveys undertaken in areas previously surveyed by the IPG have, nevertheless, resulted in the recording of a few additional sites (see below). This result is not unexpected given the terrain and the nature of the often impenetrable vegetation.

The level of detail in the recordings made by the IPG is commensurate with their goal, which is primarily to locate sites rather than to undertake a detailed site recording. The information recorded encompasses basic locational and environmental information, shelter morphology variables (including drawn plans and cross-sections) and a brief description of art including motif categories and numbers, technique, colour, superimpositioning and weathering information. The recordings also include sketch drawings of the rock art.

The previous recordings of the IPG comprise a significant archaeological resource and have provided the means to conduct the present research. The existing information has enabled the selection of sites for re-recording and, more importantly, provided positional information so that they could be relocated.

5.2 Sampling Strategy

A total of 810 archaeological sites are known to be present within the boundaries of the study area. Given time and resource constraints, a selection of a sample of sites to be recorded during fieldwork was made. Detailed re-recording has been based on a variety of determining factors as described below.

5.2.1 The Inherent Characteristics and Nature of the Site

An aim of the fieldwork has been to record graphic imagery and evidence of temporal change. Generally, but not exclusively, sites were selected for re-recording that were known to contain: a) reasonably intact (unweathered) images; b) a reasonable number of intact images; and c) superimposition of motifs. This naturally introduces a bias into the sample, so sites with single or few images or weathered imagery have been re-recorded also, especially if they have been situated on or near to the walking route to other sites or located in close proximity. With the focus of the monograph on graphics, sites with stencils only have generally not been re-recorded. In regard to stencil sites, it is considered that the information in the relevant site cards is adequate for handling stencil data. Open context grinding groove sites have generally not been re-recorded because the information available from previous recordings provides a sufficient level of information for use in this study. Six open context engraved rock art sites are present in the study area, none of which have been re-recorded. Attempts to record several of these failed as they could not be relocated.

5.2.2 The Inherent Characteristics and Nature of Site Distribution

Sites distributed in clusters (higher relative density) in some locations have, as much as possible, been re-recorded. Given a focus of the research question, which is to consider inter-site variability, site clusters provide some potential to examine this issue at a high level of resolution. Accordingly, in these cases, recordings have been made of a fuller range of site types, including sites that possess incomplete imagery only, which otherwise might have been rejected in the selection process. Additionally, sites were chosen on the basis of their distribution along drainage systems. The goal was to sample sites in a reasonably comprehensive and even spatial distribution along the entire length of each catchment, and in a range of environmental contexts. It is noted, however, that this objective was not achieved in regard to the Upper Nepean catchment where, for logistical reasons and time constraints, a very small and uneven sample of shelters has been recorded.

5.2.3 Logistics

Given the nature of the topography and terrain, the majority of sites are accessible by foot only, and overnight camping was not allowed in the study area (accordingly, limited time was available at sites, some of which required six or more hours walking to get to and from). As a result, the

issue of accessibility was to a certain extent a determining factor of site selection. A larger number of sites have been re-recorded that are located within reasonable proximity to fire trails (<4 hours walking). While it is recognised that this method of sampling is at best described as ad hoc, it, nevertheless, was the practical option. The use of data from the remainder of the IPG records lessens the biases and limitations posed by the sampling strategy.

5.3 Recorded Variables

In regard to the rock art itself, it was recognised prior to fieldwork that, as it is highly weathered, its capacity for use in analyses relating to graphic form and so on was going to be somewhat limited for the majority of rock marks. Given the high degree of weathering, the majority of graphic marks are indeterminate in regard to form and, in many instances, marks are so weathered it is uncertain if they are graphic or gestural marks. Therefore, in order to utilise the rock art data to its maximum potential in these circumstances, a number of strategies have been devised to allow the recording of as much behavioural information related to the practice of rock art as possible, which does not solely reside in the mark form. These strategies are discussed below and they tie in with the objectives of this research, which is to explore the embodied and experiential use of the study area, and rock art as cultural practice.

Data collection has entailed attending to a wide range of different contextual and situational variables including environmental, topographic (and micro-topographic), locational, site morphology and other archaeological data sets, such as the presence or otherwise of grinding grooves, stone artefacts, etc. For sites included in the database that have not been re-recorded, this information has been extracted from site forms compiled by the IPG (and others), and reports produced by Caryll Sefton, which document the IPG surveys.

All field data were recorded on forms constructed specifically for the fieldwork. Certain aspects relating to rock art had not been previously recorded by the IPG—for example, rock pitting or rubbing, and the phenomenon of isomorphic congruence. These variables had nevertheless been listed on the recording form in the anticipation that these little recognised or otherwise ignored features of rock art may well be present. As fieldwork progressed, the recording form was modified to capture more efficiently and consistently the level of recording that was made at each site. A cue card prompt was used for the detailed visual inspection (and drawing) and recording of rock surfaces, so that each rock surface and each image could be analysed and recorded comparably and efficiently.

The variables recorded in rock shelters are set out below in three broad categories: geographic, locational and environmental; shelter; and rock mark.

5.3.1 Geographic, Locational and Environmental Variables

All sites documented are identified by their site name, which is usually abbreviated (e.g. Caddie 44 = C44). The maps used for fieldwork were the 1:25,000 topographic series produced by the Central Mapping Authority of New South Wales and included the following: Picton 9029-4-S (2nd ed.); Appin 9029-1-S (2nd ed.); Bargo 9029-3-N, (2nd ed.); Bulli 9029-2-N (2nd ed.); Avon River 9029-2-S (2nd ed.); Robertson 9028-4-N (2nd ed.) and Wollongong 9029-2-S (2nd ed.). This series of maps uses the Australian Geodetic Datum AGD66 coordinate system. The grid references for sites re-recorded during fieldwork have been obtained using a Hand Global Positioning System set to WGS84. These have subsequently been transformed to Geocentric Datum of Australia (GDA) coordinates for post-fieldwork Geographic Information System (GIS) mapping and analysis.

In this research, environmental and geographic contexts, both broadly conceived and at the site specific level, are viewed as being potentially informative of a range of constraints and/or opportunities and behaviours associated with Aboriginal occupation and experience. At the level of individual locales, natural features such as rock shelters are also both enabling and constraining of human experience given their individual size and morphological characteristics.

The reality of the physical world is such that human occupation, and certain cultural practices and behaviours, cannot be equivalent and always possible everywhere: 'environments constitute arenas of human action and being, they yield resources to be exploited, and they impose constraints and provide enabling conditions for practices' (Keen 2004:3). In Chapter 3, reference has been made to what is, in Australia, a general model of subsistence organisation—a collector model, whereby people in groups formed home bases, from which they made foraging forays and returned, for the sharing and distribution of food (Keen 2004:104). In this model, people make few residential moves, and those made are often to locales valued as much for the presence of water or firewood as they are for food (Keen 2004:104). Geographic and environmental data is used in this research for anticipating where in the landscape people may have habitually resided in base camp scenarios, and how the patterns in rock art location, and other places such as grinding groove sites, relate to those landforms.

Unlike, for example, Morwood (1980) and Rosenfeld (1982:215; 2002), who were able to identify social contexts relating to habitation and/or more restricted ritual contexts based on the presence or absence of informing archaeological materials (food grinding slabs and so on, which suggest a domestic context), in the study area there is very little additional archaeological material present in shelters that can be potentially informative of social context. Stone artefacts (flaked stone debris) and hatchet-grinding grooves are frequently found to be present in rock art shelters, and in those that contain sediment, as opposed to rock floors, it is almost certain that archaeological deposit would be present. However, inferring social context on the basis of the presence or absence of these is not straightforward. The presence of stone artefacts (in the absence of analysis that has been beyond the scope of this project) does not necessarily imply a domestic occupational context, nor for that matter does the presence of grinding grooves. Numerous shelters that do contain grinding grooves have either highly irregular rock floors or otherwise very limited optimal living space (see below), and, therefore, could simply not have functioned as an occupation site.

Given the limitations here for inferring social context archaeologically, it is the land and earth itself that is used to provide an informing context for the interpretation of different spheres of sociality. In this research, various analyses will explore whether or not there are correlations between the archaeological evidence and geographic and topographic location, and specific features of rock shelters. It is, however, recognised that inferences drawn about social context from any patterns that may emerge may not all be equally secure (Layton 1992:229). Nevertheless, the ethnography in Australia shows certain distribution patterns to be characteristic of certain cultural functions; given this, Layton (1992:229) argues that '*on the balance of probabilities*, then, if different distributions occurred in the past, the cultural context was also different'. Geographic and environmental variables in this research therefore constitute a line of independent evidence for use in analyses to discriminate patterning. Specific aspects and attributes of these variables will also be evoked in some instances to infer experience and being, and, hence, to explain variability across space and time.

The following geographic and environmental variables were recorded for each site:

River catchment: The coarsest geographic level of site location has been classified according the major catchment in which it is situated—that is, the Avon, Cordeaux, Cataract or Upper Nepean rivers.

Stream order: Site locations are defined according to the stream order classification of the creek valleys in which they are situated. In the study area, first- and second-order streams form on either gentle crests or steep slopes. First- through to third-order streams are called headwater streams and constitute any waterways in the upper reaches of a watershed. As streams increase in size and strength, those that are classified as fourth- through to sixth-order are medium streams. Given that no streams are larger than fourth- or fifth-order, the *rivers* in the study area are actually medium-sized streams.

Landform: Variables utilised are based on standard terminology taken from the Australian Soil and Land Survey Field Handbook (R. McDonald et al. 1998), and are used in the analysis for the characterisation of fine-grained site locational attributes and other behavioural correlations. The following landform variables were recorded:

Morphological type:

- Crest: element that stands above all or almost all points in the adjacent terrain—smoothly convex upwards in downslope profile. The margin is at the limit of observed curvature.
- Simple slope: element adjacent below crest or flat and adjacent above a flat or depression.
- Open depression: element that stands below all or almost all points in the adjacent terrain.

The majority of slopes in the study area are simple slopes and do not strictly conform to the definition of Upper, Mid or Lower Slopes (cf. R. McDonald et al. 1998). However, for heuristic purposes, sites have been assigned an Upper, Mid or Lower Slope position, so as to allow explorations of fine-grained locational variability from an embodied perspective.

Thoroughfare: This variable is based on broad landform categories and includes Major Divide (watershed, e.g. between Avon and Nepean), Spur off Major Divide, Minor Divide (between major tributary streams in individual catchments and defined as being at least 5 kilometres long) and Spur off Minor Divide. These four attributes are used for exploring site location with reference to the notion of thoroughfare or human movement. Their categorisation is based on an assumption that people would have moved through the study area primarily via the crests of major landforms.

Slope class and value:

- Level – 0°20' average
- Very Gentle – 1° average
- Gentle – 3° average
- Moderate – 10° average
- Steep – 23° average

For the purposes of the analysis, the slope class attributes Level, Very Gentle and Gentle have been conflated into Low gradient, on the basis that from a human-embodied point of view, there is very little difference between the three categories. The Moderate and Steep categories, however, are considered to be potentially relevant, and are kept as separate attributes. Slope has been recorded for gradient located above and below a site. The study area is variable in terms of ease of human access and movement. Combined with other landform variables, such as slope position (i.e. Upper, Mid or Lower), and a consideration of the presence or absence of cliffs, or other obstacles, slope class provides an objective measurement of accessibility.

Accessibility: The variable of accessibility is a descriptive category relating to the physical ease, or otherwise, of approaching a site. It is very much a qualitative variable taking into consideration factors such as physical barriers (cliffs and gorges) and the general nature of the terrain. It is primarily based on rockiness and slope. For example, a site located on an upper slope of low or

moderate gradient, without significant physical constraints, such a formidable rock outcrops, would be assessed as highly accessible. By comparison, a site located high in a cliff face, in a lower slope position, with access via steep, rocky slopes, is assessed as difficult level of accessibility.

Aspect: The cardinal point to which the site faces.

View: Closed = <100 m; Limited = <1000 m; Moderate = between 1000 and 5000 m; Broad >5000 m.

Distance to water: Two measurements of distance to water have been calculated: the first being distance to the closest water source irrespective of its stream order; and second, distance to a fourth-order water body. These variables have been recorded primarily for the purposes of considering site location within the broader landscape context, rather than for considering the availability of water for Aboriginal land users. While not everywhere the same, water is usually available at plateau level—that is, within lower order stream contexts. This means that in the study area water is generally readily available in those landforms, such as crests on divides and watersheds where human movement is most accessible.

Type of sandstone exposure: Shelters occur in Boulders or Clifflines, while open grinding groove sites occur in creek beds on horizontal exposures. Engraved rock art occurs both in open horizontal exposures and rock shelters.

5.3.2 Shelter Variables

A scale plan of each shelter has been drawn for two primary purposes: first, to enable an analysis of behavioural constraints and opportunities at sites such as the availability and size of living areas; and second, to enable analysis of the spatial placement of imagery within sites.

The following variables relating to shelter size and morphology were recorded:

Shelter space: The shelter dimensions recorded include measurements of length, height and depth.

Internal shape (geometry): The internal geometry of rock shelter sites in the study area is highly variable; however, it conforms to a set of generalised shape categories, as defined below. This variable, in conjunction with size measurements (height of ceiling and so on), is informative of the type of physical human activity that can take place at a site.

- Wedge: generally at least as deep as high, and with a horizontal or gently sloping floor and ceiling.
- Square: an internal space that is square in profile.
- Dome: a cavernous internal space with a dome-shaped ceiling.

Dome-, square- and wedge-shaped internal spaces provide actual shelter, although it may not be possible for an adult to stand, while the two categories listed below are shallow, vertical exposures with little or no actual shelter.

- Scallop: generally higher than the width, these sites are formed usually by cavernous weathering processes that expose a shallow cavity in a vertical rock surface.
- Open: generally higher than the width, these shelters are often simply high vertical rock surfaces that slope slightly outward with increased height.

Both shelter size and shape are likely to have governed a number of human behavioural responses, such as the numbers of people present at any one time, and whether or not the site could be utilised for shelter and/or camping.

Floor: Shelter floor variables are important for defining the nature of human use of shelters (see further below in regard to living space and optimal living space).The following type of shelter floors have been recorded:

- Primarily rock.
- Primarily sediment.
- Half-rock and half-sediment (approximate).

Living space area (measured in square metres): Living space area is the floor surface within a shelter that is assessed to be a 'living or working space'. This is the area of the shelter floor that is located behind the drip line. It is relatively dry and level, contains no significant rock and has a vertical space above the ground exceeding 1 metre (cf. Officer 1994:105).

Optimal living space area: Optimal living space area is defined as that part of the living space area containing predominantly sediment floor (cf. Officer 1994:105). In this sense, it is that area within a shelter in which people could comfortably sleep. This variable is considered to be informative of the different types of social activity and behaviour that may have occurred in rock shelters.

Level area adjacent to shelter: If an area of level ground is associated with the shelter, this is identified.

Location of shelter in respect of the ground level: Some shelters are located within cliffs and have a steep drop of c. 3 metres or more to the ground below. Sites such as these may well be indicative of a specific social context of use, and may also have both temporal and synchronic significance.

Rock surfaces: In order to analyse the spatial organisation of rock art within a shelter, individual art panels have been recorded. Panels have been defined as generally broad yet coherent spaces on walls, within concavities, ceilings or under ledges that have relatively clear boundaries. They have each been assigned a coded name. Basic measurements relating to area and height above ground have been recorded, as well as a description of the rock surface and weathering processes.

In addition, an attempt has been made to quantify the amount of art present on panels, as follows (cf. Officer 1994:105–106):

- Potential Art Surface Area (PASA) is that area of panels that is assessed to be suitable for art production.
- Surviving Art Surface Area (SASA) is that area of panels that contains art.
- Unassessable Surface Area (USA) is that area of a panel for which an assessment of whether or not art is present cannot be made, due to weathering.
- Available Surface with Existing Art (ASEA) is a percentage calculation taking into consideration PASA, SASA and USA. The calculation is: SASA divided by the product of the PASA minus the USA multiplied by 100.

This assessment provides an indication of the amount of art production undertaken at a shelter, and can be considered to be an important behavioural variable. However, it is acknowledged that the area estimates which form the basis of the ASEA calculation are problematic. For example, while measurements made in regard to PASA and SASA are relatively straightforward to quantify, estimating the USA, given the highly dynamic site formation processes of the Hawkesbury Sandstone, is difficult and inexact. The ASEA can be considered as indicative only.

Different resource zones in the study area have not been defined. As documented in Chapter 3, in general terms, floral and faunal resources are considered to be uniformly distributed across space. From the point of view of Aboriginal subsistence organisation, which is based on

a collector model, it is also arguable that fine-grained explorations of discrete resource areas are not necessarily relevant, as people foraged widely from base camps. Furthermore, the value of base camp locales, as Keen (2004) argues, relates to the presence of water and firewood, both of which are present everywhere in the study area.

5.3.3 Archaeological Traits

In this research, 'rock marking' refers to all marks present on shelter surfaces, and includes graphics, non-graphic marks such as stencils, other non-graphic pigment marks, and non-graphic extractive marks such as pitted or rubbed areas. These different mark types each reflect different behavioural expressions, and so are recorded and analysed as separate categories of rock marking. The different rock mark categories are described below:

Graphic marks: Graphic marks are defined as those that are assessed to have been produced according 'to culturally regulated conventions of form' (Rosenfeld 1999).

Gestural marks: Gestural marks are defined as those that 'derive from a gestural system of expression' (Rosenfeld 1999) rather than from a structured and corporately mediated referential visual system. Two categories of gestural marks have been defined for this research: additive (non-graphic additions of pigment); and subtractive (non-graphic removal of the rock surface). These categories and sub-categories are defined below:

Gestural Marks—Additive

Stencils and prints: In her classificatory scheme for Australian rock art, Maynard (1977) classified stencilling as a mechanical technique, to distinguish it from that which is 'delineated' as created by drawing or painting. Later, Forge (1991) and Rosenfeld (1999) concluded that they are qualitatively different from a system of referential visual symbols that function in corporate processes of power negotiation. Forge argues that stencils are a different form of rock art, and separate to graphics, given that stencils are mechanically produced and not representational. This means that a stencil's form neither derives from, nor is mediated by, a cultural symbolic system. In this view, stencils are/were marks of individuals (Forge 1991:40).

While Forge (1991) was dismissive of the utility of stencils in rock art studies, considering their use to be a 'minor and common cultural fact', Rosenfeld (1999) makes the distinction between stencils and graphics for the purposes of providing greater analytical power in archaeological investigations of the ideational and societal context of rock art. She stresses the utility of treating gestural marks (inclusive of stencils) as separate analytical units, because they may relate to different facets of societal expression.

The following stencil and print variables have been defined:

- Colour: red, white, cream and black.
- Object: those classified in the study include human and animal, hand, feet and paws, and material objects.

Non-graphic pigment gestural marks are applications of pigment to a rock surface that do not conform to a visual system of structured and referential graphic marking. This category of mark has rarely been described in the Australian literature (however, see Smith & Rosenfeld 1992; Rosenfeld 1999). These marks possess traits indicating that they are simply applications, albeit deliberate, of pigment to a rock surface. In this study, marks that are classified as such include discrete blobs or smeared applications of wet pigment (Plate 5.1), and a variety of drawn, generally linear marks that often have been applied to natural features of the rock, such as concavities or slightly raised ridges (Plate 5.2).

Plate 5.1 Pigment blobs with stencils (rock shelter C39).
Source: Photograph by Julie Dibden, 2011.

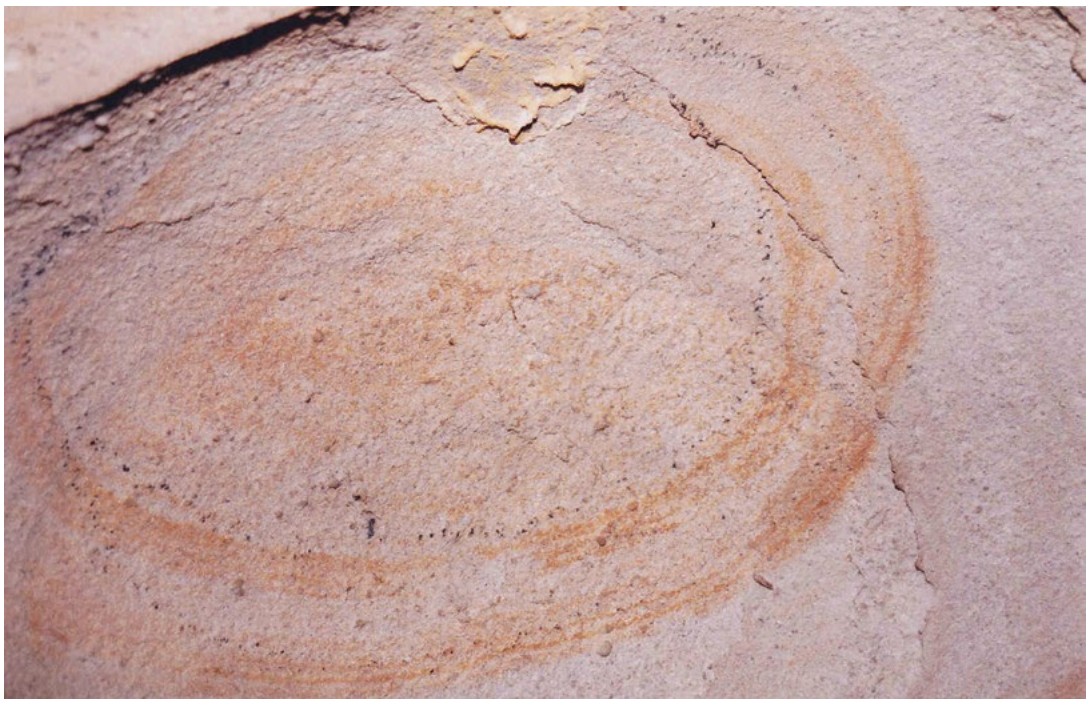

Plate 5.2 Pigment marking: drawn non-graphic charcoal pigment marking (very faint) of the natural coloured lines in a hidden concavity (rock shelter SCR3).
Source: Photograph by Julie Dibden, 2011.

Plate 5.3 illustrates an example of what is defined as a drawn type of non-graphic pigment mark (circles). The example also highlights the problematic process of classifying the mark as being non-graphic given that within a highly heterogeneous and weathered body of art, such as that in the study area, the mark may well be representational. However, in this instance, this mark is considered to be of a different order to the representational rock art for a number of reasons, including that the drawing strongly reflects the geometry of the concavity and its internal features, rather than being an imposed formal arrangement of lines. Given that this mark is located in a 'hidden' location within a shelter, it suggests that the mark was an individualised expression, rather than one that is compliant and responsive to a corporate graphic system.

Plate 5.3 Drawn non-graphic charcoal pigment mark (rock shelter SCR3).
Source: Photograph by Julie Dibden, 2011.

In the study area, a number of different non-graphic pigment application forms have been identified. Given that they are each physically different forms of expressive behaviour, they have been categorised individually and include the following:

- Pigment circles: as implied, this category is expressed as circular applications of pigment that are always dry charcoal. They are frequently located in small concavities (Plate 5.3).
- Pigment marking: the application of pigment to specific natural features of the rock surfaces, such as raised ridges or edges.
- Pigment smear: thin smears of pigment.
- Pigment blobs: usually small and discrete, thick applications, which look occasionally as though they have been thrown onto the rock surface.
- Pigment strokes: usually repeated vertical, short lines of pigment.

Gestural Marks—Subtractive

Non-graphic subtractive gestural marks are the result of the removal of part of the rock surface and their appearance is governed entirely by mechanical processes (cf. Rosenfeld 1999; Taçon & Ouzman 2004:52). Rosenfeld (2002:73) refers to Central Australia, where rubbed patches bear witness to the practice of rubbing rock during ritual.

These marks have been classified in accordance with the method of rock removal into following categories:

Scratches: Scratched rock surfaces are lightly scratched. It is noted that some graphics are also produced by light scratching. Given the shallow nature of both types of marks, distinguishing whether they are graphic or non-graphic is sometimes difficult; in such instances, marks are simply categorised as indeterminate.

Abraded (rubbed) patches are smooth areas of the rock surface and are always present on vertical walls. Their broad area, extremely shallow nature and location are suggestive that they are produced for non-utilitarian purposes. They are generally associated with graphic imagery. Numerous instances of abraded and pitted rock surfaces, created within a ceremonial context, are reported in Mountford (1976) (see also Rosenfeld 1999).

Pitted rock surfaces are always located on vertical surfaces and are generally associated with graphic imagery. These are lightly pitted features. This definition differs somewhat from that defined by Rosenfeld (1999), who described actual 'pits', which it is assumed are small, discrete depressions. Instead, in this study, the pitted surface category actually fits more readily with Rosenfeld's (1999) 'battered rock ridges' category.

Bashed edges: Battered ridges entail the deliberate removal of the edges of generally thin rock, which is often the edge of a case-hardened surface. This category fits closely with Rosenfeld's 'flaked rock' category. However, given the implication of the appearance of negative flake scars (which are not present), this is not appropriate as a classification in this study.

5.3.4 Locational Variables

The location of imagery and marks within a shelter is behaviourally determined, i.e. it is considered that the location was chosen, presumably accordingly to a limited number of conditions, some of which may have been socially sanctioned, and others of which may have been materially determined. A number of variables relating to the physical situation of a mark within a shelter have been recorded as defined below:

General location: The following attributes in this category are possible: Wall, Ceiling and Concavity.

Visibility: Open = i.e. clearly visible; Moderate = for the image to be seen one is required to kneel down or perform some similar bodily contortion; Hidden = images that are located in concealed locations, such as below very low ledges or ceilings, or behind vertical projections.

Height above the floor: Height of the bottom of an image as measured from the floor. Given that the majority of rock art in the study area is located on surfaces adjacent to rock floors, this measurement has some relative relationship to the artist. However, in those instances where the art is adjacent to a sediment floor that may have increased in height over time, this relationship cannot be directly inferred to have been relevant at all times of shelter use.

Isomorphic congruence: This variable refers to whether or not a pigment mark, graphic or non-graphic is formally congruent with natural features of the rock surface. For example, the relationship between the mark shown in Plate 5.3 and the natural morphology of the rock is identified as being one of isomorphic congruence.

Spatial association: This variable describes the spatial physical relationship of an image with other images across a rock surface face. It attempts to address whether an image is a part of a composition. If an image has no justifiable spatial relationship with another, it is simply assigned a 'No attribute'. However, if a relationship is inferred, this is defined according to the basis on which the inference is made, including if the image is adjacent to one or more other images that are of the same schema, or are otherwise in a composition that appears related by proximity and/or surface geometry.

Superimposition association: This variable describes the superimposition relationship of an image with other images on a rock surface. While this variable is important for temporal ordering of imagery, it is also an indicator of other behavioural actions that may or may not have a time-based significance. The possible attributes in this category are: Above, Below, Indeterminate or No.

Gesturally marked: This variable refers to whether or not an image has been marked with either a pigment (this is frequently by a stencil) or by non-pigment gesture such as, for example, pitting. The mode of gestural marking is recorded.

Re-marked: This variable refers to older images that have been subsequently redrawn.

Imagery was recorded in the field by drawing (and annotation) and photography. Given that a goal of this research is to discriminate graphic variability at a high level of analytical resolution, the imagery was recorded in such a way as to enable further detailed graphic analysis to be undertaken off-site. Accordingly, fieldwork aimed to record in detail all graphic marks, and any other relevant material expressions of behaviour such as gestural marks, rather than simply recording numbers of motif types, etc. The primary recording technique involved detailed scrutiny of the rock surfaces, and then the sketching onto art paper all observable marks. Additionally, a note was made of relevant graphic, taphonomic and locational information. The aim of the photography was to have a more accurate visual recording of the imagery, and spatial relationships with other imagery and the rock surfaces, so as to assist in the later analysis. Photographs included both the shelter itself, rock art panels and details of the imagery.

5.3.5 Post-Fieldwork Data Treatment

A Microsoft Access database has been built for data storage and management. The database is comprised of linked nested forms. Four forms have been constructed as defined below.

Site data includes summary locational, environmental and basic contents data for all sites used in the analysis. Site data includes data retrieved from both the IPG site forms (for sites not re-recorded) and data from 110 rock shelters recorded during fieldwork (total n = 810 sites). The variables and associated attribute options in the Site Database are listed below in Table 5.1.

Shelter data includes all observations recorded in regard to shelter morphology. The shelter data entered in this form is based only on those sites recorded (n = 110) for this research, given that a number of the variables have not been included in previous site recordings. The variables and associated attribute options in the Shelter Database are listed below in Table 5.2.

Table 5.1 Site data variables and attributes.

Variable	Attribute
Site name	As per IPG naming system, or that of another recorder
Re-recorded	Yes or No
Easting (AGD)	As per GPS
Northing (AGD)	As per GPS
Catchment	Avon, Cordeaux, Cataract or Nepean
Catchment area	Upper, Mid, Lower, and East or West of river
Creek	As per named creeks or code assigned
Stream order	1, 2, 3 or 4
Broad landform	Divide, Ridge or Spur
Small-scale landform	Crest, Simple Slope or Drainage Depression
Slope element	Upper, Mid or Lower
Distance to third-order stream	In metres
Aspect	N, NE, E, SE, S, SW, W, NW or open
Gradient above site	Low, Moderate or Steep
Gradient below site	Low, Moderate or Steep
Distance of view (approximate)	Metres
Travel route	Major Watershed Divide (between catchments), Minor Divide (within individual catchments), Spur off Major Divide, Spur off Minor Divide
AHD	Australian Height Datum
Context	Shelter or Open
Graphics	Present: Yes or Absent: No
Black graphics	Present: Yes or Absent: No
Red painted graphics	Present: Yes or Absent: No
Red drawn graphics (according to Ford [2006], these may actually be painted; they appear different from those above)	Present: Yes or Absent: No
Red-and-black graphics	Present: Yes or Absent: No
White graphics	Present: Yes or Absent: No
Other coloured graphics (includes scratched)	Present: Yes or Absent: No
Engraved graphics	Present: Yes or Absent: No
Red stencils	Present: Yes or Absent: No
White (includes cream) stencils	Present: Yes or Absent: No
Black stencils	Present: Yes or Absent: No
Handprints (red only)	Present: Yes or Absent: No
Non-graphic pigment rock marking (pigment blobs, etc.)	Present: Yes or Absent: No
Gestural rock marking: additive (i.e. added non-graphic pigment)	Present: Yes or Absent: No
Gestural rock marking: subtractive (i.e. pitted or ribbed rock surface)	Present: Yes or Absent: No
Total number of rock markings (not including grinding grooves)	Quantified i.e. counts
Grinding grooves	Quantified i.e. counts
Stone artefacts	Present: Yes or Absent: No
Cache (artefacts)	Present: Yes or Absent: No
Shell	Present: Yes or Absent: No
Engraved groove channels	Present: Yes or Absent: No
Quarry (flaked pebbles in bedrock)	Present: Yes or Absent: No
Temporal	1 = One Temporal Phase, 2 = Two Temporal Phases

Source: Table reproduced from Dibden (2011).

Table 5.2 Shelter data variables and attributes.

Variable	Attribute
Length	Metres
Height	Metres
Width	Metres
Volume	Cubic metres
Floor area	Square meters
Optimal living area	Square meters
Shelter shape	As defined previously
Level in front of shelter	Present: Yes or Absent: No
Floor composition	Primarily Sock, Primarily Sediment, Mixed Rock and Sediment (c. half and half)
Moisture regime	Dry, Wet, Mixed
SASA	Percentage
PASA	Square metres
Shelter above ground level > c. 3 metres above ground	Yes or No
Location of rock art vis-à-vis optimal living space	Adjacent Wall, Adjacent Ceiling, Adjacent Wall and Ceiling, Away, Not Applicable

Source: Table reproduced from Dibden (2011).

Mark location: All marks recorded in shelters have been given a unique location identifier. This identifier is numeric data simply 1–2,423. The purpose of giving each mark a locational identifier in a separate form in the database is to facilitate analysis of superimpositioning. For a mark not in a superimposed relationship with another, it will be the only mark in a specific mark location. Alternatively, mark locations, which contain superimposed marks, will contain two or more marks. The position of each mark within a layer or superimposed relationship is defined in the Mark Data form. Each mark location is also defined according to its location within the micro-topography of the rock shelter. The categories include wall, ceiling and concavity.

Mark data: Mark data includes all observations recorded in regard to the motifs and other marks in shelters recorded during fieldwork. The variables and associated attribute options in the Mark Database are listed below in Table 5.3.

Table 5.3 Mark data variables and attributes.

Variable	Attribute
Mark ID (unique identifier number in database)	Numbers are sequential and range from 1–2,565
Mark ID (unique identifier number in individual rock shelter)	Numbers are sequential and range from 1–206. The purpose of assigning a shelter mark ID is simply to allow reference back to original recordings (drawings, photos and notes)
Layer (numeric position in relation to its superimposed association or otherwise in a mark location [as defined above])	Layers are numeric and range from 1–4. A mark that is either a single mark in a mark location (i.e. NOT superimposed), or at the bottom in a superimposed relationship, is assigned the value 1; a value of 2 is ascribed to a mark that is above the mark that is layer 1, and so on.
Mark type	Indeterminate (i.e. cannot distinguish between graphic or gestural mark categories) Graphic Gestural Additive: stencil, print, pigment blob, pigment circles, pigment marking, pigment smear, pigments strokes, pigment random Gestural Subtractive: non-graphic scratching, rubbing, pitting, and ridge bashing

Variable	Attribute
Height above floor	Millimetres
Isomorphic congruence	Yes or No
Colour	Black, red, white, cream, yellow, crimson, brown, orange, scratch, black and white, black and yellow, black and red, black, red and white, and Not Applicable (i.e. for pitting)
Technique	Indeterminate, Dry Pigment Application, Wet Pigment Application, Scratched, and Not Applicable
Size (area)	Square millimetres
Notation (relevant to graphics only)	Indeterminate, Outline, Outline, and Infill, Solid and Line
Boundedness (relevant to graphics only)	Indeterminate, Bounded, Unbounded, Not Applicable (i.e. for stencils)
Completeness (relevant to graphics only)	Indeterminate, Complete, Incomplete, Part Complete, and Not Applicable
Symmetry (relevant to graphics only)	Indeterminate, Symmetrical, Asymmetrical, Part Symmetrical, and Not Applicable
Complexity (relevant to graphics only)	Counts of components to graphic
Association: spatial	No Obvious Association, or Indeterminate, Part of a Composition (i.e. cluster of stencils in discrete area), Same Schema, and Not applicable
Association: temporal	No Obvious Association, or Indeterminate, Below, and Above
Remarked	Indeterminate, Yes and No
Gesturally marked	No, or Pitted, Rubbed, Scratched, Stencil, Pigment blob, and Pigment Marked (non-graphic)
Infill	Indeterminate, Not Applicable, Complex, Cross-Hatch, Diamond, Diagonal Line, Lines Perpendicular, Lines Longitudinal, 'V' Lines, Solid, Zig Zag, Random
Model	Indeterminate, Unknown, Human, Imaginary Anthropomorph, Female Anthropomorph, Male Anthropomorph, Human (Life-like), Bird, ?Cow, ?Horse, Unknown Animal With Joey, Dog, Echidna, Fish, Glider, Wombat, Tortoise, Snake, Marsupial (Other), Macropod, Lizard, Koala, and Not Applicable
Motif code	A total of 265 possible—see Appendix 3 in Dibden (2011)
Orientation	Indeterminate, Horizontal, Diagonal, Vertical, Not Applicable
Stance	Indeterminate, Action, Formal, Not Applicable
Visibility	Open (i.e. visible when standing), Moderate, Hidden

Source: Table reproduced from Dibden (2011).

All rock art marks, irrespective of whether they are graphic or gestural, have been classified via a coded system (Dibden 2011:Appendix 3), in order to explore analytically their abundance, preferential location and diversity. The classification developed for coding the graphic rock art has sought to discriminate the formal variability that it possesses at a fine-grained level. In essence, each formally distinct graphic is coded by number. The formulation of the code has been focused on capturing like or very similar graphic forms, and the exercise has negotiated a path somewhere between distinguishing diversity yet avoiding undue splitting. Graphic coding, in this way, is expected to be useful in investigating issues such as diversity within and between different temporal phases, and whether individual graphic forms are located within one or more of these phases.

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