Beyond Language: Tracing Social Identity through Pottery. Stylistic Analysis of Early Iron Age Communities in Southeastern South Africa

by

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Abstract

This dissertation examines the relationship between pottery style and social identity among Early Iron Age communities in southern Africa, offering an alternative and novel framework for interpreting stylistic variation. While effective in mapping large-scale cultural patterns, traditional analytical methods are limited in their ability to capture smaller-scale social dynamics. This research combines design symmetry analysis with Bayesian modelling, introducing a temporal approach emphasizing continuity and gradual change over rigid, periodized phases.

Through this approach, the study demonstrates that pottery style is not simply a static marker of cultural identity but a dynamic expression of social relationships, environmental factors, and shifting design networks. By interpreting ceramic design within broader assemblages, this dissertation shows how pottery reflects the intricate processes of community interactions, learning networks, and identity formation across multiple scales. The findings suggest that "design networks," rather than fixed cultural groups, shaped regional stylistic patterns and that pottery served as a medium for stability and transformation within these communities.

This new framework expands the potential for archaeological analysis to explore social identities beyond language groups, contributing to a deeper understanding of how early farming societies in southern Africa engaged with and adapted their material culture over time.

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Stilte

Grense is lyne op padkaarte en breine
Mense is gedagtes met gesigsuitdrukkings
Jou taal is klanke wat jou vriende maak
Waar jy grootgeword het bestaan nie meer nie

Verlore kinders moet loop en leer en werk
Om van verlede en ontdekkingslus te bekeer
Grense verdedig hart en land
Maar hart is hart
En land is land
En afrikaans is afrikaans maak nie saak
waar in die wêreld jy jouself bevind nie

Orals op die verkeerde paaie ry duur motors met moeë gesigte in
Onderdeur bang lamppale wat op frustreurde doodloop strate skyn
Met hartseer bankkaarte wat by lee bank tellers na genade vry
En deurmekaar selfone wat langdradig kopsere wakker lui
Lewe ons verby sinister advertensie borde
En senutergende koerant opskrifte en mekaar
Oral verveelde TV's wat hartseer bangmaak beelde flikker
Op oorgewig sitkamerstelle bou ons verleë aan hoop
Om eendag hier iewers 'n prentjie-mooi huis by die bank te kan koop

In die druk verkeer
In die briesende wind
By die diepsee wolke se moordneigende reen
Oor die kendse skuureiland se versadigde lokasies spoeg
Besef ek dat ons net sotte in 'n resies is
Wat versot verby mekaar spronge tree
Ons is maar pens en pootjies en ons maak net meer
Oor die lang termyn stel ons net teleur

Ons is maar wild, verwilderde goed
Wat die waarheid in die wildernis soek
Wat ek soek kan nie aan my verkoop word nie
Wat ek soek is verniet
Dis om huis toe te wil kom
Dis om 'n koue bier te geniet en die mooi dag in sy moer te stuur
Dis om veilig binne te kan wees as die wind hard huil
En die koue reen daar buite is
Dis om te weet dat daar mense is wat
jou sal afhelp as jy op jou perdjie spring
En jou sal ophelp as jy aanjaag en uitlaat as jy wil verken
Dis om uit jou buik uit te kan lag en dit te bedoel
Dis om te weet wat jy soek

Dis om te sing tot dit pyn en te kan huil voor jou vriende
Dis om te dink jy weet wie jy is
En te aanvaar dat jy meeste van die tyd die pot mis sit

Jou land is waar die son opkom en weer gaan sak
Ons is ruimtevaarders, automechanics, dropouts en dokters
Ons is strokiesprenthelde, boggerops, seuns en dogters
Ons is miljoeners en presidente, rockers en rugbyspelers
Gelowiges en besetenes
Ons almal is

Mense het hul grense self uitgedink

-Hunter Kennedy-

For Jackie, Evalyn, and Llewelyn
For forever…

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Chapter 1 Introduction

"Is Iron Age archaeology only Bantu archaeology?" (Fredriksen, 2015)

"…however, while pots may have mouths they cannot speak (Marks, 2011, p. 129)

1.1 Purpose and scope of the study

This thesis aims to investigate whether it is possible to identify social entities at a level smaller than that of a linguistic group through a stylistic analysis of pottery. As a case study, this thesis examines the relationship between pottery style and social identity(ies) amongst Early Iron Age (EIA) communities of the Southeastern Lowlands of South Africa. Previous research in southern Africa has shown promising results, linking Iron Age pottery styles to linguistic groups, arguing that groups who share pottery styles also share a similar language (Huffman, 1980, 1989a, 2007, 2012; Whitelaw, 1994a, 1996, 2012a).

However, there is a disconnect in Iron Age archaeology on an analytical level and, therefore, on theoretical and empirical ones. The current analytical praxis lacks *recursiveness* (Fredriksen & Chirikure, 2015, p. 2) and the ability to address inquiries about social identity on various cultural and geographical scales. As such, current analytical methods are hampered by disagreements "around how style should be characterized and the kind of identity it expresses" (Whitelaw, 2012, p. 130). Therefore, this dissertation argues that if pottery style can identify language groups, a different analytical approach grounded in assemblage theory should be able to identify other smaller-scale communal groups. The cultural 'package' of metallurgy, stockkeeping, and farming practices, which accompanied the arrival and spread of food-producing agricultural communities in southern Africa during the first and second millennium AD, is commonly referred to as the Iron Age.

These Iron Age communities have been associated with Bantu-speaking peoples. The arrival and movement of these agricultural communities in southern Africa are based on linguistic and archaeological data, which shows that these people had their origins in west-central Africa (Calabrese, 2005; Fredriksen, 2023b; Herbert & Huffman, 1993; Huffman, 1970, 1982, 1989b, 2007, 2021a; Huffman & Herbert, 1994). The stylistic analysis of pottery had been a crucial

approach to monitoring the spread and relatedness of agricultural societies in eastern and southern Africa. Pottery style can serve as a marker of social groups. However, a longstanding concern with equating pottery style to 'people' is the risk of treating these categories as fixed and distinct social entities. In southern Africa three analytical techniques have been in use; technique taxonomy (Maggs & Michael, 1976; Phillipson, 1968a, 1968b, 1976b), multidimensional lists (Fagan, 1966; Huffman, 1978b; Maggs, 1980a, 1980b, 1982, 1984a; Maggs & Ward, 1986b, 1986a; Robinson, 1976; Soper, 1971a, 1971c), and multidimensional typologies (also referred to the core concept approach) (Huffman, 1979b, 1980; Loubser, 1984, 1989, 1991, 1993, 2015; Whitelaw, 1993, 1994a, 1996)

The main aim of these methods, especially the core concept approach, was to identify stylistic groups or entities in the archaeological record (see Huffman, 1980, p.168; also see Huffman 2007, p. 104). These analytical approaches aim to identify discrete cultural groups fixed in the archaeological record in space and through time, thereby enabling the identification of large regional pottery entities throughout southern Africa. Furthermore, their contribution to understanding past histories has been invaluable. The use of pottery style in southern Africa has made it possible to define group identity accurately on a large scale through multidimensional typologies. As noted above, pottery analysis has been an essential datum from which Iron Age researchers orientate themselves and from which different epistemological and theoretical stances are taken (Parkington & Hall, 2009, p. 72). Such a contribution suggests that style may be used to determine various identities if other analytical approaches are applied. Differentiating between pottery styles serves another important constituent, relating to different historical identities or processes. Variation and similarities of such styles can inform the dynamic, fluid and sometimes complex political structuring of first and second-millennium societies (Calabrese, 2000, 2005; S. Hall, 2009; Loubser, 1989, 1991; Parkington & Hall, 2009). Through pottery sequences, vital regional spatial and chronological structures can be identified (S. Hall, 2009). The use of such entities made it possible to infer culture-historical sequences, social variations and similarities between regional stylistic entities and migration patterns for most parts of southern Africa (Bostoen, 2020; Huffman, 1978, 1980, 1989a, 1990, 1993, 2004, 2006, 2007; Maggs, 1994; Mitchell & Whitelaw, 2005; Whitelaw, 1994b).

Grounded in the argument that language is the medium through which cultural codes and cosmological importance are communicated (S. Hall, 2009; Huffman, 2007; Whitelaw, 2012),

many archaeologists studying the southern African Iron Age have treated pottery styles (arrived at using specific analytical approaches) as representing a type of ethnic identity, or at least produced by people speaking the same language.

If, as shown by past and current Iron Age approaches, a relationship between decorative style and language groups exists, then it should be possible to identify smaller social entities. However, a consensus on what these smaller social identities are has yet to be reached, and no conscious effort has been made to determine them. Doing this requires alternative analytical approaches and access to new types of stylistic data.

1.2 The problem: What social identities are pottery identifying, if any?

'Iron Age' research during the 1970s and 80s was critical in formulating our understanding of the movement and spread of early farmers in southern Africa and diachronic and synchronic change and maintenance on a macro-regional scale through pottery assemblages. Huffman's (1980) paper was important in establishing that multidimensional attribute lists, or technique taxonomies, are not the most accurate methods for inferring groupness from pottery assemblages. Current analytical frameworks linked Iron Age pottery style to a form of 'macroethnicity' produced by people speaking the same language as language is the nucleus through which symbols, cognitive codes, and behavioural values are communicated and shared (Huffman, 1980, 1989b, 2007, 2012; Parkington & Hall, 2009; Whitelaw, 1994b, 1996, 2012, 2015). However, these analytical frameworks did not conclusively prove that other pottery classification systems fail to capture some form of social identity. They were used to distinguish branches of Bantu language families, which Huffman's method further refined into smaller linguistic entities, such as family groups like the Nguni or Sotho-Tswana.

There is a lack of consensus on the relationship between pottery style and language, and disagreement "around how style should be characterized and the kind of identity it expresses" (Whitelaw, 2012, p. 130). Such disputes have most recently been highlighted in debates between the 500 Year Initiative (FYI) and proponents of the style-linguistic group hypothesis. The 500 Year Initiative (FYI) is a collaboration between historians and archaeologists focusing on the last 500 years of South Africa's past. The FYI has criticized the 'structuralist' theoretical approach to identifying past groups and the static nature of inferences on group identity (Beinart, 2010; M. Davies, 2010; Delius & Schoeman, 2008, 2010a, 2010b; Etherington, 2010; Fredriksen, 2007, 2015; Fredriksen & Chirikure, 2015; Lane, 2010a; Stump, 2010; Widgren, 2010; Wright, 2010).

In contrast, Huffman (2012) and Whitelaw (2012, 2015) argue that such a critique is unfounded and pottery style must in some way correspond to the cultural identity of the makers and users of pre-colonial pottery as based on ethnohistoric studies of continuity and congruence between pottery styles and linguistic group affiliation. Both sides contend that this debate involves analytical and interpretive issues. While proponents of each side agree that style can be defined in more than one way depending upon the method of analysis used, none have explored how alternative methods of stylistic analyses, each derived from different theoretical underpinnings, could be used to infer different communal groups.

1.3 Disconnect between Iron Age research and current research across the world

I argue that the feverish critique of the FYI, which has countered the 'structuralist' approaches of defining group identity through pottery style, is misdirected, leading to some misconception of the issue and valid ways of understanding the relationship between style and identity. Such critiques on equating pottery style with group identity are unjustified, as it is tautological. Such critique rejects a means to identify social groups but demands that we examine group dynamics and change. However, one *first* needs to establish a robust means of determining group membership that is visible archaeologically.

The problem is not with identifying groups but rather the lack of recursiveness between analytical scales and theoretical, analytical, and empirical levels of inquiries (Fredriksen, 2015; Fredriksen & Chirikure, 2015). After nearly three decades of applied structuralist models and critical debates proposing alternative frameworks, this model is still influential. The importance of such models is not disputed, but rather, the partially entrenched nature of the debate and use of the model led to an epistemic standstill. Throughout the last three decades, there have been no actual moves for using varied theoretical and analytical approaches and no real critical epistemic change in Iron Age research (however, see Ashley et al., 2016; Chirikure et al., 2018; Fredriksen, 2007, 2009, 2011, 2015, 2020, 2023a, 2023b; Fredriksen & Bandama, 2016; Fredriksen & Chirikure, 2015; Fredriksen & Lindahl, 2023; Jones et al., 2023; Russell, 2022; Sadr, 2008, 2020; Siteleki & Fredriksen, 2024; Thebe et al., 2017; Thebe & Sadr, 2016, 2017a, 2017b, 2017c; Wilmsen et al., 2019). More so, there is a disconnect between this epistemic standstill in Iron Age research and knowledge production in other regions of the content and world.

In West and Central Africa, for instance, more critical and varied approaches have been applied through a combination of ethnography and archaeology (David, 1972, 1992a, 1992b;

Gosselain, 2000, 2010, 2011a, 2016, 2017, 2018; Gosselain & Livingstone Smith, 2013). Such approaches have mostly been neglected in southern Africa (however, see Chirikure & Nyamushosho, 2018; Munyaradzi & Chirikure, 2019; Moffett et al., 2020; Moffett & Chirikure, 2016; Nyamushosho & Chirikure, 2020; Thebe & Sadr, 2017a, 2017b, 2017c). In other parts of the world, especially in North America and Europe, research has prospered from continual epistemological discussions leading to various analytical and theoretical frameworks being established (Baron, 2016, 2021; Brughmans & Peeples, 2023; Crellin, 2020; Crown, 2014, 2016; DeLanda, 2016; Field & Mills, 2013; Harris, 2009, 2010, 2012, 2017, 2018b, 2021a, 2021b; Harrison-Buck, 2018; Harrison-Buck & Hendon, 2018; Harrison-Buck & Pugh, 2020; Hodder, 2024; Hodder & Lucas, 2017; Hodder & Mol, 2016; Holland-Lulewicz, 2021, 2023; Holland-Lulewicz & Roberts Thompson, 2021; Lucas, 2012; Mills, 2002, 2018; Pauketat & Alt, 2019; Peeples & Bischoff, 2023). Over the last ten years, research by European and North American archaeologists has drawn from multiple discourses, including Social Network Theory (Athenst et al., 2018; Brughmans et al., 2024; Brughmans & Peeples, 2023; Chase et al., 2024; Hegmon et al., 2016, 2021; Hegmon & Peeples, 2018; Kintigh & Peeples, 2020; Mills, 2017a, 2017b; Mills et al., 2016; Peeples, 2018; Peeples & Bischoff, 2023; Roberts et al., 2021), Community of Practice (Blair, 2015; Logan & Stahl, 2017; A. Roddick & Stahl, 2016; Stahl, 2013, 2016), Action Network Theory (ANT) (Vadala & Duffy, 2021; Van Oyen, 2015, 2016), new materialism (Alt, 2019; Cipolla, 2018, 2019, 2021; Govier & Steel, 2021; Harris, 2020; Tsoraki et al., 2020; Van Dyke, 2019), and Peircean Semeiotics (Baron, 2016; Bauer, 2013; Cipolla, 2008; Crossland, 2021; Martel, 2020; Preucel, 2008). In southern Africa, such approaches have yet to be embraced critically. Instead, the imprudent use of ethnographic analogy through the direct historical approach remains essentially unchanged. Critics argue that structuralist and processual archaeological models view pottery style as a passive reflection of group identity and rely on outdated, sometimes unethical foundations (Hall, 2002; Meskell, 2005; Pikirayi & Chirikure, 2011; Russell, 2022). While these models have been influential, their dominance has constrained debate and diverted attention from other important research questions (Bonner et al., 2008; Lane, 2010a). This credulous focus on these models is best understood within the historical milieu of the development of Iron Age research.

Iron Age researchers during the 1980s favoured a ‘cognitive’ approach. Such an approach was important in understanding past societies’ cognitive and symbolic aspects and acknowledging

the importance of ideology as an active proponent of past societies (Preucel & Hodder, 1996). The epistemological starting point was the revitalization of historical explanation through a modified positivist framework (Bonner et al. 2008). A problem faced by cognitive processualists was dealing with the 'contextuality of meaning.' If meanings are found in local and historical settings and are dependent on one another, how can they be understood? This was achieved by understanding meaning and the mind as universal principles through a Cartesian worldview, bifurcating mind and body, style and function, and group identity and language.

Another contextual consideration during this period was the political backdrop during the 1980s. In 1983, when members of the Southern African Association of Archaeologists were called upon to condemn the Apartheid government and their segregation policies by their African colleagues, they dithered and argued that politics had no place in archaeological discourse. This impartial stance was challenged by Martin Hall (1984a, 1984b, 1990a, 1990b). He critically examined the history and development of Iron Age archaeology in southern Africa and the belief that the past can be neutral and that objects will 'speak for themselves', where archaeologists can derive histories of past communities that are unbiased and scientific (Hall 1990, p. 59). He argued that such notions are inappropriate for a region where histories are continually contested. While historians and cultural anthropologists have questioned the use of cognitive, ahistorical models and the role that anthropology played in the 'invention of traditions' (Hobsbawm & Ranger, 1983), such epistemological dialogues were missing amongst 'Iron Age' researchers (see Bonner et al., 2008; Hall, 1983, 1984a)

The problem, I believe and which I will argue in this dissertation, is that Iron Age research in southern Africa has found itself at a standstill, leading to a disconnect between research in southern Africa and the rest of Africa and the world. However, the critique levelled at current Iron Age research, especially from the FYI group, is valid but not conducive to understanding past communities in southern Africa. Further to this, such critique lacks recursivity between theoretical and analytical frameworks. Most critiques against current Iron Age research have not shown how various theoretical underpinnings can be approached in the archaeological record. "Examples are the best way to demonstrate complex theoretical ideas" (Preucel, 2008, p. 17). Instead, what is needed is a form of pragmatism, … "because if theories cannot be shown to affect the interpretation of actual data, then they are indeed of limited value" (Preucel, 2008, p. 17). Such a lack of pragmatism, I argue, is one of the main issues in the current critique of Iron Age research. The

issue is not necessarily with the classifications of material. Whitelaw (2012, 2015) refutes the idea that Iron Age archaeologists' use of pottery style in-group affiliation is static, stating that 'all researchers in all disciplines classify their material to reduce its infinite diversity to manageable sets with limited variation' (2012, p. 130). Therefore, we need not 'replace' typological models, as such models have contributed significantly to our understanding of past societies. As Conkey (1990) argued, *all* classification systems have some typological basis (also see Whitelaw, 2012, 2015). However, they use various theoretical and analytical underpinnings to determine the scale of identity archaeologists observe. This dissertation will address critical questions in archaeological discourse: how do we establish what scale (type) of identity is expressed through pottery style, and what social dynamics maintain or change it? This will be done by drawing on various theoretical models, including Peircean Semeiotic and assemblage theory.

This research aims to use a relational paradigm to offer a more nuanced perspective of social identity on a smaller scale. Such a framework recognizes the entanglements between people and objects across space and time and embraces the complex interplay of social identities within material culture assemblages. Ultimately, this research seeks to reconceptualize identity in Iron Age communities through a relational and multi-scalar lens.

1.4 Research questions, hypotheses, and contributions

This research project aims to improve our understanding of the kinds of communal social groups archaeologists identify through a stylistic analysis of pottery. As a case study, this thesis will examine the relationship between pottery style and social identity(ies) amongst southern Africa's Early Iron Age (EIA) communities.

1.4.1 Research Questions

The previous research reviewed above has established that manufacturing and decorative style can be identity markers but may not cross-culturally express the same dimensions of identity. This thesis applies methods that have been and have not been used to study Early Iron Age pottery from the southeastern Lowlands of South Africa to answer the following research questions:

- What is the relationship between pottery decorative style and identity?
- Which aspects of identity are indicated through pottery decorative style?
- Which stylistic analytical methods distinguish identity at the communal level?
- Is it possible to identify communities of producers through a stylistic approach?

In asking whether it is possible to identify social entities on a scale smaller than language groups, I hypothesize that if specific methods of stylistic analysis distinguish people who belong to the same language group, then different methods of analysis should distinguish other forms of social relationships, such as those grounded in economic relations (Plog, 1980), political relations (Bowser, 2000), or generational differences amongst potters (Dietler & Herbich, 1994b, 1994a, 1998, 2008; Fowler & Greenfield, 2009; Herbich & Dietler, 1994). Alternatively, if different methods of stylistic analysis cannot distinguish entities within pottery traditions, sequences, and facies, then it is unlikely that early farming peoples in southern Africa used pottery style, intentionally or unintentionally, to signal their communal social identities.

1.5 Summary of the thesis

Chapter Two introduces the southern African Iron Age as a research discourse. More specifically, this chapter discusses pottery's essential role, especially the stylistic analysis of pottery, in southern African Iron Age archaeology by asking how pottery has been applied to understand past people. Three main analytical approaches, the technique taxonomy, multidimensional lists, and multidimensional typologies (core-concept), are highlighted, followed by a discussion on how the core concept approach became the prevalent method used. This chapter identifies how this approach equates ceramic styles to language groups. Importantly, this chapter discusses an aspect that has not explicitly been addressed before: what research questions the various analytical methods were developed to address. This chapter also discusses the recent critique from the Five Hundred Year Initiative (FYI) and how their critique is unfounded.

Chapter Three discusses how the current core-concept approach is not able to account for understanding variability between people and things on a scale smaller than that of language groups. This chapter highlights how conventional approaches, like representationalism, culture history, and Saussurean Semiotics, often present static and categorical interpretations of the past, which struggle to explain identity's dynamic, heterogeneous nature. This chapter argues that by incorporating relational theoretical paradigms, this research proposes a shift towards a relational approach that recognizes the fluid entanglements between objects and people. This perspective challenges Cartesian dualism and highlights the need for multi-scalar analyses that account for changing relations over time and space. Furthermore, this chapter argues that understanding identity through assemblage theory, network approaches, and Peircean semiotics can engender more nuanced interpretations of material culture, thus offering a more dynamic and relational

understanding of past peoples and their identities on smaller scales. This is followed by a discussion of the analytical approaches employed in the study in **Chapter Four.** This chapter focuses on understanding the continuity and variability of ceramic design in southern African Iron Age communities. Two primary methodologies are used: design analysis of ceramic materials and network approaches. This is followed by discussing the four applied analytical techniques, including symmetry analysis, Bayesian modelling of legacy radiocarbon dates, statistical apportioning models of the ceramic material based on Bayesian results, and social network analysis (SNA). These approaches aim to capture spatial and temporal patterns in ceramic design. By integrating design analysis and network theory, this chapter highlights how this study seeks to address research questions that previous analytical approaches could not adequately answer.

Chapter Five situates the 15,361 ceramic vessels from 23 Early Iron Age (EIA) sites in the Southeastern Lowlands of South Africa that were analyzed as belonging to the Msuluzi ceramic sequence of the Kalundu Tradition, including three facies: Msuluzi, Ndondondwane, and Ntshekane and dated between AD 650 and AD 1050. Furthermore, this chapter identifies the previous research in the region, from the 1920s to the 1990s, which laid the groundwork for understanding the socioeconomic organization of early agriculturalists. This chapter discusses the study area and EIA sites across four distinct ecozones (Upper Thukela Basin, Lower Thukela Basin, uMngeni Valley, and the Coastal Belt) from which the ceramic sample was selected. In **Chapter Six,** the trend identified in the design symmetry repertoires of the EIA ceramics in the Southeastern Lowlands of South Africa is systematically explored. This chapter examines how design symmetries shift spatially and temporally from localized patterns within specific sites and ecozones to broader connections across regions and time. The chapter analyzes symmetry types within ceramic facies and phases, testing their relationships and assessing them within the conventional EIA temporal framework. Furthermore, an alternative temporal framework is introduced based on Bayesian and statistically apportioned modelling. Finally, using Social Network Analysis (SNA), the chapter identifies patterns of design symmetry across the four ecozones, highlighting both variability and similarities. The last chapter, **Chapter Seven,** discusses the trends identified in relation to the dissertation's research questions, focusing on the relationship between pottery decorative style and identity in southern Africa. It addresses whether specific stylistic methods can distinguish communities of producers and reveal aspects of identity

at a smaller level. The study hypothesizes that the analytical and theoretical approaches applied in this study highlight social relationships beyond language groups.

Chapter 2. The Southern African Iron Age

2.1 Introduction

This chapter aims to address three concerns. First, it will comprise a historical survey of Iron Age archaeology, especially Iron Age ceramic studies in southern Africa. Second, it will discuss the complexities of connecting ceramic decorative style(s) with language groups and other forms of social identities. Third, it will highlight how this study aims to address such complexities.

Archaeological research on the origin and spread of agricultural communities in southern Africa started much later than in other parts of sub-Saharan Africa. Beginning in the early 1960s, research on these agricultural communities became more prevalent with the improvement of field standards, the acknowledgement of agriculturalists' antiquity and the inception of radiometric dating. These advancements resulted in the establishment of robust chronological frameworks, which by the 1970s demonstrated that agriculturalists existed as early as the start of the first millennium AD. The research identified shared origins, ceramic styles, and settlement patterns across sites in southern Africa. A flurry of excavations, especially in the Lowveld and Southeastern Lowlands of South Africa, coupled with radiometric dates, identified shared origins amongst eastern and southern African agriculturalists. Additionally, a common ceramic style was noted, shifting the focus from defining cultural history sequences to understanding the nature of these communities. New structuralist-inspired models influenced and, in many instances, determined the interpretation of these agriculturalists. Their settlement patterns and unearthed material culture could be related to organizing principles and systems of thought, a specific "worldview."

This chapter will reveal how substantial research in the late twentieth century established subcontinental syntheses and culture-history frameworks of large regions based on stylistic variation in ceramics (Huffman, 1970, 1980, 2007; Phillipson, 1976a, 1976c).

This chapter identifies and critically discusses how ceramic style has been used to express a form of *macroethnicity* (Parkington & Hall, 2009, p. 73) or 'large-scale identities' (Fredriksen, 2007, p. 127; Fredriksen & Chirikure, 2015, p. 6) The notion of macroethnicities, as discussed in this dissertation, refers to "a simplified and academic *etic designation based on a common linguistic family* [emphasis added], rough geographic contiguity, and broadly shared similarities

in subsistence techniques…" (Marken et al., 2017, p. 188). Macroethnicity, thus, is not equated to the definition of an ethnic group in the stricter sense, which sees ethnic groupings as 'people who consider themselves to be a limited social and historical entity, distinct from other similar entities in multicultural situations such as urban centres.' (Huffman, 2002, pp. 2–3). Thus, ceramic style, rather than reflecting ethnic groupings, "represent[s] large-scale identities" (Huffman, 2002, p. 3, 2012, p. 237), such as a language group. This chapter discusses the conceptual and analytical frameworks that informed the establishment of such macroscale cultural units (see Hammond-Tooke, 2000), upon which several socio-political underpinnings of agriculturalists are based. The critique raised by many researchers of equating ceramic style with macroethnicity and their calls for the deconstruction of such frameworks will be reviewed. I will argue that these critiques are misplaced and tautological. The issue is not with equating ceramic style to group identity. Instead, as this research aims to address, the problem is that ceramic style has rarely been studied to infer other aspects of social identity on a scale smaller than a language group. First, however, the history of Iron Age archaeology in southern Africa will be discussed.

2.2 The “shallow” history of pre-colonial farmers: Iron Age Research in southern Africa

The archaeology of agricultural communities is subsumed under a culture-historical term called the Iron Age. The term "Iron Age" has been criticized by some for its direct borrowing from European archaeology and carries particular colonial baggage (Bonner et al., 2008; Hall, 1984a; Maggs, 1992). However, despite reservations about the term "Iron Age," many researchers still use it as shorthand for a larger concept (Bandama, 2013, p. 14). The term has been incorporated into southern African archaeology's local knowledge systems, detached from its original meaning (Fredriksen, 2020, p. 48, 2023b). The differences between the Late Stone Age (LSA) and Early Iron Age (EIA) are linked to ceramic ware groups. Thin-ware pottery is associated with LSA mobile herders or hunter-gatherers and does not practice cultivation or livestock husbandry. In contrast, herders and pastoralists predominantly rely on livestock-keeping and rarely practice cultivation. Thick ware pottery, on the other hand, is associated with EIA farmers/agriculturists who depend on a diverse subsistence strategy that includes the cultivation of crops and domesticated animals (Fredriksen, 2023; Sadr, 2008).

The Iron Age is defined as mixed farmers who practiced metallurgical and ceramic production, lived in semipermanent to permanent structures constructed from daga[1] (clay-and-dung) framed and held together by wooden poles (Mitchell, 2013) in villages where they cultivated various root crops and dry-land cultigens (such as gourds, beans, millet and sorghum), and raised domesticated animals (goats, sheep, cattle, and chickens). Archaeological evidence of such villages usually included abundant pottery and faunal remains from middens, evidence of storage pits, grain bin foundations, and metalworking (Huffman, 2007; Maggs, 1984a, 1984b, 1984c; Whitelaw, 1994b, 2012, 2013, 2019a; Whitelaw & Hall, 2016). Comprising the period between AD 250 and AD 1820, the Iron Age, illustrated in Table 2.1, is commonly divided into three periods: the Early Iron Age (EIA), the Middle Iron Age (MIA), and the Late Iron Age (LIA). The EIA is marked by the introduction of food production due to a southward migration of agriculturalists from further north (western and eastern Africa) into southern Africa, a phenomenon known as the Bantu expansion (Huffman, 1970; Phillipson, 1976a).

The presence of distinct differences in material culture during the EIA-what has been termed an "Iron Age package"-distinguishes the EIA from the Late Stone Age (LSA) (Huffman, 2007; Maggs, 1984a, 1984c; Phillipson, 2005). The presence of highly decorative ceramics, metallurgy, domesticated livestock such as sheep, goats, and cattle, grain bins, storage pits, and daga-and-pole (i.e., adobe) houses is evidence of a lifeway drastically different to that of LSA hunter-gatherers (Maggs 1984c, p. 331).

The periodization from the Early Iron Age to the Late Iron Age is distinguished by sharply contrasting ceramic styles and settlement locations (Whitelaw, 2015; Whitelaw & Hall, 2016). The changes in material culture have been attributed to the arrival of the first Nguni speakers from East Africa at the start of the second millennium AD (Huffman, 1989b, pp. 173–178, 2004, 2007; Ownby, 1985, pp. 75–80; Wilson, 1981). The presence of a Middle Iron Age from AD 900 to AD 1300 has been contested by several researchers (Denbow, 1981; Garlake, 1978; Maggs, 1984c). These researchers argue that notable shifts in material culture, settlement locations, and grain cultivation around AD 1000 are attributed to a socio-political change among Iron Age communities. Maggs (1984b), for instance, argues that in the Southeastern Lowlands, the drastic shift in pottery style between Ntshekane (a terminal EIA site) and Blackburn (LIA site) and the

[1]Different spellings are attributed to the word, with some researchers preferring the term dagha and others daga. In this dissertation, the daga spelling will be followed.

subsequent change in the local occupations is attributed to an influx of new agriculturalist in the region, and therefore is seen as the start of the Late Iron Age. However, Huffman (2007, p. 361) has argued that the Middle Iron Age originated in the Shashe-Limpopo, where evidence of social stratification and sacred leadership between AD 900 and AD 1300 were present at sites such as Great Zimbabwe, Kami, and Mapungubwe. This shift from ranked to class-based is referred to as the Middle Iron Age (Huffman, 2007, p.361). This dissertation will follow the two-age system of the Early and Late Iron Ages, as this is the model most researchers use for the Southeastern Lowlands. The Shashe-Limpopo was also the setting for some of the earliest systematic Iron Age research in southern Africa (Caton-Thompson, 1930b, 1930a, 1931; Fouche, 1937; MacIver, 1906; Schofield, 1926, 1937).

2.2.1 Iron Age research governed by colonialism

Archaeological research in Africa during the nineteenth and parts of the twentieth centuries AD was afflicted by Victorian evolutionary theories. Africa was seen as a 'dark continent' inhabited by savage marauders incapable of change, with a short history (Hall, 1981, 1984a). These evolutionary theories placed Africans at the bottom of a supposed cultural and racial hierarchy (Hall, 1984a, p. 263; Stahl, 1993). African archaeology, especially southern African archaeology as a discipline, is situated in colonialism and developed in relation to colonial ideologies, as many archaeologists worked for the colonial powers (Shepherd, 2002, p. 192). In Zimbabwe (then called Rhodesia), colonial rhetoric dictated Iron Age archaeology (see R. Hall, 1905, 1909; Hall & Neal, 1902 on early ideas regarding the Phoenician origins of Great Zimbabwe.

The seminal work of McIver (1906), Schofield (1926), and Caton-Thomson (1930b, 1930a, 1931) disproved earlier claims that Great Zimbabwe was of Phoenician origin (see R. Hall, 1905, 1909; Hall & Neal, 1902, for a detailed discussion on colonial and racial rhetoric plaguing early Iron Age research, see Bonner et al., 2008; Hall, 1983, 1984a, 1984b, 1990a, 1990b, 2008; Ndlovu, 2020; Ndlovu & Smith, 2019). Caton-Thompson's conclusions, however, still reflected colonial biases, labelling African communities as technologically inferior (Steele, 2001, p. 48). These early research projects carried a 'settler paradigm' rhetoric (Hall, 1984b), in which researchers aimed to portray a foreign rather than African origin (also see Garlake, 1982).

Subsequent research by Robinson (1959, 1961, 1966) and Summers (1950, 1958, 1961b, 1961a, 1967, 1971) at Khami and Great Zimbabwe established complex ceramic typologies and type-sequences that provided a solid base for future syntheses (Hall, 1990a, 1990b; Robinson,

1961; Summers, 1960, 1970). Summers (1967) was the first researcher to aim to understand the continuity and changes concerning the region's ecology and environment during this period. Researchers have adopted such approaches to explain Early Iron Age communities in the Southeastern Lowlands (see Hall, 1981; Maggs, 1980a, 1980b, 1984a, 1984b, 1989).

Many of Robinson and Summers's analytical approaches were inspired by trends in Iron Age research in Europe (Hall, 2008, p. 79). To explain continuity and change across time and space, Summers (1950, 1961a, 1967b), for instance, applied the analytical concept of 'archaeological cultures', an approach first adopted by Gordon Childe for European prehistory. Archaeological cultures were seen as analytical units from which material culture, especially ceramics, could be ordered temporally and spatially (Trigger, 1989).

Similarly, Schofield (1935, 1936, 1943, 1948) subsequently turned his attention to ceramics regionally, constructing a typological scheme for southern Africa from surface collections and a regional sequence from limited excavations. Schofield's seminal *Primitive Pottery* (1948) was a crucial synthesis of pre-colonial pottery for the region. It remained the essential reference for the region's Iron Age until the 1970s (Maggs, 1993) when the introduction of radiometric techniques and new excavations extended the Iron Age's antiquity.

The term' Iron Age' for a southern African context was first introduced by Revil Mason (1952), which he used to define the "period subsequent to the introduction of iron-working, but prior to the appearance of European metal" (p.70). Adopting the European three-age system of prehistory, Mason (1952) identified two periods for South Africa's prehistory – the Stone Age and Iron Age – thus rejecting the term 'Bantu period' popularized by Caton-Tompson and Schofield. Following Daniel (1950), Mason found Wissler's (1914, 1923) 'culture area' concept more helpful in explaining discontinuity and similarities in the material culture of this period, thus providing a means to understand regional variations within the South African Iron Age (e.g., Southern Transvaal Iron Age and Northern Free State Iron Age; Mason, 1952, p. 70). Applying Wissler's 'culture area' concept to a North American context (see Binford & Sabloff, 1982) resonated with Childe's concept of archaeological cultures already known to archaeologists in the region.

Before the inception of the term 'Iron Age,' the period of southern Africa's past was known as the 'Bantu Period' (Hall, 1990b). This Bantu Period was defined by a short and recent chronology (Maggs, 1993, p. 70). Because of this brief history and recent origins, archaeologists before the mid to late 1940s did not see it as falling within their purview. Instead, Stone Age

research remained the central interest for South African archaeologists, while research on the 'Bantu Period' was left to the ethnographers and experts on current African 'tribes' (Hall, 1984a, p. 263). The period from the inception of the term Iron Age through the early 1970s was marred by tension between empirical evidence of a more extended past for Iron Age farmers and the political rhetoric of the Apartheid government, which still aimed to maintain that the interior of South Africa was empty for an extended period and that Iron Age farmers only moved south as European settlers moved in a northern direction (Hall, 1984a, p. 265; Hamilton, 1982).

2.2.2 The Iron Age of southern Africa: Systematization of pre-colonial farming

The appointment of Ray Inskeep and the application of archaeological knowledge from Zambia during the 1960s were crucial developments in southern African Iron Age research. Ray Inskeep took up a position at the University of Cape Town in 1960, permitting the systematic and empirical expansion of Iron Age research. Before his appointment, Inskeep initiated two major Iron Age studies in Zambia on the Kalomo culture (Inskeep, 1962b, 1962c), which were expanded by Fagan (1963, 1967), Phillipson (1968), and Vogel (1970). The culture history of Zambia's Iron Age was one of the most complete and best-understood ceramic records for the subcontinent (Huffman, 1989a, p. 1). Thus, being aware of various research developments in other parts of Africa, Inskeep pushed southern African archaeology to follow the trajectory occurring further north, calling for more ethnographic work to provide a basis for Iron Age research (Inskeep, 1961a, 1961b, 1961c, 1962a). This push by Inskeep led to substantial increases in Iron Age research across South Africa, which, coupled with the introduction of radiometric dating, allowed for a pertinent paradigm shift.

It can be argued that radiometric dating was one of the most crucial contributions to southern African Iron Age research. While it was a critical development in archaeology broadly (Bayliss, 2009; Thompson & Krus, 2017), the dating method had additional implications in Southern Africa. It provided scientific evidence that challenged the 'settler paradigm' and, with research at various Iron Age sites across southern Africa (see below), led to the firm establishment of ever-expanding ceramic sequences anchored by absolute dates. With radiometric dating firmly established in Iron Age researchers' toolkits, reliable and accurate dates helped make sense of the Iron Age's expanding and confusing chronological sequences (Maggs, 1993).

The introduction of new field-and-dating techniques allowed for a more detailed and complex understanding of the southern African Iron Age. Nick van der Merwe and his team (Stuiver & van der Merwe, 1968; van der Merwe & Killick, 1979; van der Merwe & Scully, 1971), for instance, launched the Phalaborwa Iron Age project, a detailed analysis of Iron Age communities of the Lowveld by combining archaeology, ethnography, and ethnohistory. This project ran concurrently with Richard Krause's in-depth ethnoarchaeological study of the various manufacturing techniques used by present-day potters in the region (Krause, 1978, 1984, 1985, 1990). While also in the Lowveld, Menno Klapwijk (1973, 1974; Mason et al., 1973) excavated Silver Leaves, a site which yielded pottery similar to the Dimple-Base pottery found at the East African sites of Urewe and Kwale (Leakey et al., 1948; Soper, 1967a, 1967b, 1971b, 1971c). Dating to the early first millennium AD, Silver Leaves became the earliest known Iron Age site in southern Africa, where agriculture and metalworking occurred. Other Iron Age sites dating to the seventh and eighth century AD were identified by Evers (1973, 1974, 1975, 1977, 1979; Marker & Evers, 1976; Mason et al., 1973). While at Broederstroom, Mason (1974a,1981; Mason et al., 1973) identified similar artifacts, including a pot burial and collapsed hut remains, dated to the fifth century AD. In Namibia, along the Okavango River, evidence of Iron Age communities dating to the ninth century AD was identified (Mason et al., 1973; Sandelowsky, 1971, 1974, 1979).

The long chronology of the Iron Age in southern Africa was realized for the first time in 1973. Due to C^{14} dates obtained at the sites mentioned above, more than 700 years were added to the Iron Age's antiquity (Maggs, 1993, p. 73). By 1970, for instance, Ray Inskeep (1971) argued that the Iron Age in southern Africa only spanned approximately 1,000 years.

Several research developments in the Southeastern Lowlands identified EIA sites in the Upper and Lower Thukela Basin dating to the sixth (Maggs, 1980a), seventh (Maggs, 1984b), and ninth century AD (Maggs & Michael, 1976), while along the coast various excavations provided dates from the third and fourth century AD (Hall, 1980; Maggs, 1980a, 1993).

The many infrastructure developments and construction projects by the 1990s in the Southeastern Lowlands identified several archaeological sites. A Cultural Resource Management project was launched by the Natal Museum Archaeological Department (now KwaZulu-Natal Museum) in the uMngeni Valley to identify and excavate archaeological sites which would be flooded with the construction of the Inanda Dam (Maggs et al., 1984). The project identified numerous Iron Age sites, and subsequent excavations occurred at four EIA sites: Nanda,

KwaGandaganda, 2930DB 43, and Hilltop (Whitelaw, 1993, 1994b). These projects established a clear regional ceramic sequence, while the research at Nanda and KwaGandaganda significantly contributed to the understanding of the nature of EIA communities. Further south, evidence of EIA settlements was found at various coastal middens and alluvial terraces in river valleys as far as the Tyolomnqa River near East London (Cronin, 1982; Derricourt, 1972, 1977; Feely, 1980, 1987; Prins, 1993, 1994; Prins & Granger, 1993).

For the first time, the long chronology of the Iron Age was acknowledged south of the Zambezi River. The adoption of the term 'Early Iron Age,' already in use to categorize the dimple-based and channel-decorated assemblages during the 1960s north of the Limpopo River (see Desmond Clark, 1962, 1965, 1970, 1974; Desmond Clark & Fagan, 1965; Fagan, 1963, 1966, 1967; Maquet & Hiernaux, 1960; Posnansky, 1961a, 1961b, 1961c, 1968; Soper, 1967a, 1967b), had significant consequences for Iron Age research in southern Africa. By embracing the term, archaeologists accepted the chronological implications and the cultural link between eastern and southern African Iron Age communities (Maggs, 1993, p. 73). Noting similarities between ceramics recently described in southern Africa and those in eastern and central Africa, it became clear that the distribution of the EIA was linked with the spread of Bantu-speaking farmers in sub-equatorial Africa (Maggs, 1993, p. 73). Together with C^{14} dating, these realizations allowed researchers to establish firm spatial and temporal ceramic sequences. This advancement enabled research to move beyond merely describing historical culture units. Researchers could now answer questions about the introduction of agriculture in southern Africa and the social and spatial dynamics of Iron Age communities.

The 1960s to 1980s were the most fruitful and crucial years in southern African Iron Age research. During this period, expanding research projects and the inception of radiocarbon dating allowed the 'settler paradigm' to be discredited. It showed that the Iron Age was not comprised of a shallow history but extended back to the third century AD. Furthermore, now that the cultural history of southern Africa was more established, researchers started looking to answer questions on the mobility, social aspects, and political organizations of these first farmers.

2.3 Ceramic style and cultural units in the Iron Age of southern Africa

During the 1970s and 1980s, the initial aim of Iron Age research in southern Africa was to trace the spatial and temporal distribution of material culture groupings, primarily through similarities and discontinuities of aspects of decorative style on pottery vessels. Researchers in southern African Iron Age studies have employed three overarching analytical approaches to address such concerns; (a) technique taxonomy (e.g. Maggs, 1976a; Phillipson, 1968b), (b) multidimensional lists (e.g. Fagan, 1967; Hall, 1980; Huffman, 1978b; Maggs, 1980a, 1980a, 1984a; Maggs & Ward, 1984, 1986; Soper, 1971a; van Schalkwyk, 1991, 1994a, 1994b), and (c) the core-concept (multidimensional typologies) approach (e.g. Huffman, 1979b, 1980, 1989b, 1989a, 1994, 2021, 2022; Huffman et al., 2020; Klapwijk & Huffman, 1996; Loubser, 1984, 1989, 1991, 1993, 1994; Whitelaw, 1993, 1994a, 1996; Whitelaw & Moon, 1996). The salient unit of analysis in all three of these approaches is the design structure (Fowler, 2017; Soper, 1971b, p. 15), which Soper (1971a, p. 15) states is "a pool of technical and decorative traits shared…as a whole from which different regional variants have drawn in different combinations and frequencies". Thus, the design structure is "the layout or arrangement of a design; the way the surface area to be decorated is conceptualized…and the arrangement of elements and motifs within the layout" (Rice, 2015, p. 455). Researchers conducted more studies south of the Limpopo River and gathered additional material culture for comparative purposes. They identified that specific ceramic traits, such as vessel shape and decoration, were salient and practical attributes for distinguishing assemblages from one another (see Fagan, 1967; Huffman, 1978a, 1978b, 1979a, 1979b, 1980, 1989a, 1989b; Maggs, 1976, 1980a, 1980b, 1980c, 1984a, 1984b; Phillipson, 1968, 1976a, 1976b; Robinson, 1966, 1976; Soper, 1971a, 1971c). Further research in southern Africa led to ceramic design structure analyses being updated and refined to include decoration placement and combinations of attributes (Huffman, 1980, 1989b).

2.3.1 Technique taxonomy

Archaeologists using the technique taxonomy approach organize classes of pottery by a hierarchy of divisions. They base this hierarchy on the notion that the first division is the most essential aspect. Thus, the technique used to create a specific decoration would be the most salient element of the technique taxonomy approach (Huffman, 1980). For instance, as applied by Phillipson (1977, pp. 23–24), for Late Iron Age sites in Zambia, he identified four critical decorative techniques: stamping, incision, appliqué, and punctates.

2.3.2 Multidimensional attribute lists

This classification technique compares stylistic variability in pottery through a matrix of attributes (Parkington & Hall, 2009, p. 77). The multidimensional lists present categories of different variables distinctly, with none of the categories being combined into further types. The salient attributes are vessel shape, decoration type, and decoration position. These characteristics are then listed in a matrix, an example shown in Figure 2.1**,** highlighting the interrelationships and frequencies. Importantly, this approach analyzes jar and bowl vessels as separate entities. However, shape, decoration position and motifs are not combined to generate classes and merely monitor the presence/absence of attributes within and between assemblages (Hall, 1980; Hall & Horwitz et al., 1991; Maggs, 1979; Maggs, 1980a, 1980b, 1984b, 1984a, 1984c, 1994a, 1994b; Maggs et al., 1984; Maggs & Michael, 1976a; Maggs & Ward, 1984, 1986; Mason et al., 1973; van Schalkwyk, 1991, 1994a, 1994b).

While the technique taxonomy approach was popular in eastern and central Africa during the 1960s and 70s, it never became a primary analytical method in southern Africa. The multidimensional attribute list approach was more commonly used among archaeologists with similar research aims and scale of analysis.

The intrinsic theoretical underpinning of both the technique taxonomy and multidimensional attribute lists is based on what Huffman (1978b, p. 2) terms the 'core-concept approach,' which is defined as "the essential ideas that govern the clustering of attributes" (Huffman, 1978b, p. 2).

2.3.3 *Core-Concept Approach (multidimensional typologies)*

In many instances, variation in Iron Age ceramics style can be attributed to the idiosyncrasies of its application, termed isochrestic variation by Sackett (1986). Such variation is not a reliable measure for distinguishing between different assemblages. The core concept approach aims to circumvent such isochrestic variations by "characterizing the underlying structure of style systems by emphasizing conceptual categories rather than actual execution" (Huffman, 1980, p. 128). In this regard, the core concept approach shares the central tenet of design structure analysis prevalent in the American Southwest, which will be discussed in more detail in Chapter 4 (Crowe, 2004; Crowe et al., 1985; Crowe & Washburn, 1987; Hardin Friedrich, 1970;

Hardin, 1977, 1979, 1983a, 1983b; Hardin, Margaret, 1977, 1991; Sekaquaptewa & Washburn, 2004; Washburn, 1977, 1978, 1983a, 1983b, 1984a, 1984b, 1987, 1988, 1992, 1993, 1995, 1996, 1998, 2000, 2001, 2003, 2004a, 2004b, 2018b, 2018a, 2019, 2021; Washburn & Crowe, 1988; Washburn & Humphrey, 2001; Washburn & Matson, 1984; Washburn & Petitto, 1993). To define ideas and choices, researchers use the 'ideal' type to refer to the design the maker had in mind when decorating the object (Washburn, 2021). Therefore, researchers can identify such' ideal' types by isolating and combining vessel morphology, decoration type, and decoration placement.

Huffman (1980) developed and refined the core-concept approach by testing the most common analytical procedures used to identify ceramic styles (technique taxonomy and multidimensional attribute lists) in southern Africa by applying these procedures to the ceramics of known groups of people. He argued that for a procedure to be deemed reliable, it must correctly assign the ceramic assemblage to the control group. Huffman's results revealed that most ceramic analytical methods were not reliable because these methods included superfluous details. Some methods, for instance, placed too much emphasis on specific aspects of style, such as the motif, or disregarded similar motif combinations because the focus was placed on ceramic fragments and not whole vessels (Huffman, 1980, 1989a). Therefore, he concluded that the most accurate method to infer group identity should be based on the core tenets of ceramic design, specifically vessel morphology, motifs, and decoration placement.

In his analysis, Huffman does not provide a specific quantifiable threshold for the stylistic differences necessary to attribute ceramics to a distinct language group, nor does he establish a precise limit on the amount of sharing that can occur across language-group lines. Instead, Huffman relies on a comparative and qualitative understanding of ceramic attributes, arguing that major differences in the core concepts would indicate different language groups. In contrast, smaller-scale variability could be attributed to changes within and among a group of people speaking the same language. It is, however, possible that different ceramic facies were linguistically similar because the decoration found on a vessel forms part of a much larger design field, which might extend across several facies boundaries (Whitelaw, 2012).

Huffman (1974, 1978b, 1980, 1989b) introduced key terminology for explaining pottery units as decorative stylistic entities (pottery that forms a unit based on decoration type, decoration placement and vessel morphology combined to form a type). These pottery units form pottery ***traditions***, which are archaeologically discrete cultures defined by pottery decorative styles. The

pottery traditions can further be divided based on ***phases*** or time segments, whereas the actual pottery unit, or the geographical area occupied by the archaeological culture, is termed ***facies***.

Ceramic facies can identify and trace groups of people who make the same design decisions across time and space in the archaeological record. A facies is the complete list of design style types and defines the ceramic unit. Since these types result from repeated choices made by the potter, the core concept approach could capture the underlying structure of the ceramic facies (Huffman, 2017, p. 180, 1980).

Because language is the medium through which people communicate various social behavioural tenets, Huffman (1989b, 2007) argues that specific ceramic design fields will be associated with a particular language group. Ceramic style, therefore, represents a form of macroethnicity produced by people who share the same language.

Within this context, ceramic style and the larger design field found across a group material culture are the result of patterned behaviour. Therefore, they are created and learned by groups of people. Transmission of such styles requires some element of verbal communication, and provided that the producers and consumers belong to the same material-culture group, Huffman (2007, p. 108) argues that the distribution, the spread of a specific ceramic style must represent the spread of a group of people who speak the same language. Interestingly, Evers (1988) conducted a large-scale study on ceramic style across southern Africa amongst present-day and archaeological communities and identified large geographical regions that yielded the same ceramic styles. These ceramic styles were connected by a short, narrow zone where styles changed, with each ceramic facies having a discrete geographical distribution.

Overall, the core-concept approach works on the premise that symbolic meaning associated with ceramic styles is conveyed through language and communication. Therefore, if the people who made and used the pots were the same, each ceramic facies (such as Msuluzi, Ndondondwane, and Ntshekane) would represent a geographical area where people spoke the same language. Furthermore, Evers (1988, p 52, p. 104) argued that variability in stylistic expressions of identity at facies' boundaries was accompanied by different verbal and, therefore, linguistic expressions of identity. Whitelaw (2012) has argued that such patterns most likely occurred where differences between facies were more about the overall structure of the style, rather than with specific details or variables used to describe them as, noted between the Mzonjani and Msuluzi facies.

The core-concept approach has become the dominant approach in southern African Iron Age archaeology, tracing spatial and temporal variability in ceramic style to understand the mobility of agriculturalists and its reflection of social identities like group affiliation and language.

2.4 The Mobility of Agriculturalists across sub-Saharan Africa: The Chifumbaze Complex

As a result of the core-concept approach, migration models based on ceramic styles were developed to explain the shared ceramic style amongst EIA communities from eastern and southern Africa who shared a common ceramic style with the ceramics from Urewe in the Great Lake region of eastern Africa. The shared type is called the *Chifumbaze Complex* (Phillipson, 1977). Phillipson (1977) initially argued that the Chifumbaze Complex comprises a two-stream Bantu-speaking farming communities migration model, which he based on ceramic style differences in the archaeological record. The earliest migration routes are defined by the Highland and Lowland ceramic facies of an Eastern Stream, originating in the Great Lake Region in East Africa. The second migration route occurred along a Western Stream from West Africa.

Based on linguistic evidence, reanalysis of ceramics through the core-concept approach and radiocarbon dates from sites in West and East Africa, Huffman (1989a, 1989b) challenged Phillipson's two-stream model. Instead, he argued that a third stream should be added to the model, the Central Stream. The updated Chifumbaze Complex illustrated in Figure 2.2 constitutes Urewe and Kalundu traditions. Urewe incorporates two branches, the ***Kwale Branch*** (Eastern Stream) and the ***Nkope Branch*** (Central Stream), while the ***Kalundu Tradition*** only consists of the ***Western Stream*** (Huffman, 2006, 2007).

Within the Nkope and Kwale Branches, the facies share an assemblage of stylistic types (i.e. combinations of decoration placement, motif types, and vessel shapes), and variability is primarily due to individual motifs or individual decoration placements (Huffman, 2007, p. 335). On a macro scale, the Urewe and Kalundu Traditions share a broad stylistic structure (Huffman, 2007, p. 335), and variability occurs in the profile, motif types and combinations of these. Therefore, when ceramic styles are traced back phase-by-phase, it becomes possible to identify the origins and timeline of a language group in a specific area (Huffman, 2007, p. 335).

Southern Africa's earliest evidence of agriculture originates from Silver Leaves (see Figure 2.3) near Tzaneen, Limpopo Province, where a seed impression of pearl millet (*Pennisetum americanum*) on a potsherd directly indicates agricultural activity (Klapwijk, 1974). Thus, Silver

Leaves ceramics (the Silver Leaves site being the holotype for the Silver Leaves facies) are associated with the earliest known agricultural activities in southern Africa and are identified as part of the Urewe Tradition of the Kwale Branch. Moving along the eastern coast into Mozambique, these early farmers settled in southern Africa around AD 200 to AD 300 (Whitelaw, 2015; Whitelaw & Hall, 2016). The presence of abrupt stylistic changes at a ceramic assemblage level provides evidence for transitions across space (facies) and time (phase), leading to the introduction of new ceramic facies (Huffman, 2007, pp. 115-116). *Mzonjani* ceramics exhibit a design layout and profile shapes similar to Silver Leaves but lack bevels and flutes. Therefore, Mzonjani is recognized as forming a new facies in the Kwale Branch (Klapwijk & Huffman, 1996) (see Figure 2.3). Key features of these facies include the relatively straight, everted rims with well-defined points of inflection. Thus, during the fifth century AD, sufficient change was observed that the Mzonjani facies replaced Silver Leaves (see Figure 2.1). These pioneer agriculturalists of the Urewe Tradition limited their occupation to within six kilometres of the east coast of southern Africa. Four factors are believed to have influenced the locations of these earlier farmers.

First, the location of the earliest agricultural sites correlates with ancient Pleistocene dune systems. Once the Coastal Dune Forests were cleared by slash-and-burn cultivation, agricultural activity had a brief but productive period before the nutrients leached from the soil. Thus, these first-millennium agriculturalists could only occupy coastal areas for a short time before relocating (Hall, 1981, p. 148).

Secondly, another advantage of coastal occupations is the ability to exploit rocky points and rich shellfish fields, particularly Brown Mussels. Berry (1978) estimated a return of 5,000 kilograms (kg) annually per hectare of Brown Mussel flesh, which would have served as an essential supplement to their diet. Archaeological evidence for agricultural activities at the Silver Leaves and Mzonjani sites is limited, suggesting that these early farmers along the southern African coast frequently moved across the landscape (Whitelaw & Moon, 1996). Thirdly, more recent evidence highlights another factor that may have contributed to the coastal location of the Urewe farmers: iron ore. A significant correlation exists between site location and iron ore outcrops during the Early Iron Age (EIA), particularly in KwaZulu-Natal (Whitelaw, 2015; Whitelaw & Hall, 2016). This suggests that the discovery of iron ore was a decisive factor in the spread and mobility of first-millennium farmers.

Lastly, rainfall was a significant factor along the eastern coast, as evidence indicates that the region experienced substantial amounts of rain from the fourth century until around the tenth century AD due to anticyclonic circulation (Prins, 1994). Such circulations resulted in increased rainfall along the coast, while further inland, a more arid climate prevailed (Whitelaw & Moon, 1996, p. 70). Evidence highlighting the importance of iron ore and rainfall site locations was found further north around the Mpumalanga escarpment and in Eswatini (formerly known as Swaziland) highlands (Dart & Beaumont, 1969; Klapwijk, 1974). Huffman's reanalysis of the Broederstroom ceramics (1998), a Mzonjani-type site in the Magaliesberg Valley, reveals that these communities had migrated over the escarpment and far inland by the turn of the sixth century AD, but did not extend further south than present-day Durban in KwaZulu-Natal.

The second branch of the Urewe Tradition, the Nkope branch, originates in eastern Africa, around Lake Victoria and Lake Tanganyika in southern Tanzania. It moved south through Malawi, the eastern part of Zambia, and into Zimbabwe, most likely around the fifth century AD. The Zhizo phase is the first expression of the Nkope Branch in southern Africa. It was found around the Shashe-Limpopo region from the ninth century AD and is closely related to the Toutswe phase in eastern Botswana (Denbow, 1982).

A second migration, known as the Kalundu Tradition, is believed to have originated near Luanda province in Angola in the early first century AD (Huffman, 1989b, 2006, 2007). However, recent research (Bostoen et al., 2015; Clist et al., 2018; Clist, Hubau, et al., 2019; Clist, Kaumba, et al., 2019; Valdeyron & da Silva Domingos, 2012) suggests that the origin of the Western Stream likely occurred west of Lake Tanganyika. The Western migration stream depicted in Figure 2.2 has been interpreted by Huffman (2021) as the spread of Western Bantu-speaking communities.

The most accessible expressions of Kalundu-type sites in southern Africa are found, at the Lydenburg Head site in Mpumalanga, extending into the Southeastern Lowlands of KwaZulu-Natal by the end of the sixth century AD. In contrast to the early Urewe-type sites, the Kalundu sites are located further inland and south of present-day East London (Prins, 1994; Prins & Granger, 1993). At the beginning of the eleventh century AD, a marked change in ceramic styles was observed. These changes have been linked to significant socio-political and economic shifts among regional agriculturalists (Maggs, 1984c; Whitelaw, 2013, 2019a; Whitelaw & Mazel, 2023). Maggs (1980c, 1984c) argued that these changes reflected an *in-situ* development within the agricultural communities.

In contrast, others, such as Huffman (1989a, 2004) and Wilson (1981), argued that the changes were due to a second migration: the arrival of Nguni speakers from East Africa (Whitelaw, 2013; Whitelaw & Mazel, 2023) that marked the start of the Late Iron Age in southern Africa. Ethnographic, archaeological, and linguistic data corroborate this argument for a second migration moving into southern Africa during the eleventh century AD. Stylistic continuity and dissimilarity have been essential tools for understanding the origin and mobility of Iron Age communities. However, at the beginning of the 1980s, the theoretical and analytical model termed the Central Cattle Pattern (CCP) was central to explaining and understanding Iron Age settlement organizations and worldviews.

2.5 Settlement organization and worldview

As discussed throughout this chapter, the accumulation and expansion of Early Iron Age research and data, in conjunction with the introduction of radiometric dating, have shown that EIA communities lived in villages, which typically consisted of semi-permanent structures made from daga (clay-and-dung) held together by wooden pole frames (Mitchell, 2013), along with storage pits, middens, and grainbin foundations. They worked metal, reared domestic animals, and produced various food crops. Since the 1980s, researchers have explored the internal dynamics and social relations of these first-millennium farmers (Whitelaw, 2013). Archaeologists, historians, and cultural anthropologists have recognized that social, political, and religious significance is linked to settlement layout (Maggs, 1995, p. 134; Whitelaw, 2012, p. 135; also see Guy, 1979; Kuper, 1972; Maggs, 1976a). However, Adam Kuper's (1980, 1982) spatial analysis of southern Bantu settlements became crucial in understanding the nature of social relations and intra-site dynamics of Iron Age institutions. Drawing from Kuper's analysis, Huffman (1982, 2001) applied a critical theoretical and analytical model to explain the social, economic, and cosmological aspects of Iron Age societies, termed the Central Cattle Pattern (CCP) (initially called the Bantu Cattle Pattern).

The basis of the CCP and its applicability in an archaeological context requires intra-site spatial data permitting the interpretation of settlement layouts. Huffman (2007, p. 23) argues that it is possible to develop settlement models because human societies divide their physical space into discrete locations where specific activities occur. Furthermore, such spatial arrangements have social significance and consequences. Because of this, a particular settlement organization is

closely tied to specific worldviews, "a cluster of symbols that give meaning to social organization, rules to govern behaviour, and values to decide choice" (Huffman, 2007, p.23). Archaeologists have developed the CCP model relevant to southern Africa using an ethnographic approach.

The crucial tenet of the CCP is the importance of cattle. Cattle are used to unite communities through bridewealth payments, sacrifice to ancestors, and strengthening political relations (Huffman, 1982, 1989b, 2001, 2007, 2012; Kuper, 1980; Mitchell, 2013). Settlements are organized around one or several livestock pens, a male space where men and other people of high status are buried. Married women and unmarried girls occupied the outer 'domestic zone and incorporated the households of individual wives with their private sleeping houses, kitchens, grain bins, storage pits, and graves. The outer households were arranged according to seniority, expressed through a left-to-right distinction, starting with the great hut-built upslope of the court and livestock pen (Huffman, 2007, pp. 23-24). Ethnographic records indicate that this pattern was only exclusively by eastern Bantu-speaking people who share a patrilineal ideology regarding procreation, a preference for bridewealth in cattle (*lobola*), male hereditary leadership, and a favourable belief about the role of ancestors in everyday life. Men are associated with pastoralism, and women with agriculture (Huffman, 2007, p.24).

The application of the CCP to explain the social and political organization of agriculturists has been effectively applied to second-millennium AD communities and into the first-millennium AD at sites such as Broederstroom (Huffman, 1993), KwaGandaganda (Whitelaw, 1994a, 1994b), Ntshekane (Huffman & Whitelaw, 2019), and Kgaswe in Botswana (Denbow, 1986). However, the connections between language, worldview, and ceramic styles remain contentious and debated. In the following section, the complexities of linking ceramic decorative styles with language groups and other forms of social identities, along with relevant critiques and alternative approaches, will be explored.

2.6 Pottery style and language

Before continuing, a short detour into style and identity as it relates to this study is needed to address the challenges of linking ceramic decorative style(s) to language groups and other aspects of social identity.

Style in archaeology has been defined as several different phenomena by researchers, as stated by Hegmon (1992, p. 517) "…sometime[s] [it] appears that archaeologists have as many approaches to style as we have works on the topic". However, there is an overall agreement that

style is a way of doing something (Conkey, 1990; Hegmon, 1992; MacEachern, 1992, 1994; Plog, 1983; Sackett, 1977, 1986; Wiessner, 1983, 1985, 1989; Wobst, 1977, 1999) and *style involves choices* among a set number of alternatives (Audouze, 2002; Lemonnier, 1986, 1993).

'Identity,' on the other hand, is defined as "individuals' identification with broader *groups* [emphasis added] on the basis of differences socially sanctioned as significant" (Lucy, 2005, p. 1). Identity is situated in this study as the individual *within* a socio-cultural community because it is within such a community (informal groups people form as they follow similar enterprises over time) (Wenger, 2011) that this dissertation examines.

Communities worldwide express their identity through material culture. In KwaZulu-Natal, for example, studies on beadwork (Boram-Hays, 2005, 2018; Jolles, 1994, 2001, 2004, 2006), earplugs (Jolles, 1997), and pottery (Armstrong & Calder, 1996; Berglund, 1976; Biyela, 2015; Chahine & Kinuthia, 2013; Fowler, 2006, 2009, 2011b, 2015; Grossert, 1978; Jolles, 2005, 2012; Kennedy, 1993; Maggs, 2018; Perrill & Garrett, 2011; Nettleton, 2010; Papini, 1994; Perrill, 2005, 2008; Todd, 2006; Whitelaw, 2021; Whitelaw & Hall, 2016) have shown that these material objects convey various aspects of Zulu identity, both within and among groups. Similar patterns have been observed in other parts of the world. Among the Hopi in the American Southwest, ceramic design symmetries are viewed as metaphors for social reciprocities (Sekaquaptewa & Washburn, 2004, 2009; Washburn, 2018b). Fundamental concepts of social behaviour are continuously reflected in material culture, ensuring that these relationships are passed down from generation to generation (Washburn, 2018b, p. 127).

Theoretically, there are myriad ways to manufacture material objects, such as pottery. Among modern-day Zulu potters, for instance, Fowler (2017) identified 36,504 distinct *chaînes opératoires* that potters might use. By identifying seven stages (extraction, processing, shaping, decoration, drying, firing, and post-firing) in pottery manufacturing among Zulu potters, Fowler classified all methods utilized across each manufacturing stage (Fowler, 2015, 2017). He recognized each combination of methods across all seven stages as a single pathway. One pathway was defined as a single *chaîne opératoire.* Each region in KwaZulu-Natal had distinct pathways, and at Nkandla, for example, he identified 80 distinct *chaînes opératoires.* However, the potters only utilized 57 of them (Fowler, 2017). Ethnographical and archaeological studies on pottery across different regions have reached similar conclusions (Arnold, 1972, 1983, 1984b, 2006, 2015; Gosselain,1992, 1998, 2000, 2008, 2011b, 2017, 2018) that only certain specific and calculated

design structures are consistently chosen to decorate objects. Such structures are specific and repetitive, learned and taught, and exhibit discontinuity between groups or regions (D'Andrade, 1984; Fowler, 2015, 2017; Hardin Friedrich, 1970; Huffman, 1989a, 1989b, 2007; Leach, 1991; Plog, 1978; Rice, 2015; Rice & Natt, 2014; Turner, 1967).

Thus, design structures are repetitive and cohesive units of cultural signs occurring on the surface of a decorative object (i.e. design field), in this instance, a ceramic vessel. Ceramic design structures are part of a more extensive design repertoire, which occurs in some form on beadwork, drums, hut walls, mats, and skin aprons (Evers, 1988, pp. 13–36; Huffman, 1989b, 2007, 2019; Mönnig, 1967; Vogel, 1983, 1984). Design repertoires in this study are defined as constellations of shared decorative pathways (see Fowler, 2017) from which groups of people with shared sociocultural histories draw in various combinations and frequencies (Soper, 1971b, p. 15). Such overlaps in design repertoires are also present in the archaeological record (Fowler, 2008, 2009; Inskeep & Maggs, 1975; Ortman, 2000). Emically, ceramic style is a controlled portion of a community's more extensive design repertoire. Design structures combined in specific ways can inform group identity to outsiders and carry social messages communicated to group members (Wobst, 1977, 1999). Thus, Huffman (1989a, 1989b, 2002, 2006, 2007) argues that ceramic style can be used as a proxy to identify a distinct group of people. If the producers and consumers of the pottery are the same, and the pottery style is complex, pottery style can represent the larger design structure and culture code of a language group and be used to recognize such identities in the archaeological record (Huffman, 1989b, pp. 5-6). Ceramic sequences infer the movement, chronology, and social groupings of the southern African Iron Age. These sequences are based on the premise that ceramic style can express group identity (Huffman, 2007, p. 104).

Huffman's (1980) seminal research, as discussed in Section 2.4, established that neither multidimensional attribute lists nor technique taxonomies are the most accurate methods for inferring group affiliation from ceramic assemblages among modern cultural groups. Huffman aimed to identify an approach that could discern discrete macro social identities (language groups) linking Iron Age ceramic style to linguistic groups. In doing so, he argued that groups sharing a ceramic style also shared a similar language (Huffman, 1980, 1989b, 2007, 2012; Whitelaw, 1994a, 1994b, 1996, 2012, 2015). However, he did not conclusively demonstrate that alternative ceramic classification systems adequately capture other dimensions of social identity.

As of now, there isn't an agreement on how pottery style relates to language, nor is there a consensus on how to define style and the identity it represents (Whitelaw, 2012, p. 130). Furthermore, interpretations of the social boundaries separating various ceramic style clusters differ among the individuals who crafted and utilized them (Parkington & Hall, 2009, p. 73). These contentions have recently been emphasized in debates between advocates of the 500 Year Initiative (FYI) and proponents of the style-linguistic group hypothesis.

The FYI has criticized the 'structuralist' approach to understanding past groups of people, along with the homogenous and fixed inferences on group identity (Beinart, 2010; Davies, 2010; Delius & Schoeman,2008, 2010a, 2010b; Etherington, 2010; Fredriksen, 2007; Fredriksen & Chirikure, 2015; Lane, 2010b; Stump, 2010; Widgren, 2010; Wright, 2010). In response, Huffman (2012) and Whitelaw (2012) argue that this critique is unfounded because pottery style must, in some way, correspond to the cultural identity of the makers and users of pre-colonial pottery.

However, the critiques expressed by the FYI members are familiar and have also been voiced by other researchers. In particular, several scholars have raised concerns regarding the static nature of ceramic phases and the ahistorical and structuralist models that imply past populations were incapable of change (see Ashley, 2010; Eggert, 2005; Hall, 1983, 1984b, 1984a; Lane, 1994, 1998; Pikirayi, 1997, 1999; Robertson & Bradley, 2000). For example, Martin Hall (1983, p.268) contends that the direct link between current and past groups within the multidimensional model requires revision. It creates a static, reified representation of past groups, wherein these groups are locked in form over time as a "cultural package." These cultural packages are automatically applied spatiotemporally in the archaeological record (see Hall 1983, 1984; Mitchell, 2002; Pikirayi 1997, 1999, 2007). Other studies demonstrate that group identity is not fixed in time and space; it can be fluid and evolving (see Ashley, 2010; Gosselain, 2000; S. Jones, 1997; Pikirayi & Lindahl, 2013; Stark, 1998a, 1998b). Additionally, there are issues related to how cultural units are defined (Bonner et al., 2008; Delius & Schoeman, 2010a, 2010b; Wright, 2010). According to Wright (2010), the current definition of cultural units reveals a lack of internal agency among groups:

> "In its focus on defining cultural units, it is an archaeology that proceeds by highlighting cultural boundaries between groupings whose internal cohesion it takes for granted. It underplays their internal political and social dynamics, and thus finds it difficult to explain historical change except in generalized social evolutionist terms" (p. 231).

While proponents of each side agree that ceramic style can be defined in more than one way depending upon the method of analysis used, none have explored how alternative methods of stylistic analyses, derived from different theoretical underpinnings, could be used to infer other communal groupings (Ashley, 2010). These critiques have led some researchers to adopt alternative approaches to southern Africa's distant past.

2.7 Scale, ceramic analysis, and the various dimensions of social identity

In response to the critique discussed in the previous section, Huffman (2001) countered that the CCP is meant to be normative and "is not…concerned with variation *between identity groups* [emphasis added]" (Huffman, 2001, p. 24), instead such a model requires all nuanced variability to be subsumed to identify overarching principles (Huffman, 2001, p. 24). If the aim is to discern variation on a smaller scale, an alternative, more culturally specific model is needed, as the current core concept approach is not able to adequately address subtlety (S. Hall, 2012, pp. 303–304; Parkington & Hall, 2009, p. 83).

During the 1970s and 80s, there was a propensity to situate Iron Age sites as single occupational horizons to accommodate the applied ceramic analysis, even when the radiometric dates made such interpretations highly unlikely (Maggs & Ward, 1984, pp. 136–137). Such practices were evident at many important type sites, including Broederstroom (Mason, 1981), Lydenburg Heads (Evers et al., 1982), Klingbeil (Evers, 1980), Klein Afrika (Prinsloo, 1974), and Ntshekane (Maggs & Michael, 1976). At Ntshekane, Maggs and Michael (1976, p. 737) suggested that the site was occupied several times. Further multidimensional scaling analysis of the ceramic data confirmed that Ntshekane was occupied across at least three phases (A. A. Butler & Sutcliffe, 1977). Thus, researchers realized that EIA agriculturalists had a propensity to reoccupy sites or occupied places for more extended periods across multiple ceramic phases, only shifting the settlement layout as communities grew and adapted (Maggs, 1994; Maggs & Ward, 1984; Whitelaw, 1996). Such phenomena were widespread for EIA sites in the Southeastern Lowlands (see Horwitz et al., 1991; Huffman & Whitelaw, 2019a; Maggs et al., 1984; Maggs & Ward, 1984, 1986; van Schalkwyk, 1994c; Whitelaw, 1994a, 1994b, 2019; Whitelaw & Moon, 1996). Thus, "the various temporal layers must be teased apart to discern settlement size(s) at any particular time." (Whitelaw, 2013, p. 210).

However, such 'teasing apart' of ceramic phases does not consistently deliver accurate results. At KwaGandaganda, for instance, Whitelaw (1994a, p. 17) notes that "Msuluzi and Ndondondwane sherds are difficult to separate because all Ndondondwane vessel classes occur in Msuluzi." Such difficulties of accurately decerning between Msuluzi and Ndondondwane ceramics led Horwitz et al. (1991, p. 9-12) to establish a Msuluzi/Ndondondwane transitioning phase at Emberton Way because, as they noted, "several characteristics are shared by the two phases" (p. 9). Thus, current analytical approaches seem inadequate to answer questions surrounding social identity at alternative scales.

Some researchers have aimed to circumvent such shortcomings through alternative analytical approaches. At Ndondondwane, Fowler and Greenfield (2009) combined the multidimensional typology and attribute matrix analytical techniques and established Minimal Decorative Units (MDUs) (Fowler, 2002) of all analyzed ceramic material. Because of the tight spatial-temporal control available at Ndondondwane, Fowler and Greenfield (2009) could discern generational changes through a micro-chronological analysis of the ceramics from the site. Similarly, several researchers (Chirikure et al., 2018; Fredriksen, 2007, 2009, 2011, 2015, 2020; Fredriksen & Bandama, 2016; Fredriksen & Chirikure, 2015; Fredriksen & Lindahl, 2023; S. Hall, 1998, 2012; Lane, 1994, 1998, 2010b, 2011; Segobye, 2005) argued that current Iron Age methodological praxis lacks *recursiveness* (Fredriksen & Chirikure, 2015, p. 2), the ability to address inquiries on various scales, and the ability to move between the macro and microscale.

Various researchers have approached this issue from different angles. Simon Hall (1998; 2012), for instance, addressed identity at the scale of gender and social dynamics from ceramics found in the Moloko household context. The Moloko sequence is associated with the Sotho-Tswana (Huffman, 2002, 2007). Noting that pottery from the earlier Moloko phases between AD 1300 and AD 1700 was elaborately decorated in comparison to post-AD 1700 ceramics, which were much less stylistically complex, Hall argued that the change in ceramic styles was due to changes the Sotho-Tswana political power, and shifting gender roles within Moloko households (S. Hall, 1998). Similarly, Fredriksen (2007, 2011) traced changes to Moloko pottery and the shifting nature of hearths in social interactions of households between two sites, noting temporal and spatial shifts in the importance of hearths (Fredriksen, 2011; also see Fredriksen & Lindahl, 2023).

Other researchers applied Igor Kopytoff's 'internal frontier model' (S. Hall, 2009; Kopytoff, 1989; Parkington & Hall, 2009; Whitelaw & Hall, 2016) to explain interaction, confrontation, marginalization and reconstruction of social identities between groups of people. Whitelaw and Hall (2016; also see Parkington & Hall, 2009) have argued that the transition between the Early and Late Iron Age, in the Southeastern Lowlands at least, can best be explained through Kopytoff's internal frontier model. The sharp ceramic stylistic discontinuity between the EIA and LIA is due to an influx of newcomers (Nguni-speakers) from the north into an environment already occupied by EIA agriculturalists and hunter-gatherers (Whitelaw & Hall, 2016). When the newcomers moved into this heterogeneous social landscape, they absorbed EIA agriculturalists, leading to the sharp discontinuity of ceramic styles (Whitelaw & Hall, 2016; Hall & Parkington, 2009).

Similarly, Urewe (Mzonjani) and Kalundu ceramics (Msuluzi) share several similarities due to their interaction when the Kalundu agriculturalists spread into southern Africa from the northwest. However, on a structural level, Mzonjani and Msuluzi ceramics are still largely distinct, with Mzonjani pots mostly decorated on the rim and shoulder of the vessel, while Msuluzi-type vessels see the decoration occurring on the rim, neck and shoulder (Whitelaw, 1993, 1996; Whitelaw & Hall, 2016; Whitelaw & Moon, 1996). Other scholars (Maggs, 1980a, 1986), however, argue that there needs to be more structural differences between these two ceramic types and that the variability is due to *in situ* change rather than a new influx of agriculturalists.

Varied interpretations are most likely due to differences in analytical procedures. The core concept approach aims to capture complex style structures by combining vessel shape, motif type and placement to allocate ceramics to a tradition or phase. With this approach, the focus is on identifying discontinuities between ceramic traditions and phases. Alternatively, Maggs (1976, 1980b, 1984b) compares pottery through an attribute matrix. This method still identifies differences between various ceramic traditions and phases, but it can highlight the continuity between ceramic styles on a smaller scale (Parkington & Hall, 2009). However, it is not merely an analytical issue. A more significant concern is researchers' contrasting views on Iron Age societies- some believe that Iron Age communities lack the ability to be creative and innovative. In contrast, others see Iron Age communities as dynamic, capable of change and creative.

As discussed in the previous sections, ceramic design styles have been used to construct broad material culture sequences and trace the spatial and temporal movement of material culture

on a large scale. Research intimated that these ceramic sequences represent a form of macroethnicity based on a common language. The following section will specifically review the critiques directed at current analytical and theoretical approaches in Iron Age studies.

Moreover, the following section will identify why such critiques are misplaced. Instead, alternative analytical procedures to study ceramic design style are needed, which would help decipher other types of identities present on a level smaller than language groups.

2.8 Alternative methods can reflect social identity on a different scale

Some critical points need to be raised with how the FYI misconceives the relationships between style and identity. Key critiques of the FYI's argument have caused misunderstandings about the link between style and identity. These critiques, which challenge the connection between ceramic style and group identity, are unjustified and tautological. They reject using style to identify social groups but still call for examining group dynamics and change. To address this, researchers *must first* establish a robust means of determining group membership that is visible archaeologically. The problem is not with identifying groups but rather the indiscreet use of ethnographic analogy in modelling the behaviour of archaeological groups. Whitelaw (2012, 2015) has eloquently rebutted the idea that Iron Age archaeologists' use of ceramic style to define in-group affiliation is static, stating that 'all researchers in all disciplines classify their material to reduce its infinite diversity to manageable sets with limited variation' (2012, p. 130). This research aims to address this by applying alternative approaches to determine if such approaches could assist in detecting social identities amongst Early Iron Age communities in the Southeastern Lowlands of South Africa.

2.9 Chapter Summary

This chapter has introduced the historiography of Iron Age research in southern Africa. Iron Age research in the region began much later than in other parts of sub-Saharan Africa. Furthermore, this chapter addressed the crucial pottery analysis, especially stylistic analysis had, in the region.

Moreover, the introduction of radiometric dating held vastly important implications for southern African archaeology. Now, not only was it realized that the Early Iron Age was substantially older than initially thought, but it also became possible to establish sound cultural

historical sequences, identifying the connection between eastern and southern African Iron Age communities. What became apparent was the importance of material culture in tracing people's temporal and spatial movement by linking ceramic design styles to varied past communities. Therefore, “as long as makers and users of pots were the same, each facies most likely represents an area in which people spoke the same language” (Whitelaw, 2012, p. 131). This chapter introduced various critiques that have been levelled against the creation and application of such ‘normative’ and ‘ahistorical’ models and sequences, arguing that it aims to explain the region's history in a static nature and does not consider interaction and agency amongst groups of people. Especially amongst the FYI practitioners, critique is primarily directed at how cultural units represent themselves materially. However, this chapter has shown that such critique is misplaced and that the main concern is that there is no consensus on a robust means of identifying group membership that is visible archaeologically. Therefore, multiscalar analytical and theoretical approaches are needed to determine alternative dimensions of social identities.

Table 2.1 The relevant established chronological periods for southern Africa. Adapted from Greenfield and van Schalkwyk (2008, p. 134) and Huffman (2007, p. 361)

Period	Phase	Years
Late Stone Age (LSA)	Terminal	5000 BC-AD 1000
Early Iron Age (EIA)	Silver Leaves	AD 280-450
	Mzonjani	AD 450-650
	Msuluzi	AD 650-750
	Ndondondwane	AD 750-950
	Ntshekane	AD 950-1050
Middle Iron Age (MIA)*		AD 900-1300
Late Iron Age (LIA)	Blackburn	AD 1050-1500
	Moor Park	AD 1350-1750
	Nqabeni	AD 1650-1820
Historic Contact		AD 1700-1800
Colonial		AD 1800-1900
Modern		AD 1900-present

***The MIA is the period in the Shashe-Limpopo and demarcates a significant shift from ranked to class-based communities (see Huffman, 2007, p. 361)**

Figure 2.1 Example of the multi-dimensional attribute approach. Various attributes (neck shape, decoration position, and motifs) are compared, and their co-occurrences are shown in a matrix diagram. From van Schalkwyk, 1994a, Table 2

Attribute		Ceramic assemblages					
		Wosi G II	Wosi GIV–VI	MSUL	Wosi GI + GIII	MBA	NDON
	2	100	95	100	81	58	67
	44	—	5	—	19	42	29
	8	67	53	80	38	—	19
	9	10	—	2	—	—	2
	32	12	—	7	62	74	79
	11	41	26	18	24	16	2
	12	5	4	4	—	—	—
	14	29	16	4	16	5	10
	15	14	11	9	11	11	26
	34	12	16	22	22	47	45
	35	30	5	38	8	—	—
	17	4	—	4	3	—	2
	23	4	37	20	14	—	—
	36	4	5	11	3	—	—
	24	6	11	—	—	—	10
	19	10	21	9	5	—	2
	20	22	32	—	5	—	—
	37	21	42	24	32	5	12
	38	6	—	16	8	26	7
	39	6	16	2	19	47	7
	25	8	11	6	—	—	—
	40	2	5	9	8	—	2
	29	2	—	2	3	—	—
Burnish	48	8	5	2	8	5	7
	n	49	19	45	37	19	42

Figure 2.2 The Chifumbaze Complex. Adapted from Huffman 2007, p. 212

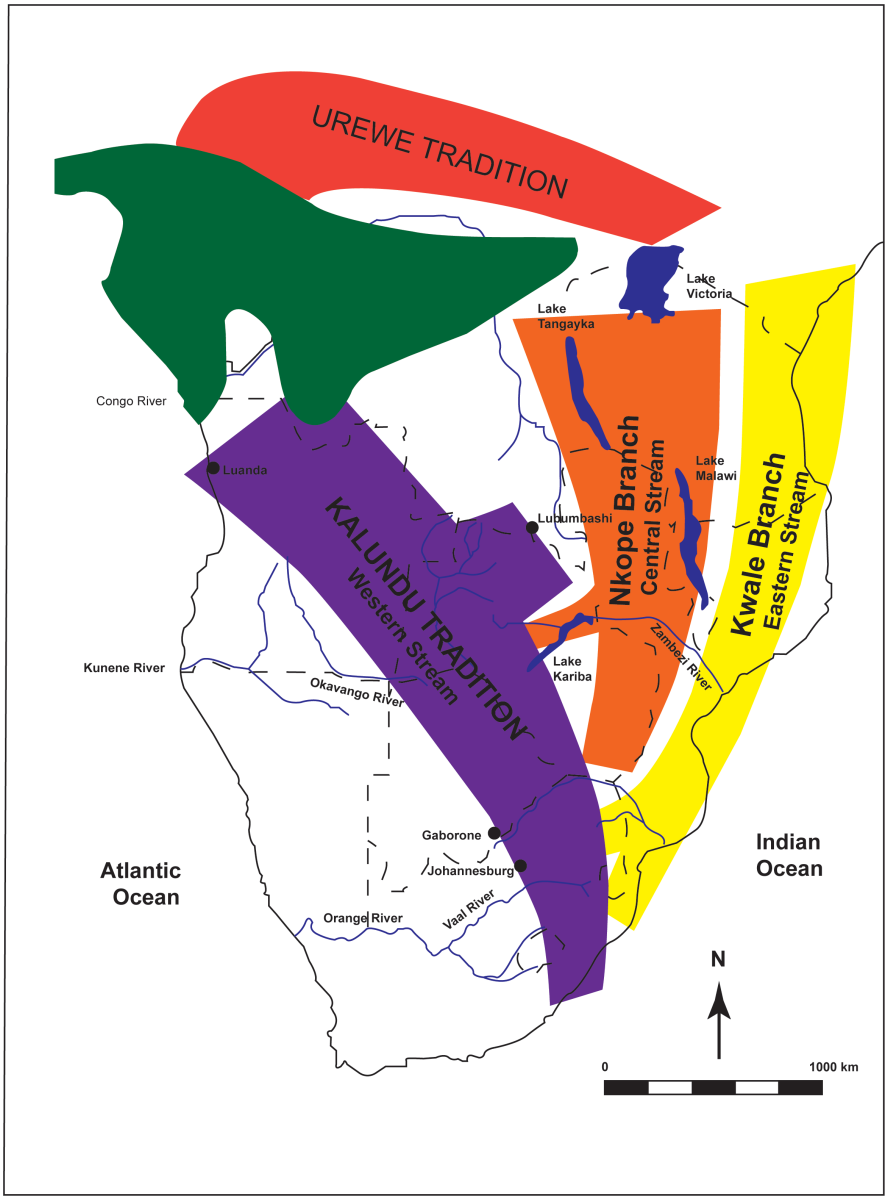
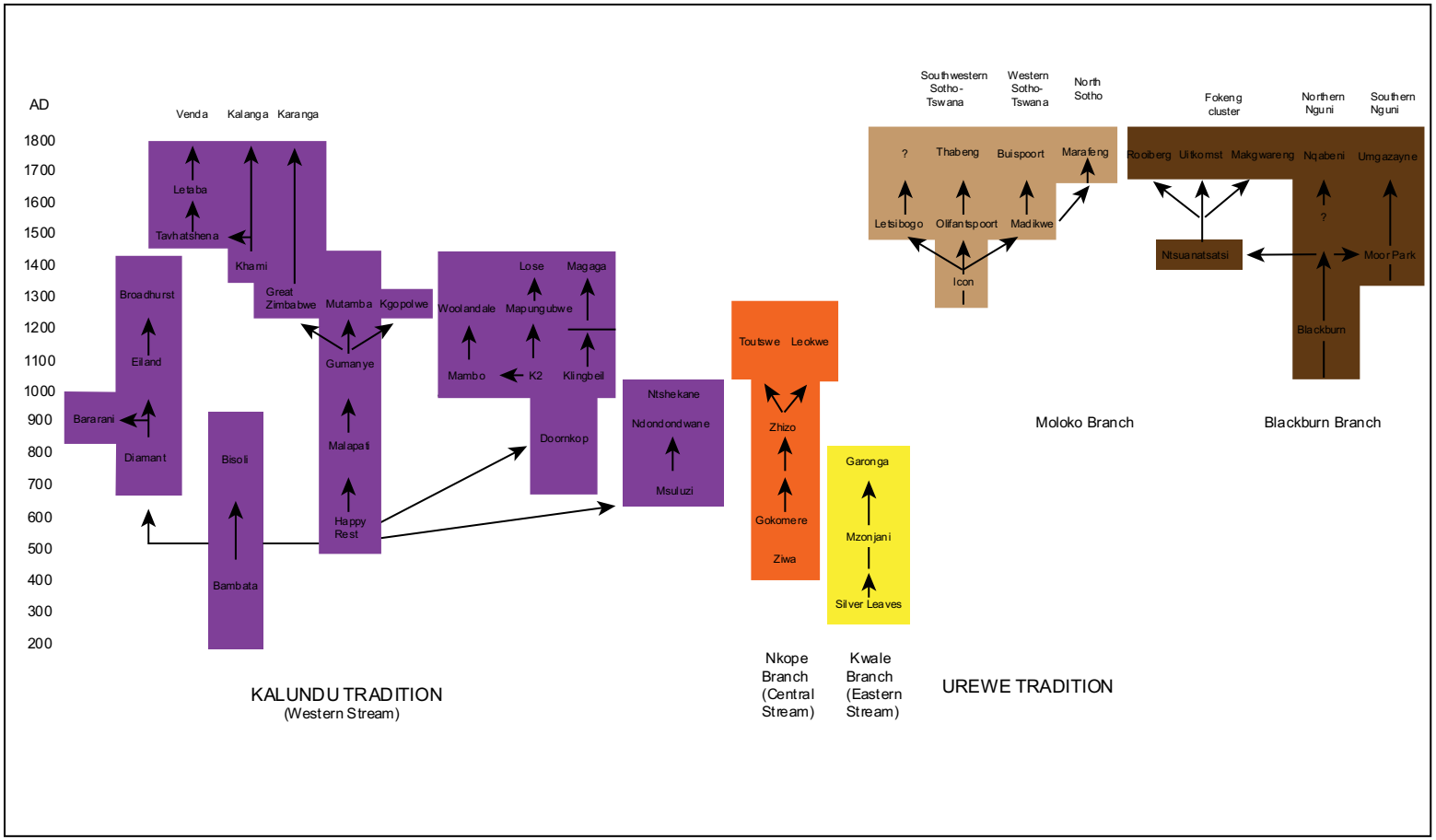


Figure 2.3 Relationship of ceramic facies in southern Africa. Adapted from Huffman 2007, p. 118



Chapter 3. Theoretical applications

3.1 Introduction

This chapter addresses the theoretical and conceptual considerations of identifying social entities at a level smaller than linguistic groupings (see Chapter 2 for a discussion). The preceding chapter traced the analytical and theoretical approaches in Iron Age archaeology and discussed several critiques on how social identities materialize. However, as discussed in Chapter 2, there is no problem with equating ceramic style to group identity as these categorization frameworks, such as the core-concept approach, are essential heuristics for situating archaeological data in space and time and identifying and tracing large-scale mobility and regional variability (Crellin, 2020; Griffiths, 2017; Harris & Cipolla, 2017, p. 19; Holland-Lulewicz, 2021, p. 538; Whitelaw, 2012). Instead, these approaches sought to identify a specific form of large-scale group identity, i.e. language, because an equivalence is made between language and material symbolling and, therefore, are inadequate to address social phenomena occurring in scaled-down spaces or to allow alternative and fluid understandings and narratives of past worlds. Recently, Fredriksen and Chirikure (2015) have made a similar argument, stating that "some critics have not yet fully grasped that the models are normative, apply at a general level and are not intended to account for variation below a certain analytical scale" (p. 3). These models, such as the core concept approach, were not intended to address social identities on an intra and inter-site level. Thus, the core-concept approach will not adequately identify stylistic variability in pottery production between households.

This chapter argues that understanding social entities on smaller scales requires a relational approach that moves beyond fixed categories for both materials and people. New materialism, which includes diverse concepts and methodologies (see Coole & Frost, 2010), offers such an approach by emphasizing the dynamic nature of material objects and their impact on human lives, societies, and histories. Rather than seeing artifacts as mere passive remnants of human activity, new materialism considers them as active agents in shaping cultural and social dynamics. Therefore, this chapter identifies and discusses specific aspects of relational theoretical paradigms, and I argue that they can assist in addressing social identities on alternative scales. First, categorization as a heuristic tool is introduced, followed by a critical review of such approaches, identifying why it is not appropriate for understanding social identities on a smaller scale. Rather,

I argue that understanding pottery production as a skilled, performative process involving repetition, improvisation, and interaction with materials allows for a better understanding on smaller scales. Such an approach does not see potters as relying on static templates; instead, they create through ongoing alignment of observation and action. Repetition, including boredom, sustains cultural continuity and change. Using Derrida's (1982) concept of iteration, artifacts and categories like the Msuluzi facies are seen as dynamic, shaped by repeated acts that transcend single contexts. A discussion on meaning and meaning-making will follow this, highlighting how meaning in objects is fluid, leaving traces rather than holding a fixed significance; this perspective highlights how objects act as mnemonic links between past and future contexts. A relational approach, focusing on connections and continuities between objects, shifts the focus from static meanings to understanding the influence of material traces and signification, which will be further explored through Peirce's semiotics. Such an approach makes it possible to identify the various entanglements between objects and persons and how meaning and interpretations shifted in a multitude of ways depending on the relationality, the context, and audience (Capone & Preucel, 2002; Parmentier, 1997, p. 51).

Lastly, this chapter addresses how similarities and repetitions between objects are connected through bodily practices of production, best understood as part of a learning network. Tracing and capturing shifting meanings and social identities across different scales requires a relational approach which can capture meaning on different scales without relying on reified homogenous categories; this, I argue, can be done through an assemblage and Social Network approach.

3.2 Categorical approaches and essentialist models

3.2.1 Categorization in archaeology

Since the twentieth century AD, archaeological endeavours have used various categorical perspectives from cultural-historical units to processual neo-evolutionary categories and categories of organizational characteristics (Holland-Lulewicz, 2021, p. 537).

Classification-"the fundamental structuring procedure by which disciplines organize…data" (Rice, 2015, p. 230; also see Rice, 1982, pp. 48-49, 2013, p. 12)- is a crucial aspect of all scientific discourse and "all researchers in *all* [emphasis added] disciplines classify their material to reduce its infinite diversity to manageable sets with limited variation" (Whitelaw,

2012, p. 130). As Brew (1946, p. 65) so eloquently stated, there is no single classification best suited for archaeology. Rather, *how* data is classified should be done based on the questions being asked. The classification of material culture in southern African Iron Age research, especially ceramics, is a topic that has received plenty of critiques lately (see Chapters 2). Many researchers argue that current typological classifications of ceramics are static and do not allow for recursive or alternative approaches. However, the issue is not with the classification of material. Instead, we need not 'replace' typological models, as such models have contributed significantly to our understanding of past societies. Conkey (1990) argued that *all* classification systems have some typological basis (also see Whitelaw, 2012, 2015). If, as Whitelaw (2012, p. 130) states, there is disagreement "around how style should be characterized and the kind of identity it expresses," then the application of alternative classificatory models and analytical practices situated in various theoretical underpinnings and methodologies should be employed to determine the scale of identity archaeologists are observing. In the subsequent section, the classification of archaeological ceramic material will be discussed, highlighting how ceramics have been and still are classified.

Within a general methodological paradigm, classification precedes analysis and interpretation (Hill & Evans, 1972, p. 234; Rice, 1982, pp. 48–49, 2013, p. 11, 2015, p. 221); for obvious reasons, materials first have to be classified, identified and named-before any analysis or interpretations can be made (Hills & Evans, 1972, p. 234). Analysis entails "collapsing a collection into some set of constituent attributes to determine their nature, proportions, and nature/or relations" (Rice, 2013, pp. 11-12); therefore, in dealing with pottery, the analysis could be stylistic, morphological, functional, etc. Interpretation is the highest level of study where the data (in this instance, pottery) is situated in a theoretical context (Rice, 2013, p. 12). The classification of any material can be pursued through categorization, the creation of new previously unclassified or ungrouped material, or identification, the process through which individual objects are assigned to known previously established classes (Rice, 2013, p. 12). Dunnell (1971, p. 94) distinguished between grouping (the phenomenological or empirical real) and classification (the ideational realm) in how material culture, such as pottery, is organized. *Grouping* constitutes the physical sorting or categorizing actual objects, such as pottery excavated at Ndondondwane. Groups, therefore, are conditional because they are bounded by the restricted set of objects that can be grouped. Paradigmatic classification, based on the ideational realm, is a conceptual structure independent of space and time, used for arranging *attributes "*property, characteristic, or feature

of an entity, typically of material, technique, style, or morphology" (Rice, 2015, p. 220), into *classes,* which are established based on a theoretical criterion (Rice, 2013, pp. 12-14, 2015, p. 225). Classes and types are cognitive constructs. Class is defined as "*any* division of materials or events into groupings based on similarities and differences" (Hill & Evans, 1972, p.233, original emphasis). Type, on the other hand, is "a formal conceptual (or abstract) unit based on a consistent patterning of the materials" (Rice, 2015, p. 225; Hill & Evans, 1972, p. 233). The outcome of pragmatic classifications is the creation of a *typology,* a classification that "has an explicit theoretical basis" and is used "to shed light upon the reasons beneath the occurrence of some observable phenomena" (Kluckhohn, 1940, as cited in Gifford, 1960, p. 346). Paradigmatic classification systems benefit from replicating and testing, while groupings based on specific data sets cannot be tested (Rice, 2013, p. 14). Furthermore, paradigmatic classifications can be distinguished by noting whether the criteria for describing classes are comparable and unordered, ordered or hierarchical (Dunnell, 1971, p. 70; Rice, 2015, p. 226).

The type-variety method allows for ceramic vessels to be "grouped into successively finer categories on basis of some combination of variable" (Gifford, 1960; Orton & Hughes, 2013, p. 11; Rice, 2013, p. 15, 2015, p. 230; Sinopoli, 1991, p. 230; Willey & Phillips, 1958, 1980). Pottery can first be divided into past groupings, and then further subdivided into decoration technique, decoration placement, etc. Thus, the type-variety method is a hierarchically structured typology (Rice, 2013, p. 15). Rouse (1939, 1960) introduced an alternative approach based on modes. *Modes* are defined as the notions and habits which directs the producers of a community and will be handed down vertically from one generation to the next. *Modes* are then (Ford, 1952; 1954) able to spread between communities over vast distances (Rouse, 1960, p. 313). The classification of archaeological pottery in North America was impacted by the 'typology debate' (Hill & Evans, 1972) with issues on description and interpretation. The debate is characteristically framed as two polarized epistemological positions. At the one end, James Ford (1952; 1954) and his supporters (see, for example, Brew, 1946; Dunnell, 1971) argued that types were subjective and arbitrary constructs which archaeologists use and impose over their material culture. Spaulding (1953) instead argued that types were statistically verifiable collections of attributes which archaeologists discover. Pottery types are fundamental categories representing the 'mental templates' (Gifford, 1960; Rouse, 1939, 1960) of the producers and users (Rice, 2013, p. 16).

3.2.2 Concerns with categorization.

It is here that the overarching problem with categorization can be introduced. The fundamental philosophy that underlines categorical units such as typologies or periodizations is the implicit understanding that ideal Platonic versions exist in the heads (mental template) of groups of people, and through replication, a copy of the ideal type is passed from person to person (Beck, 2018, p. 144; Cipolla et al., 2024; Crellin et al., 2021; Crellin & Harris, 2021; Harris, 2018b, 2018a; Lucas, 2012; Van Oyen, 2015). Such an understanding places the ideal always out of reach, and a replica of the ideal will always be a poor copy of the ideal (Deleuze, 1991, p. 265). Such categorical understandings "rely on an essence that is truer than the real object" and variability, discontinuities, and differences are expunged in favour of similarities (Normark, 2010, p. 167). Thus, a dependence on a concept where a final form is imposed is problematic as it imposes a human-centred notion of design and planning onto historical contexts, hinging on the duality between mind and body, and stifles diversity and variation (Harris, 2018b, p. 162).

It is important to note that the aim here is not to create an axiomatic strawman of typologies and culture history units. As discussed in Chapter 2, such categorical approaches are heuristic tools essential for situating archaeological data in space and time. Recent calls to abandon categorical principles (see Beck, 2018) are problematic, as well as absolutism. It would be nearly impossible to conduct any meaningful archaeological research without categories. As Harris (2018b) stated, "[a]n archaeology without types, categories, or periods would become unmanageable, a sea of chaos" (p. 165). Though taxonomic approaches are heuristics, that is all they will be, and when such heuristics are deployed to address research questions they were not established for, it becomes problematic (Holland-Lulewicz, 2021, p. 538). In a recent publication, Sørensen (2015) argued that using typologies in archaeology has become an intrinsic practice, where similarities and differences are identified without any substantial reflection on why forms differ or are similar. Sørensen's (2015) critique has led to several discussions on the use of categories from especially relational perspectives (Beck, 2018; Boozer, 2015; Crellin & Harris, 2021; C.Fowler, 2017; Harris, 2021; Lucas, 2012; Normark, 2010; Van Oyen, 2015). A key aspect here is how archaeologists have become uncomfortable with accepting fixed categories and the associations they bring (Kosiba, 2019, p. 448). Archaeologists have found it more effective to explore the intricate and dynamic social relations, networks of interaction, and assemblages involving people and objects, many of which do not fit into reified categories (Kosiba, 2019, p. 448). Relations, as understood

here, consist of the physical traits, sensory qualities, and dynamic interactions of substances, materials, and phenomena that link, intertwine, or associate with each other. These connections shape individuals and other organisms, objects, environments, and beyond (Pauketat & Alt, 2018, p. 73). Such relational approaches, I argue, are central to coming to grips with understanding social relations on a smaller scale. A crucial aspect of this research project will be addressed in the following section: how can we identify design symmetry patterns while embracing past people's heterogeneity and relational aspects without relying on reified static categorical concepts? Thus, how can we understand repetition and difference?

3.3 Performance, repetition, improvisation, and iterations

3.3.1 Performance, repetition, and improvisation

Pottery production is a performative process consisting of long periods of repetition, continuity, and discontinuity (Jones, 2012, p. 117). Here, similar to Jones (2012, p. 144) and Carlson (1996, pp. 3–4), performance is characterized as a type of patterned behaviour that showcases skill and is always aimed at an audience that acknowledges it—regardless of whether that audience is solely the individual. Thus, all aspects of pottery production are not merely mechanical activities. It involves skill, embodied knowledge and the intentional actions of the potter, who engages in both habitual and improvisatory practices.

Cultural performances such as pottery production involve improvisation; "there is no script for social and cultural life" (Ingold & Hallam, 2007, p. 1). Thus, the performance of design symmetries on pottery vessels as part of the pottery production had to be worked out by people as they went through everyday life; they had to be improvised (Ingold & Hallam, 2007, p. 1). Improvisation is an ongoing process, always in the making. It is a process that comes into being through its relational aspects to materials (Ingold & Hallam, 2007, p. 3; Jones, 2012, p. 103). Repetition and reproduction are critical. However, reproductions of design symmetries are not due to idealist notions of the 'perfect' template; instead, they involve improvisation. Understanding improvisation this way reveals that imitating and repeating designs is not simply about following mental templates of ideal forms (Ingold & Hallam, 2007, p. 5; see also Jones, 2007, 2012). Instead, imitation and repetition happen through the continuous alignment of observing the model with actions in the world. Such action occurs with materials. Thus, the resemblance between the model and copy is an interactive process with materials not given in advance. It is improvisatory (Ingold & Hallam, 2007, p. 5). Performative and improvisatory processes concern continuity; however,

such continuity does not have to be homogeneous or smooth (Jones, 2012, p. 103). Instead, the continuous flow of performative actions can consist of periods of boredom and repetition and periods of ruptures, discontinuities, and change (Jones, 2012, p. 103).

Interestingly, looking at the field of Human Geography, the effect of boredom and repetition on performance shows that boredom plays a crucial role in social and cultural performative processes (Anderson, 2004). Discussing the role of boredom in performativity, Anderson (2004, p. 743) argues that the body experiences boredom as the inertia of time and space. This stagnation of time and space that the body experiences are created through stilling and slowing. Stilling and slowing happens due to an impeded sense of bodily movement (Anderson, 2004, p. 743). Rather than equating the slowing and stilling with a movement towards nothingness (Anderson, 2004, p. 746), focusing on the materiality of the movement before and after boredom, it becomes possible to identify boredom as something which enables and contributes to various social and cultural practices (Anderson, 2004, p. 743-744). For instance, if pottery production is viewed as a seasonal activity (see Jones, 2007, 2012; Fowler, 2002, p. 297), there would have been periods of activity punctuated by periods of inactivity or 'boredom'. Such periods of stasis and stilling, when understood as a rhythm from which possibilities and potential are transcended, are crucial in contributing to social and cultural practices (Anderson, 2004; Bissell, 2007). It is such periods of inertia that Kierkegaard (1963) considers when he states: "strange that boredom, so still and static, should have such power to set things in motion. The effect that boredom exercises is altogether magical" (p. 227). Meaning-making is promoted and thrusted into being through periods of boredom (Barbalet, 1999). Design structures would have been reproduced through a process that evoked pottery production improvisatory skills. Parallels with the science researcher David Turnbull's (2000, pp. 56–58) analysis of the construction of Gothic cathedrals. Turnbull (2000) shows how scholars studying the development and construction of these medieval architectural phenomena create dichotomies between technology and science, between the ad hoc and the theoretical, and between medieval and modern, which adds a mystical explanation to how such buildings were constructed (Turnbull, 2000, p. 57). Rather, Turnbull (2000, p. 57) argues from a performative approach that these cathedrals can be considered places of experimental practice. Such confluences, similar to laboratories, allow people, practices, and materials to interact and actively create knowledge (Stokes & Turnbull, 1990) and transcend the initial space (Turnbull, 2000, p. 57). Thus, the rhythms of movement and difference-making that human bodies engage,

and encounter material qualities are performative. As such performances are carried out, the body will shift between periods of action and repetition and inaction (Jones, 2012, p. 104). To understand performative aspects, I argue requires us to understand objects as iterations.

3.3.2 Iterations

Concepts of iterations come from Derrida (1988). Derrida sought to understand how spoken words are comprehended and become intelligible. He argues that for something to be understood, it must leave a trace or mark (Jones, 2012, p. 18). For traces, or signs, to be recognized as intelligible, they must be repeatable and capable of functioning beyond a single event or context (Loxley, 2000, p. 168). This repeatability, or iterability, allows a mark or trace to carry meaning even outside its original setting. An iterable mark thus combines a certain unstable sameness with elements of variability or difference (Jones, 2012, pp. 19-20).

In other words, a mark would not mean something in a different context if it's not iterable, but at the same time, a mark can never be constrained to signify a single meaning (Loxley, 2000, p. 168). As discussed by Jones, this idea of iteration focuses on the notion that things need to be performed and reiterated. Thus, no a priori categories of artifacts need to be established that are discoverable. Instead, categories, such as the Msuluzi facies, are intelligible because they comprise iterations and repetitive acts, each referring to past events.

3.4 Signification, Peircean Semiotics and citations

Jones (2007, p. 80) argues that trace embodies an absence of complete meaning, continually deferring from one term to the next. Thus, rather than seeking static, singular, and fixed meaning in objects, a more prudent pursuit would be to understand the movement of meaning and ask questions of meaning-making as it leaves traces along varied pathways of signification (Jones, 2007, pp. 79–80; Joyce, 2007, p. 101). Such an approach can assist in understanding how objects act as mnemonic traces, connecting past occurrences with future events. Schneider (2022), for instance, has shown how clothes acted as mnemonic devices for two refugees, allowing them to maintain continuity with their past while connecting them to new places during their displacement.

Differences, similarities, and continuities need to be examined to identify connections between objects as they appear in different contexts. This will allow for a better understanding of the influence specific objects or groups of objects have on the production of others (Jones, 2007).

This approach is relational, moving away from merely determining the meaning of material culture to understanding the connections between objects embodied in physical or material traces.

The above discussion brings a pivotal aspect to the front: signification. Thus, in the following section, Charles Sanders Peirce's theory of signs (semiotics[2]) will be introduced, highlighting how such an approach will assist in coming to grips with meaning across various scales.

3.4.1 Peircean semiotics

In archaeology, semiotics has fallen out of grace due to its association with literary theory, which many argue has limited contributions to material culture studies (Lucas, 2012; Olsen, 2003, 2010, 2012; Preucel, 2008). Such a view of semiotics is embedded in a linear, narrow understanding regarding representation merely as discourse and symbolism (Crossland & Bauer, 2017). However, here I argue, similar to Preucel (2021) and Crossland and Bauer (2017), that a shift to Charles Sanders Peirce's triadic semiotic model allows us to move from representation to more-than-representational.

Peirce's semiotics broadens the field, defining it as "the study of the innate capacity of humans to produce and understand signs" (Preucel, 2008, p. 5). In Peirce's terms, a sign is "any type of stimulus that invokes a response by a living thing" (Houser, 1998, p. 478). Saussure (Saussure, 1966), the father of contemporary linguistics, argued that language is arbitrary and its social existence a product of a historical trajectory. He examined language in terms of binary oppositions. The language system, which he refers to as *internal linguistics* (Saussure, 1966, p. 23), consists of the rules and principles of grammar, the structure of any given language system. Within this system, he made distinctions between *langue* and *parole. Langue* constitutes the linguistic store, the rules and codes which structure any language (Preucel, 2008), while *parole* refers to how the language is understood and acted upon by members of a linguistic community (Saussure, 1966). Pursuing *synchronic* linguistics, he analyzed the general structure to understand the conditions in which any language exists (Cobley & Jansz, 1999, pp. 9–10). In linguistic

[2] Researchers hold opposing opinions regarding the correct spelling of this word. The majority of archaeologists prefer to use "semiotics." However, several researchers (e.g., Crossland, 2009, note 6; Lele, 2006, note 1; Watts, 2008, note 6) argue for "semeiotics" to distinguish the Peircean sign theory from its broader meaning. In this dissertation, I make use of the conventional spelling.

analysis, the sign is the essential unit. Saussure defines the sign as a "two-sided psychological entity" (Saussure, 1966, p. 66), which links the concept to the sound pattern (Preucel, 2008, p. 28). Thus, for Saussure, the concept is not a tangible object but a mental picture of the object in question. The sound pattern, likewise, is not constituted of tangible sound; instead, it is a person's interpretation of that sound (Preucel, 2008, p. 28). This dyadic system of concept and sound pattern are both mental entities independent of the external object. Saussure defined the concept as the *signified* and the sound pattern as the *signifier.*

Furthermore, for Saussure, the relation between the signified and the signifier is arbitrary (Saussure, 1966, pp. 67-68); it is a matter of convention. For Saussure, the importance was the arbitrary nature of linguistic signs. This dualistic understanding of signs needs to account for the role that objects, and things play in meaning production, as it underrepresents and marginalizes their role as empty containers needing to be filled by human agents.

For Peirce, the sign is "something which stands to somebody for something in some respect or capacity (Peirce, 1931, p. 228) Signs are irreducibly triadic, from which new signs can be generated similar to or different than their original (Lee, 1997). A fundamental difference with Saussurean semiotics is that there is no preconceived link between the sign and the object. Instead, "a sign mediates the *relation* between itself and an object in such a way as to cause another sign to relate to it in the same way it relates to the object and so on" (Lee, 1997, p. 96). Thus, the relational importance between object and subject is a crucial aspect of Peircean semiotics.

3.4.2 Firstness, Secondness, and Thirdness

Peircean semiotics is grounded in three categories of being, which could, he argues, be used to categorize everything in experience (Crossland & Bauer, 2017): Firstness, Secondness, and Thirdness. Firstness is a probability or capability which might be realized. Firstness is an extremely difficult concept to conceptualize, as it is an intangible (the 'assemblage of enunciation") formation of being or that which exists independent of anything else (Pruecel, 2008, p. 52; Peirce, 1931). It can be defined as unanalyzable, intense feelings.

Secondness is a category of relation, a particularity of experience in time and space (Crossland & Bauer, 2017). It is how we experience the world and is called into action when decisions, efforts, or discoveries are made (Peirce, 1931). Secondness is always established by past occurrences; thus, all knowledge can be understood as Secondness (Preucel, 2008, p. 53).

Thirdness is the category that Peirce developed in response to his observation that the world forms habits that can grow and change (Crossland & Bauer, 2017). Therefore, it is the conception of negotiation and habits through which a First and Second are brought into relation with one another (Preucel, 2008, p. 53) and comprise conventions, representation and meaning.

3.4.3 The Sign, Object, and Interpretant

For Peirce, rather than signs being dyadic (signifier and signified), signs are composed of three parts: Sign, Object, and Interpretant. Phrased, the Sign (or representamen) is anything which is perceived by the interpreter and understood by the mind and stands for an object. The Object is "that which so determines a sign that the latter determines an idea in a person's mind"(Peirce, 1931, p. 343) and can be nonphysical like an idea (Baron, 2021, p. 191). The object is the Sign's meaning and exists externally from the interpreter. Lastly, the Interpretant generates a response and can become new signs themselves. Therefore, the Interpretant is the sign's meaning, which allows for a connection between the Sign and the Object made by the interpreter. The Interpretant could also potentially form a new Sign (Harris & Cipolla, 2017, p. 116). If Peirce's mode of categories is applied, a triadic relation is established, where the sign stands in relation to itself (a First), its object (a Second), and an interpretant (a Third) (Pruecel, 2008, p. 55).

3.4.4 Qualisign, Sinsign, Legisign, and Replica

Using Peirce's triadic sign types (Qualisigns, Sinsigns, and Legisigns) makes it possible to describe signs. Qualisigns are what Peirce termed Firsts and are properties or latent qualities that are not able to exist on their own (Baron, 2021; Peirce, 1988).

They are intangible feelings or qualities that only exist once they manifest through something else. Red ochre can be Qualisigns, a colour associated with power and protection amongst many southern African communities (Whitelaw, 2013). The colour red, the red hue, is the quality of the qualisign. However, the colour red does not convey meaning on its own. Only when it becomes a signsign does that happen. Sinsigns are individual manifestations of signs, also termed tokens. A ceramic vessel that has been burnished with red ochre, a particular instantiation of a qualisign and a second. Legisigns are laws and types, not individual signs but categories. The red burnished pot is also a token or a replica of a legisign. Thus, in this case, each individual token is a replica (individual instance of a legisign) of the type by virtue of shared qualia (Baron, 2021, p. 192). In other words, the burnished pot is a token because of its shared quality – red colour. For

instance, Gokee (2015) and Watts (2008) both quote Parmentier (1997, p. 50) describing pottery styles as replicas, with specific pots being replicas.

3.4.5 Icon, Index, and Symbol

The Objects allow humans to recognize, experience and interpret Signs. Objects and Symbols, Peirce argued, are connected through the Sign Mode in three ways: *Icon, Index, and Symbol*. *Symbols* connect Signs and Objects through cultural habits created and established through social conventions. In an archaeological context, *symbols* are complex and elusive to identify, as they are culturally constructed and arbitrary. The *icon* is established through physical similarities. Onomatopoeic words, such as buzz (the Sign), clearly resemble the Object (a bee in flight). Another excellent example of an icon is an archaeological typology. Identifying a ceramic vessel from the Late Iron Age in southern Africa, the uncovered ceramic vessel is seen as the Sign. At the same time, the Object is the category assigned to that type of vessel by the interpreter (the archaeologists). The *index*, also called indication, links the Sign and Object through a spatiotemporal connection for the interpreter. Peirce uses the example of a weathervane on a windy day. To determine the wind direction (Object), the person would look at the orientation of the weathervane (Sign). The Object is physically pushing the Sign in a specific direction.

3.4.6 Peircean Semiotics in Archaeology

Peirce's ideas on semiotics have been applied in various ways in archaeology. Bauer (2013) explored how social relationships were established and maintained through similarities in ceramic design among coastal communities during the Early Bronze Age along the Black Sea. Utilizing Peircean semiotics, he demonstrated the practical implications of both human and nonhuman agencies. New ceramic styles that emerged in one community bore a physical resemblance (iconically) to the pottery used by other communities in the region.

A person familiar with their own community's ceramics (Object) might, through movement or trade, encounter ceramic vessels (Sign) from a discrete community across the sea. Such iconic signs indirectly. This iconic sign invokes similarities between their home and the discrete community (Interpretant). Thus, over time, they may recognize that specific ceramics are characteristic of distinct inland communities. Thus, ceramic styles along the coast could evolve into symbols of social identity, distinguishing insiders from outsiders. Crossland (2013) used a similar model to interpret new architectural forms and settlement patterns in nineteenth century South Africa.

Importantly, Peirce's sign theory highlights how signs never stand alone; they do not exist or act in isolation. Signs are always connected to additional signs, pointing back in time toward the Object and into the future toward the Interpretant, making it part of an endless sequence (Preucel, 2008, p. 55). Signs are processual and can stand independently, giving rise to new signs, *ad infinitum,* through signification (Keane, 2003, p. 413). Therefore, Pierce's triadic model can transcend the subject/object dualism popular in processual and post-processual archaeology through the acknowledgement that signs are not capricious but rather a relation between the world out there (intended meanings) and what we interpret (Bauer, 2013, p. 14; Parmentier, 1985). Meaning for Peirce cannot be separated into objective and subjective because humans' understanding of signs is embedded in experiences. Therefore, every cognition has a subjective and objective aspect (Bauer, 2013, p. 14).

Several key ideas, including indexing and citations, need to be expanded here as they relate to the above discussion.

3.5 Indexing

The index is the most basic of the three sign forms discussed above, with meaning derived not from social conventions but from a pragmatic understanding of the material world (Jones 2007, p. 18). For example, the link between lightning and thunder forms an index, signalling an impending storm. A more literary example is in Arthur Conan Doyle's *The Hound of the Baskervilles*, where Sherlock Holmes interprets a cane as an index of past events, illustrating how indices can reveal unrevealed stories (see Eco, 1984). Peircean semiotics are especially suited for analyzing material culture, as artifacts' meanings often stem from their material properties (Jones, 2007, p. 19). Artifact analysis opens up many interpretations of past behaviours by focusing on indexical signs.

3.6 Citations

Like index, citation is the process by which a word or artifact gains meaning by referencing parts of previous words or artifacts (Jones, 2007, 2012). For citations to be effective, they must capture and rearticulate past ideas or things, creating new interpretations or categories. Citations can apply to verbal, textual, or material actions (see Butler, 2011; Derrida, 1982) and, like indices, they reference past events. However, unlike indices, citations actively repeat these actions,

reinforcing meaning through repetition. The more citations are reiterated, the stronger the connections between practices become (Jones, 2007, p. 55).

Mills and Walker (2008, p. 18), interested in the archaeology of memory work, argue that citations of past actions, things, memories, and artifacts are essential for understanding how personhood and identity are expressed. Citations allow us to see how past social identities and other social practices were established as they form connections between people and things across various scales, spaces, and temporal frameworks, showing how such social practices can be expressed at different social scales. For Jones (2007, pp. 59-60), artifacts evoke the past because their physical and sensual character encroaches upon and interacts with the person. Sensually (regarding the senses), artifacts index bodily experiences; artifacts such as pottery are also iconically connected to bodily experiences relating to human bodies (see David et al., 1988). Such bodily experiences are neither personified nor stored in objects in any empirical manner rather, a dialogical relationship occurs between a person and the object that evokes recall (Jones, 2007, p. 59).

The body develops a sensual experience through repeated actions. The sensual exchange between a person and a thing can be understood as a citation form. Objects index past experience and act as a form of 'material citation'; the past is thus referenced and reiterated simultaneously. Thus, objects reference the past because of their sensual qualities, and by reaffirming past experiences sensually, material citations do not only refer to the past. Still, they are also directed toward future experiences (Jones, 2007, pp. 59-60). Drawing on citations and bodily practices, Lucas (2012) argues that similarities between objects are connected through bodily practices of production. Artifact types, thus, are a collective of objects, and their reproduction, repetition, and spread are usually understood as part of mental templates, rules or grammar. Instead, adopting the c*haîne opératoire* approach (see Leroi-Gourhan, 1993; Mauss, 1935), Lucas (2012, p. 197) argues object reproduction considers the body's external configuration, and the objects used. Thus, it's not related to internalized rules but to memory, which is distributed across all elements involved in the production. Therefore, types are serial objects produced through the iteration of technique, which is the interaction of gesture and matter. Thus, moving away from understanding meaning as part of an ideal type, a mental template, or only as symbolically meaningful, the reproduction and repetition of objects are part of the body, and the reproduction of design symmetries on pottery is dependent on the external configuration of the human body and the objects used in any particular

manufacture. Thus, reproduction depends not on rules but on memory, which is distributed between all the elements involved in production.

A salient part of this dissertation, I argue, considers how meanings in material culture are not fixed but vary across contexts, and Peircean semiotics helps explore these shifting meanings at multiple scales. Objects don't have a single, static meaning set by their creators but can "break free" and gain new interpretations (see Filipowicz, 2017). The overall design repertoire used by large-scale regional social groups exemplifies a legisign—a general type of sign that differs from traditional symbolic norms. This perspective allows for analysis beyond the symbolic or structural limitations of anthropology. Replication, in this instance, design symmetries found on Early Iron Age pottery, highlights how groups adopted specific elements while discarding others. Legisigns act as iterations of techniques that only gain concrete form as replicas when acted upon, linking them to the mobility and adaptation of cultural ideas. How can we understand differences and repetition in design symmetry across various scales? This can be done by incorporating the Deueuzian concepts of the virtual and the actual.

3.7 The Virtual and the actual

Deleuze introduced the concepts of the virtual and the actual as ways to think about ways the world comes into existence without having to rely on reified dualistic notions of dualism (Harris, 2018a, p. 163).

The virtual represents potentiality, all the possibilities that a specific phenomenon (here, design symmetry on pottery) could manifest (Deleuze, 2004; Harris, 2018a). Thus, concerning design symmetries, the virtual can represent all the possible ways potters structure designs on vessels. Crucially, for Deleuze, the virtual is not the opposite of the real. In contrast, the actual is the concrete, realized form that emerges from the virtual. Therefore, the actual design symmetries are used on specific vessels.

Potters may draw from this virtual field of design possibilities, and cultural, social, and environmental factors influence the selection of particular designs. Thus, a materialization of design symmetries is not about matter but about organization-relations of exteriority (DeLanda, 2000, 2006). Therefore, what is being materialized is not found outside or above the material (i.e. ideals and beliefs, in or as part of a mental template), but qualities always inherent in matter itself but crucially not yet actualized.

Variations in pottery design may represent different ways of actualizing the same virtual potentials. Another critical aspect must be considered when examining object variability, including design symmetries on pottery. One factor causing disjuncture could be turbulent times related to pottery learning networks.

3.8 Learning networks and variability

This study understands design symmetries as part of the *chaîne opératoire,* in which knowledge transfer occurs through apprenticeship within learning networks. Over time, this could cause continuity and ruptures in design structures applied to pottery. Thus, the design application of pottery is bodily performances and memory, where materiality emerges (Mauss, 1993; Lucas, 2012).

Various ethnographical and ethnoarchaeological studies have identified that learning to apply decoration to pottery is not always a straightforward process that apprentices learn first and without difficulties. Amongst potters from three ethnic groups in Cameroon (Dii, Duupa, and Doayo), novice potters start their apprenticeship by making miniature undecorated vessels. In contrast, only more experienced potters are allowed to use basic designs for their pots (Wallaert, 2008; Wallaert-Pêtre, 2001). Similarly, among the Dowayo potters, the learning and teaching process of pottery production is rooted within traditional practices of production, and any extravagance and novelty are discouraged and only during the last two stages of apprenticeship, which are also seen as the most difficult, do apprentice learn to decorated pots and applying decoration (Wallaert, 2012, p. 30). Interestingly, it is still possible to note some small 'micro styles' due to potters diverging from the rules through small shifts in the layout of the decoration design structures. For Dowayo, potters from the Boulko village, apprenticeship is different in that the mother-in-law enforces a second apprenticeship after marriage, where young wives become apprentices again for a period of three years. Amongst Boulko potters, the mother-in-law plays a vital role in how specific micro styles are cited among novice potters (Wallaert 2012, p. 31). Overall, amongst Dowayo potters, the mother-in-law insists on guiding the apprentice in most aspects of pottery production, including decoration and surface treatment. The mother-in-law in potting apprenticeship among the San Idelfonso people in New Mexico is also crucial and would guide novice potters through every step of the production sequence. Interestingly, the only stage in the pottery *chaîne opératoire* not influenced by the mother-in-law is the vessel formation process (Wallaert 2012, p. 38).

In Spain, modern pottery apprenticeship in Bailen allows novice potters to move through different stages of the apprenticeship, which would see the tasks become more complex as they progress (Curtis, 1962; Hasaki, 2012). Similar to what Nicklin (1971) found, the decoration of pots is only done by more experienced potters who have completed the majority of their apprenticeship. Hasaki (2012) argues this was also the case for painting ancient Greek vases.

Ideas that decoration as part of the *chaîne opératoire* would reflect more malleable and superficial aspects of social identity, while vessel shaping techniques are salient aspects of a communities social identity (Gosselain, 2000), have been challenged. Research amongst potters in Niger, showed a "preoccupation that developed about ornamental designs which parallel those observed at the level of shaping" (Gosselain, 2011a, p. 221). Thus, decoration is not an aspect that is taken lightly and is easy to learn and transfer. Instead, decoration application and structuring require that potters are intimately familiar with the design parameters in use and control the motor habits needed to apply two-dimensional designs on a three-dimensional surface (Crown, 2014, p. 78) and balance these processes with innovations.

Decoration as part of a learning network is a form of memory work. A fundamental tenet to such memory-making processes is indexing and recurrent citations of various social aspects, past and present (Fredriksen & Lindahl, 2023; Lucas, 2012, pp. 195–201; Mills & Walker, 2008). Many ethnographical and archaeological examples have shown how decorative motifs cite past or present (but geographically distant) considerations or people and are openly and consciously acknowledged amongst potters. In the Grassfield region of Cameroon, potters from the Nsei village have developed new styles of decorative motifs based on more traditional regional decorative repertoires (Forni, 2013). The production of modern pottery vessels is seen as a continuation of conventional prestige items. It identifies a need for ceramics to index the region's shifting nature of socio-political situations (Forni, 2013). Containers, no matter the material they were made from, are powerful metaphors through which male authority is established; thus, such containers can be seen as indexes of ensuring that the male lineage continues (Warnier, 1993). Among the Babessi of the western Grassfield region of Cameroon, pottery is embodied with multitudes of functions and meanings, placed into action by the producer of the vessel as well as through relational aspects and social interactions (Forni, 2007, pp. 42–44).

Pots thus, embody many sets of shared meanings and practices. Pottery, produced by women through a process of the relation between the potter and the materiality of the clay, becomes

a transformative process through which the soft clay is transformed into structured beings, containers and images. Thus, through such relational processes, Babessi women can give shape to crucial aspects of daily and ritual life and molding both people and pots that take part in such practices. The visual elements and motifs on the pots emphasize such relational and social qualities. Interestingly, the decorative style of Babessi pots has remained relatively consistent over the last 100 years. However, innovation still occurs. Potters are in a continual dialogue with the daily reality in which they live. Strict traditional potting regulations and rules do not constrain Babessi potters, and they are able to draw freely from the regional "iconographic repertoire" or even invent their own personal motifs. More importantly, they draw inspiration and thus cite and index from various sources. Potters are proud in their ability to create new designs and combinations. However, they are only able to do this through working along and with the material. The overall finished ceramic vessels and their effect is more important to Babessi potters than with each decorative motif's semantic reference (Forni, 2007, p. 50). It is the finished vessel that becomes an index referencing the importance of its owner in a multilayered way.

In southwestern Niger, indexing occurs between different communities of potters (Gosselain, 2008). In this region what is noted is a juxtaposition between continuity where pottery decoration is situated in extant repertoires, which are reinforced by shared representations among communities of potters as well as through consumer expectations and innovation and ruptures. These innovations are due to developments in other forms of material culture and developments of regional stylistic variants (Gosselain, 2016, p. 62). Potters continually reconstruct and stretch their design repertoires, indexing and citing from various social situations. Such processes challenges ideas regarding the homogeneity of designs and temporal and spatial variability of specific design repertoires (Gosselain, 2016, p. 62).

This cautionary tale extends to the symbolic meaning of pottery, and that not all decorative styles on pottery are symbolically meaningful. Post 1950, for instance, Fowler (2008) argued that among Zulu potters, symbolic meaning is not often attributed to decorative motifs due to the number of original creations that came into being through indexing designs seen at markets.

In South Africa, there are various processes of innovation and continuity are noticed in the decorative motifs and tools among Zulu potters (Fowler, 2008, 2011, 2015). Similar to what was noted among the Babessi potters in Cameroon, modern Zulu potters are receptive to innovation in decorative motifs, which can involve rearrangement and combination of traditional motifs which

sees such rearrangement occurring on the design layout but not the location of the decoration on the pots (Fowler, 2008, pp. 492-495). At other times, innovation would lead to new techniques and motifs being introduced and incorporated into the design repertoire (Fowler, 2008). An interesting example of how social memory is continuously renegotiated is the indexing of Early Iron Age designs (such as pendent triangles and ladder motifs) by Nesta Nala, a modern-day potter who resided at Oyaya in the Thukela Valley (see (Garrett, 1997; R. Watt, 2020), and over time became part of her overall design repertoire. When interviewed by Perrill (2007, p. 25), Nesta mentioned that she did not directly copy the 'old' designs, but that she "use the old designs and then add on new ideas and designs continually" (p. 25).

Another fascinating example of decorative indexing is seen amongst the Asafo flags from Ghana (Forni, 2018). These flags are sacred objects and are "revered mobile shrine[s]" (Labi, 2023, p. 136) that are perceived as having supernatural powers. The Asafo were militant groups of the traditional Akan states in Ghana (Ross, 2007, p. 12). However, with the British taking control of the region in 1872, the Asafo had to shift their role. Asafo became a successful social and civic organization with significant political, ritual and performance roles in most of the Fante states. What makes these flags fascinating is how various aspects, such as political and social situations, were indexed in establishing these flags. The flags' form was indexed from European flags displayed since the fifteenth century on forts and ships (Underwood, 2018, p. 89)

The examples discussed above highlighted how citations and indexing of past social situations and peoples are crucial in memory making. These studies showed how indexing links past actions and people to the present, and as Connerton (1989, pp. 6–40) has shown that all processes, such as pottery production, embody elements of remembrance as past actions are constantly referenced and brought into being, reimagined, reworked in the processes of current actions. Furthermore, as shown, the application of decoration within the c*haîne opératoire* requires time and practice as part of the learning network and not something that is straightforward. Citations and indexing are depended on successful knowledge transmission between the teacher and apprentice (see Fredriksen & Lindhal, 2023; Gosselain, 2011, pp. 214-221). Therefore, memory work is susceptible to breaches and ruptures between generations of potters (Fredriksen & Lindhal, 2023). The repetition of skills and processes through performative actions, such as pottery production, are improvised and recalled from one potting season to the next, which would

provide constancy and continuity (Jones, 2012, p. 117) in the decorative motifs and design symmetry over considerable periods of time and space.

Addressing the social relations among Iron Age communities on alternate scales requires a more-than-representational approach framed in assemblage thought (Anderson & Harrison, 2016; Harris, 2018b).

3.9 Assemblage theory

This section introduces assemblage theory, as relations always in a state of becoming (Harris, 2021). Assemblage theory allows for relations to be not only identified but, more importantly, to explain such relations (Crellin, 2020; Harris, 2021b). Assemblage theory introduces the notion of the *rhizome* as an assemblage (Deleuze & Guatarri, 2004) and is used to explain the various models of connectivity. The rhizome is non-linear; it connects and assembles in movement without losing or gaining and is always becoming (Harris & Cipolla, 2017; van der Klei, 2002). Therefore, the issue of scale is negated, as assemblages allow for the relationships between people and things to be understood across varied scales (Harris, 2017).

3.9.1 What are assemblages?

At their most basic definition, assemblages are "compositions that act" (Due, 2002, p. 132). Assemblages are ad hoc constellations of diverse bodies (Bennett, 2010, pp. 23–24) that act on their parts but that do not necessarily define them (Harris, 2017, p. 129); they are *emergent properties* (DeLanda, 2006, p. 9). A key aspect here is that such bodies retain their autonomy; they can detach from one assemblage onto another, causing new relations without completely being transformed (DeLanda, 2006, p. 10). Because each part is continually in the process of becoming, Deleuze and Guattari (2004) refer to them as lines of flight or lines of becoming. Assemblages can consist of objects and people, ideas, language and symbols. Deleuze (Deleuze, 2007) defines assemblages as "states of things, bodies, various combinations of bodies, hodgepodges;…also…utterances, modes of expression, and whole regimes of signs" (p. 177). Thus, assemblages are relational processes of different things coming together. Assemblages are complex and ever-changing constellations of various things and are only temporarily assembled together (Harris, 2021a, p. 61).

As defined by Deleuze and Guattari (2004, pp. 97-98) assemblages are in effect across two axes (horizontal and vertical) and four dimensions (Machinic assemblages, Assemblages of

enunciation, Territorialization, and Deterritorialization, see Figure 3.1 for a visual representation) which Deleuze and Guattari (2004; also see Dewsbury, 2011; Harris, 2021a) refer to as being 'tetravalent' (see Figure 3.1). The horizontal axes describe the matter, which comprises all assemblages, material (machinic assemblage') and the affective ('assemblages of enunciation') (Deleuze & Guattari, 2004, p. 88). Thus, fundamentally, assemblages are composed of material constituents and include intangible elements, the 'regimes of signs' (Deleuze & Guattari, 2004, p. 88). Within the horizontal axis, a connecting interplay between the material constituents and intangible elements allows a focus on issues of social identity, symbolism, and meaning. At the same time, attention is also accorded to the physical and material aspects (Harris, 2021a).

The vertical axis illustrates how assemblages are continually in the process of becoming, being assembled (territorialization), breaking apart (deterritorialization), and joining different assemblages (called reterritorialization). The vertical axis deals with the flow of matter (material and/or immaterial) and how elements become part of an assemblage, detach, and form part of alternate assemblages. Deleuze and Guattari (2004) use the metaphor of a rhizome to explain this flow. Like a rhizome, assemblages are intertwined and connected through several relations; there is no start and end. Instead, assemblages are always in a state of becoming (Deleuze & Guattari, 2004).

Territorialization, thus, explains the coming together of components as an assemblage. However, the organization of these components is defined as being (Deleuze & Guatarri, 2004; Jervis, 2019). Coding, thus, determines the order and limitations of entities within an assemblage. When flows become entrenched with other entities and assemblages (deterritorialization and reterritorialization), a similar process could lead to the *decoding* of the flow, which could establish a broader range of potential entanglements (Jervis, 2019, p. 37; Harris, 2021a, p. 237). Thus, assemblages are never stagnant, constantly actively engaging or re-engaging. Coding and decoding of assemblages can be identified in all material cultures. Amongst the Wola in Papa Nuginea, Sillitoe (1988) painstakingly recorded how their material culture was made. Any of the material cultures made required several different materials, which needed to be included in the production process at specific stages (coding). Removing certain materials would alter the material while simultaneously adding relevance to another object (decoded).

The importance of assemblage theory in archaeology can be exemplified by its application to Early Iron Age ceramics in southern Africa. EIA ceramics comprises machinic parts, including

clay, temper, fire, and decorating tools. Ceramics also have enunciative principles; they evoke certain feelings and emotions and carry specific symbolic meaning and active messaging regarding group identity and social relations. Ceramics may be associated with particular people or activities (beer drinking, feasting, or cooking). The production of ceramics was a specific historical event; territorializing the assemblage together while imbuing the ceramics with decorative designs to carry specific messages or inform on specific ideals allows for the territorialization of that assemblage. The process of territorialization is continuous in the message that ceramic vessels continue to be used for feasting or beer drinking. At the same time, the ceramic vessel is experiencing deterritorialization through continual use, becoming less structurally sound, or when it breaks, the vessel will also break from its current assemblage, and its social meaning can become less important over time. However, crucially, the vessel, while undergoing deterritorialization, can become part of an alternative assemblage. Therefore, objects like ceramic vessels can have multiple relations, shifting over time or across space. "An assemblage, in its *multiplicity,…*acts on semiotic flows, material flows, and social flows simultaneously" (Deleuze & Guattari, 2004, pp. 22-23). In the above context, ceramic vessels can also be understood as a thing and object. In face-to-face proximity, amongst members of a single homestead, the ceramic vessels might be mercurial, functional, and quantifiable, they are understood by the community members in specific ways. However, once the ceramic vessels are released from proximity (cf. Gamble, 1998)) either in physical or metaphysical space they are seen as things, as fixed, immutable and immeasurable. In other words, their relational understanding shifts.

A vital aspect of this study is that assemblages are multiscalar; that is, different levels of analysis can be treated in the same ontological fashion (Harris, 2016, 2021a, 2021b; Normark, 2009).

The multiplicity of assemblages allows for considerations of how different assemblages relate to each other and how they become part of a larger assemblage or can break up into smaller elements (Harris, 2021a, p. 63). The remainder of this chapter will argue that assemblage thinking, in connection with network approaches and Peircean Semiotics as analytical underpinnings, can help reconceptualize how shifting scales and space can help us grasp the entanglement between people and things on varied scales and temporalities.

3.10 Network approaches

Network approaches in archaeology have great potential as a conceptual and analytical toolkit. Because network analysis constitutes a vast array of methods, models and approaches, its applicability to the multiplicity of archaeological research is apparent. Its key importance to archaeology is its central tenant, relations, which allows for a shift from studying entities to studying the relationships between and amongst entities (Collar et al., 2015; Wasserman & Faust, 1994). Not only is the relational component of Social Network Analysis (SNA) a crucial contribution to archaeology, but as outlined by Wasserman and Faust (1994, p. 6), there are four other vital contributions of social networks. Firstly, nodes (actors) and their interaction(s) are considered co-dependent rather than isolated entities. Secondly, relational ties between various actors are viewed as channels through which actions occur, move and are reestablished, in Deleuzian terms, the *affect* which arises when different bodies interact (Deleuze, 1988). Thirdly, network models concentrated on individual networks can view the network structure as either providing opportunities for or constraining individual actions. I argue that this can be extended to individual assemblages and how they are coded or decoded (see Chapter 4). Lastly, network models are processual, conceptualizing social structures (social, political, economic, etc.) as lasting patterns of relations among actors.

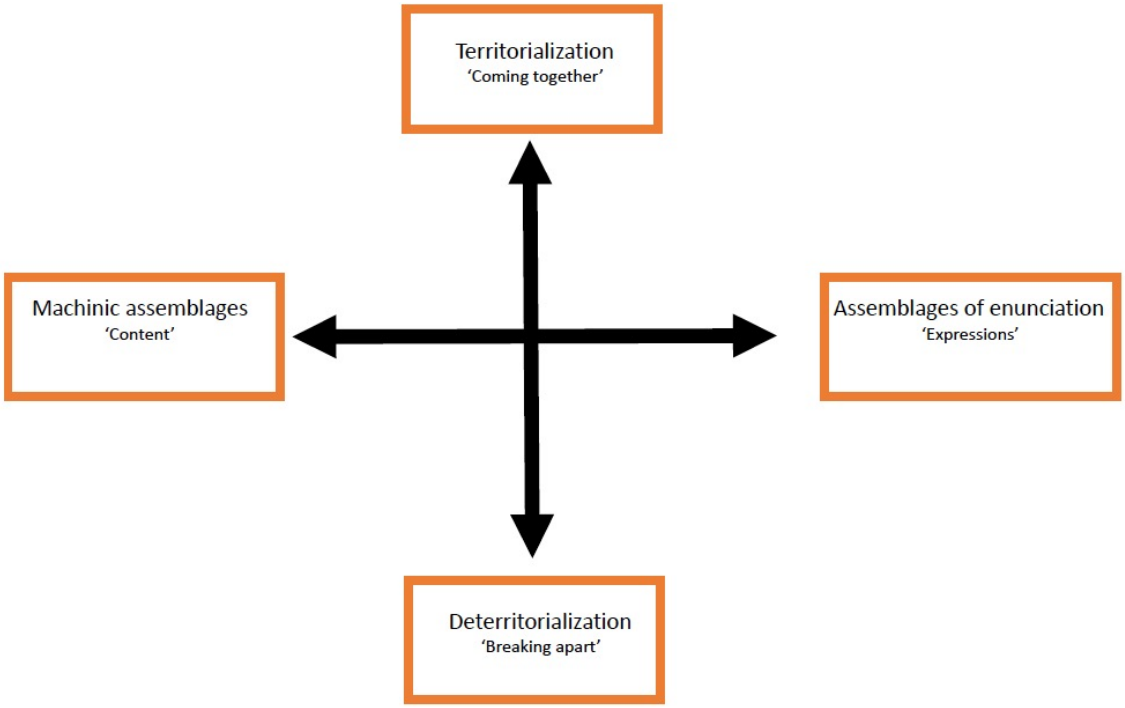
Network approaches have, as of late, been approached on two fronts, formal network analysis, visualized and statistically analyzed on network graphs, or networks used as metaphors to discuss the entanglement between objects and people (e.g. Gosden, 2004; Hodder, 2024; Hodder & Mol, 2016; Ingold, 2010; Knappett, 2011; Malafouris, 2019). For some scholars, the different approaches to networks are incompatible, with the main disagreement being around the location and nature of social interaction and agency (Donnellan, 2020; Peeples, 2019b). However, some researchers have successfully bridged the divide between the two conceptual approaches (e.g. (Knappett, 2013, 2020b, 2020a, 2021; Van Oyen, 2016). Borgatti et al. (2018, p. 1) have argued that a substantial aspect of network science is that the positionality of the node within a network both constrains and creates opportunities for future action. Therefore, a network paradigm, such as social network analysis, can centrally be situated within an assemblage conceptual framework. Networks can be understood as assemblages, where relations (ties) between nodes (actors) are continually coming together (territorialization), breaking apart (deterritorialization) and joining alternative assemblages.

3.11 Chapter Summary

This chapter has aimed to distinguish and evaluate the various conceptual and theoretical aspects in which this study is situated. I have shown the different approaches to material culture studies and how they have been applied to the archaeological record.

This chapter examines the limitations of current categorical models, such as the core-concept approach, which struggles to capture the variability among people and objects on scales smaller than language groups. By adopting relational paradigms, this research advocates for a shift toward understanding the fluid interconnections between objects and individuals, challenging Cartesian dualism and underscoring the need for multi-scalar analyses that consider shifting relationships over time and space. This chapter identified a more nuanced, dynamic perspective on material culture and identity at smaller scales using assemblage theory, network approaches, and Peircean semiotics. The next chapter will introduce the analytical approaches employed in the study.

Figure 3.1 Tetravalent assemblage, adapted from Deleuze and Guattari, 2004, p. 88



Chapter 4. Analytical methods

4.1 Introduction

This chapter identifies the various analytical methods and approaches used in this study. The first section discusses the two analytical methods, design analysis of ceramic material and network theory, in which the research is situated. This will be followed by a discussion of the four analytical approaches used: symmetry analysis, Bayesian modelling of the legacy radiocarbon dates from the Early Iron Age in the study area, statistical apportioning model of the ceramic material based on the Bayesian modelling, and social network analysis (SNA) to highlight continuity and variability of symmetry types spatially and temporally.

Chapter 2 delved into the evolution of analytical methods and approaches in southern African Iron Age archaeology, which illuminated how current approaches to ceramic style were developed to trace variability on a macro scale. However, these approaches are not able to answer questions on a smaller scale within language groups. As discussed in Chapter 3, alternative approaches situated in relational ontological and epistemological frameworks are required to address this. In this chapter, I argue that in association with such theoretical underpinnings, a analytical approach focusing on design analysis and network theory will be able to address questions on a smaller scale.

The first section will discuss the design analysis in more detail and explain why it was chosen to address the research questions. This will be followed by a discussion of network analysis in archaeology. The final section will deal with the analytical approaches used in this study.

4.2 Analytical approaches

During the 1960s and 1970s, decorative style (see Table 4.1 for definitions) of ceramics received significant attention among archaeologists (see Chapter 2). Several different analytical approaches were applied to the decorative style of ceramic, one of which focused on the design elements of ceramic. Proposed as part of the social interaction theory, several archaeologists (Deetz, 1965; N. J. Hill & Hill, 1970; Longacre, 1968, 1970; Whallon, 1968, 1969) argued that specific decorative stylistic variability in artifacts (in this case, design elements of ceramics) allows for inferences about past social organization (Plog, 1978). The design elements (see Figure 4.1) shared between communities will be relative to the direction and intensity of social interaction

between members of those communities (Rice, 2015, p. 393). This analysis has been critiqued by several scholars on various fronts, arguing that such an approach is reductionist and oversimplification of the social meaning associated with the design elements (e.g., Plog, 1978, 1980; Stanislawski, 1978; Stanislawski & Stanislawski, 1978; Washburn, 2021; Washburn et al., 2010; Watson, 1977).

Analytical approaches that were focused more broadly on the structure of decorative styles were developed by ethnographers and ethnoarchaeologists (see Amsden, 1936; Arnold, 1983, 1984, 1991; Bunzel, 1929; Colton & Hargrave, 1937; DeBoer, 1975; Faris, 1972; Hardin Friedrich, 1970; Hardin, 1983b, 1983a, 1984; Muller, 1966; Rice & Natt, 2014; Roe, 1980; van Esterik, 1981; W. Watt, 1967) aimed to understand and define the 'rules' (the design 'grammars') which governs how decorative style is constructed and approached by ceramic producers (termed design structure analysis, or hierarchical design structure analysis (see Table 4.1). Theoretically, design structure refers to the cognitive system (termed 'mental template' by (Geertz, 1973) that underlies a specific decorative style and its production (Rice, 2015, p. 395). Empirically, design structure refers to the design layout, the location and subdivision of the design, where and how it's bounded, the symmetry, the amount of space covered, and the placement of different design elements (Rice, 2015, p. 395). There are numerous benefits to design structure analysis. Various studies have shown that ceramic design elements, motifs, and configurations are not salient cultural indicators of interaction intensity (e.g., Gosselain, 1998; Livingston Smith et al., 2015; MacEachern, 1998), as they are too easily copied and reproduced. However, the design structure can relate to a community's social identities (see Friedrich, 1970, p. 338-339). Furthermore, Rice and Natt (2014) have argued that because design structure analysis focuses on the decisions and actions made by the producers, it shares the principle conceptual perspectives of technological choice models (Lemonnier, 1986, 1993) and practice theory (Bourdieu, 1977). However, as discussed here, design structure analysis faces one possible analytical limitation: its application to archaeological data. Identifying each 'step' in the design process could be challenging, as archaeological ceramic assemblages are fragmented. A possible approach to overcome this limitation is to separate the *design layout* and *design structure* (Washburn, 2021). This allows the analysis to focus on the arrangement of the elements and motifs without being concerned with the designs' layout, boundaries, and order (Washburn, 2021). Thus, this study will analyze the design structure of EIA ceramic, as described by plane pattern symmetries.

4.2.1 Plane Pattern Symmetry

Symmetry, or plane pattern analysis, is a mathematically principled classificatory tool concerned with the structural arrangement and repetition of elements and motifs in complete designs (Washburn et al., 2010, pp. 743–744). It provides impartial units of pattern structure and colour, allowing for the analogous definition of systematic and temporal comparisons among different design systems spatially and temporally (Washburn, 2021, Symmetry analysis section, para. 2).

The principles of symmetry originated with Russian crystallographers during the early twentieth century through an interest in describing the structure of atoms. A textile physicist, H. J. Woods (1935a, 1935b, 1935c, 1936), was one of the first researchers to present symmetry analysis to non-mathematical users. The first real application of symmetry principles in an anthropological context was presented by Brainerd's (1942) description of prehistoric Anasazi ceramic from the Monument Valley region, Arizona, and the Mayan site of Chichen Itza in the Yucatan in Mexico based on four one-dimensional symmetries. Anna Shepard highlighted the utility and applicability of symmetry analysis of ancient ceramics in *The Symmetry of Abstract Design with special reference to ceramic decoration* (Shepard, 1948). However, it was not seriously considered an analytical technique until the late 1970s. Since that time, the greatest advocate of symmetry analysis has been Dorothy Washburn. She has published a multitude of substantive case studies (e.g., Washburn, 1977, 1983a, 1983b, 1988, 2000, 2018b, 2018a, 2021a; Washburn & Matson, 1984) and analytical methods treatises aimed at applying design symmetry to various media, specifically in archaeological contexts (e.g., Washburn, 2004b, 2004a; Washburn & Crowe, 1988).

Symmetry analysis involves identifying the basic unit, "the unique part of the pattern from which the entire composition can be generated" (Shepard, 1957, p. 268). The aim is to describe the superposition of the basic unit of the design as they move along a line axis or about a point axis (or both) during the generation of a given pattern (Washburn & Crowe, 1988, p. 78). The basic unit (also termed *figure*) can form one of three possible pattern axial configurations on the plain. The first of these configurations, *finite designs*, are formed around a single axis and do not accept translation (see below). For instance, any rotation about the centre of the circle will take every point of that circle onto another point of the circle (D. W. Crowe, 2004). In theory, there could be an infinite number of rotations that could occur around a point axis and an infinite number of mirror axes that could pass through the point axis. The former is called *cyclic* (C), while the latter

is termed dihedral (D) by geometers (Washburn, 2013) (see Figure 4.1). The second axial configuration regards designs with motifs that admit translations in a single direction. This design is called *one-dimensional patterns*, *bands, strips,* or *frieze* (Washburn & Crowe, 1988, p. 52). Lastly, if a design "admits translation in two or more directions, it is a *two-dimensional pattern"* (Washburn & Crowe, 1988, p. 52).

The fundamental units are classified according to the rigid motion by which they are repeated on the plane. Rigid motion (also termed isometry) emphasizes the essential property of symmetry, a distance-preserving transformation of the plane onto itself (Crowe, 2004, p. 4; Washburn & Crowe, 1988, p. 44). In all three pattern axial configurations (finite, one and two-dimensional patterns), symmetry is restricted to four types of motion, as seen in Figure 4.2: translation, rotation, reflection, and glide reflection (Washburn & Crowe, 1988, pp. 44-51).

Translation occurs when fundamental units are displaced or shifted by a specific distance along a particular line. *Rotation* symmetry has only one established point at the core of the rotation (Washburn & Crowe, 1988, p. 48). This motion usually occurs twofold (i.e. 180° turned twice), producing contrasting parts. The third motion, *reflection,* allows for a mirror reflection of fundamental units across a line axis. There are three classes of reflection: horizontal reflection, where the fundamental units are mirrored across a horizontal line; vertical reflection, which consists of the mirroring of the fundamental units across a vertical axis; and ***horizontal and vertical reflection***, where the fundamental units are mirrored across both horizontal and vertical axes concurrently. The fourth and last motion, *glide (slide) reflection,* combines the motions of mirror reflection across an axis with translation along that specific axis into the subsequent position (Washburn, 1977, p. 12). The motion of glide reflection produces a figure which resembles the alternating left-right movement of human footprints along a line. In totality, these four motions allow for only seven possible one-colour one-dimensional classes and seventeen one-colour classes for two-dimensional patterns[3].

For the seven one-colour, one-dimensional patterns, the generally accepted four-symbol notation of the form *pxyz* is used. A detailed discussion of the notions used can be found in Washburn & Crowe (1988, pp. 57-61).

[3] Because Early Iron Age ceramics used in this study area does not consist of any colour design, colour symmetry will not be discussed here. For a detailed discussion on two-colour one-dimensional and two-colour two-dimensional patterns see Washburn and Crowe, (1988, p. 63-80)

The seven one-colour, one-dimensional classes shown in Figure 4.3 are;

(1) translation (p111),

(2) horizontal reflection (p1m1),

(3) vertical reflection (pm11),

(4) bifold rotation (p112),

(5) horizontal and vertical reflection (pmm2),

(6) glide reflection (p1a1) and

(7) alternating rotation and vertical reflection (pma2).

Regarding one-colour, two-dimensional symmetries shown in Figure 4.4, the seventeen possibilities are as follows;

(1) translation (p1),

(2) glide reflection (pg),

(3) mirror reflection in one direction only (pm),

(4) mirror reflection with glide reflection (cm),

(5) twofold rotation (p2),

(6) glide reflection and twofold rotation (pgg),

(7) mirror reflection and twofold rotation (pmg),

(8) two sets of mirror reflection (pmm),

(9) wo sets of mirror reflection with glide axes passing midway between mirror axes(cmm),

(10) twofold and fourfold rotation (p4),

(11) mirror reflection in four directions and glide reflection in two directions,

(12) glide reflections in four directions, mirror reflection in two directions (p4g),

(13) threefold (120°) rotations (p3),

(14) mirror and glide reflection with threefold rotations (p3m1),

(15) threefold rotation at intersections of three mirror reflection axes (p31m),

(16) six 60° rotations (p6) and

(17) two, three, and sixfold rotations (p6m).

4.2.2 Application of design symmetry analysis in archaeology

Design symmetry analysis has been applied to various theoretical and conceptual issues. Interested in the identification, spread, and variation of design structures, both on an inter-and intra-site level, design symmetry analysis situated in a social interaction theory (see the previous

section on classification) argued that communities which interact for regular and prolonged periods would share homogenous design symmetries, while groups which are in conflict and/or spatially distant would have more heterogeneous design symmetries (A Guide to Analyzing Prehistoric Ceramic Decorations by Symmetry and Pattern Mathematics, 1981; Donnay & Donnay, 1985; Dziedzic, 2019; Friedrich, 1970; Van Esterik, 2023, 1979; Washburn, 1977, 1983b; Washburn & Matson, 1984; Zaslow, 1980, 1981, 1986, 1990; Zaslow & Dittert, 1981)

Focus on the cognitive dimensions of symmetrical preferences has also received substantial attention (e.g. (Washburn, 1983a, 1988, 1998, 2018b, 2018a; Washburn & Crowe, 1988). Such cognitive dimensions of symmetrical preferences were situated in Gestalt psychology, a school of thought in psychology and the theory of perception introduced in the early twentieth century by German and Austrian psychologists Max Wertheimer, Kurt Koffka, and Wolfgang Köhler. Gestalt psychology emphasizes processing and perceiving patterns rather than focusing on random individual components (Goodblatt & Glicksohn, 2022; Wertheimer, 2010). Washburn and Humphrey (2001) argued that symmetry production is influenced by learning and exposure, while symmetry perception, on the other hand, is not (Washburn & Humphrey, 2001). Thus, symmetry as part of the larger design structure is universal, and people would inductively seek out symmetrical structures. However, symmetry production, manipulation and organization of designs are culturally specific (i.e. ethnic and language groups) (Washburn, 1989, 1998, 2018). Change and continuity of symmetry types have been shown to correlate with change and stasis in various sociopolitical organizations amongst various groups (e.g. Minch & Price, 2018; Washburn, 2018a). Design symmetry analysis has also been incorporated into broader artifact design studies (Bowser, 2000; Hegmon et al., 2021; Washburn, 1995). Amongst potters in the Ecuadorian Amazon, Bowers (2000), for instance, found a strong correlation in the design symmetries used between potting communities and their political affiliations.

These studies have highlighted that symmetry designs in material culture can assist in defining group membership and various other entities on a smaller scale. How symmetries are arranged and used is taught and learned, and exposure to various symmetry designs occurs through interaction networks. However, perceptions may differ.

4.3 Social Network Analysis

The last decade has seen a prolific increase in network approaches, especially social network analysis (SNA), in archaeological discourse (Brughmans & Peeples, 2017; Collar et al., 2015; Mills, 2017b). These approaches are mostly relational, as the main aim of networks is identifying and mapping connections between various entities. This shift in focus from specific entities to the entanglement amongst them has made network approaches especially prevalent in archaeology. Network analysis is appealing because it is interdisciplinary, drawing on literature and empirical data from fields as varied as biology, mathematics, computer science, social science, geography, and physics (Girvan & Newman, 2002; Mills, 2017b).

At their most basic level, networks are a means of thinking through social systems (Borgatti *et al.,* 2018). Networks are a prescribed depiction of the relations between various sets of actors (Peeples, 2019b). The most common depiction of network data is through a network graph, where the actors or entities are depicted as nodes or vertices, and the connecting lines between sets of nodes, called edges or ties, represent the relations between various nodes (Borgatti et al*.,* 2018; Mills, 2017; Peeples, 2019). Edges are lines between a pair of nodes representing a specific type of relationship between that pair of nodes (actors) (Collar et al., 2015; Peeples, 2019). Edges can be either directed, undirected, weighted or unweighted. Directed edges are ordered pairs of nodes, which are usually graphically represented with an arrow, indicating the direction of the edge. Directed edges are asymmetrical; as they connect a starting node with an end node, the direction cannot flow in the opposite direction. Undirected edges are the opposite of directed edges, as they are unordered pairs of nodes and will be graphically represented with a line drawn between them. They are symmetrical. Weighted edges are defined as an edge with a value attached to it. In most instances, such values are actual numbers but can be any other type of value that connects a pair of nodes. Unweighted edges are not weighted (Collar et al., 2015, p. 20-25).

Various relations can be identified and characterized in a network, from the flow of information or goods to strong or weak patterns of influence and actual geographic distances (Dawson, 2020; Peeples, 2019b). Nodes and edges are, in many instances, associated with other attributes, which allows for a multiscalar perspective of data (Bogatti et al., 2018; Peeples, 2019). Network analysis typically would be visually represented as network graphs based on the calculations of various descriptive statistical models. Most network methods in archaeology have been applied by borrowing three research traditions: graph theory, social network analysis (SNA),

and complex science (Peeples, 2019, p. 454). Social network analysis is a network approach focused on social relations, such as relatedness, practices, consumption, marriage, exchange, trade and exchange routes, etc. (Crabtree & Lewis, 2019). Rather than being perceived as a method or theory, social network analysis can be termed "a paradigm…a way of conceptualizing and analyzing social life" (Carrington & Scott, 2014, p. 5).

Unlike ethnographical and sociological network analysis applications, which directly access social structures, communities, and interactions, archaeologists often use proxies to determine relational connections between nodes (Brughmans et al., 2016; Lulewicz, 2018a). This makes the application of network analysis more challenging to the point that many scholars (Barthélemy, 2011; Donnellan, 2020; Fulminante et al., 2017) argue that SNA in archaeology can only reflect actual spatial connections and nothing else. However, I believe a strong case for the opposite can be made. Archaeological applications of network analysis, specifically SNA, are characterized by exceptional diversity (Holland-Lulewicz & Roberts Thompson, 2021). From the diverse data, conceptual frameworks, and analytical approaches, Mills (2017) argues that SNA in archaeology can be roughly categorized as belonging to one or multiple topics: historical, material, and/or spatial (Mills, 2017, p384).

Proximal (face-to-face and observable exchanges) and textual-supplemented (information extracted from textual data, such as documents) network data, i.e. historical SNA, are not often applied in archaeological networks, as individual interaction cannot be accurately ascertained for most archaeological records (Mills, 2017b). Nevertheless, historical archaeologists have applied network approaches in some instances. Kamp-Whittaker (2021), for instance, applied social network data to trace changes in social structures caused by diasporic movements, such as the Granada Relocation Centre (Amache), a World War II Japanese American imprisonment center in Southeastern Colorado, USA. Kirakosian Kirakosian, on the other hand, used network methods and Ingold's (2010, 2011) notion of the meshwork to understand how various social circles influenced shell-midden archaeology during the nineteenth and twentieth centuries in Massachusetts.

Spatial network approaches have been combined with social network analysis on various occasions. Graham (2006), for example, has used spatial networks to simulate the social networks of ancient Rome. Spatial understandings have also been combined with the SNA of material culture. Their application has been used to trace and explain the social movement of various past

communities (e.g. Borck et al., 2015; 2006; Hart, 2012; Hofman et al., 2021; Mills, Clark, et al., 2013; Mills et al., 2015; Mills, Roberts, et al., 2013; Peeples, 2011, 2018).

One of the more common applications of SNA in archaeology is by using material culture as proxies for identifying social identities and connections between and within communities (Hart & Engelbrecht, 2012; Peeples & Roberts, 2013).

4.3.1 Network Structure

Binary networks are merely networks in which actors (nodes) are present (1) or absent (0) (Brandes et al., 2013; Collar et al., 2015; Mills et al., 2015; Peeples, 2017; Peeples & Roberts, 2013) (Figure 4.7). The ties in such networks can be directed or undirected. Using binary networks (also termed unweighted networks) has a significant advantage in specific contexts where the defined actors are straightforward, such as using established routes to identify various transportation networks (Pailes, 2016). However, a binary network would not be appropriate in most archaeological data, where the aim is to understand the entanglement between objects and people on multiple scales. Instead, the use of weighted networks, where individual edges in the network are valued, is a more prudent way to understand more complex archaeological data sets (Peeples, 2017; Peeples & Roberts, 2013).

4.3.1.1 Network Centrality

One of the most prevalent network techniques applied to archaeological data is the notion of network centrality (Athenst et al., 2018; Brughmans, 2010; Brughmans et al., 2015; Peeples, 2017). In archaeological networks, many case studies are interested in defining which actors are predominantly important or central within the network (Peeples & Roberts, 2013, p. 3005). Centrality, thus, can be defined as the "property of a node's position in a network (Borgatti et al., 2018, p. 190). A node's centrality indicates the node's importance and prevalence for controlling, directing, and receiving various flows through a network (Borgatti, 2005; Borgatti & Everett, 2006; Peeples & Roberts, 2013). The goal of centrality measures is to rank the nodes or edges in the network (Weidele & Brughmans, 2017). Centrality is a node-level property; however, it is possible to combine the node-level centralities "to define the centralization of the entire network" (Peeples & Roberts, 2013, p. 3005). Centralization, thus, measures to what degree specific nodes are predominant in the network (Borgatti et al., 2018, p. 333).

Degree centrality: The simplest centrality measure that can be applied to network graphs is degree centrality. In binary networks, degree centrality is the number of first-order ties a node has

(Peeples & Roberts, 2013; Peeples, 2017). For weighted networks, degree centrality can be defined as the sum of the weights of all edges connected to a specific node. If a weighted node, for example, has 12 links, that node will then have a degree centrality of 12 (Weidele & Brughmans, 2017, p. 34).

Betweenness centrality: Betweenness centrality can be defined as the measurement of the number of times a specific node falls along the shortest paths between two other nodes (Borgatti et al., 2018, p. 332). Therefore, nodes which have a high betweenness can be understood to have been an important route (here, the route does not only refer to geographical distances but also to any actor which had strong connections) between other nodes, but also as a bottleneck in the network (Weidele & Brughmans, 2017, p. 34).

Closeness Centrality: A node's Closeness Centrality is defined as the inverted sum of its paths to all other nodes in that network. Closeness in networks is usually interpreted as the minimum time it takes for something flowing through the network to arrive at its destination (Borgatti et al., 2018, p. 334).

Eigenvector centrality: Eigenvector centrality is "a variation of degree centrality in which we sum the number of nodes adjacent to a given node, but weight each adjacent node proportionally by its centrality" (Borgatti et al., 2018, p. 462). Therefore, it can assist in determining the connectivity of central nodes to adjacent nodes (Brughmans & Peeples, 2023).

Once centralities for the networks are established, clustering analyses can be introduced to identify groupings of nodes based on the network structure. Therefore, only a few connections between the groups (termed low coupling) and substantial connections within a specific group (termed high cohesion) will be present (Weidele & Brughmans, 2017, p. 34). One way to do this is through the Girvan-Newman Clustering algorithm. This algorithm allows for removing edges established on edge betweenness to fragment the network, which then would reveal connecting subgroups in the network (Borgatti et al., 2018). Edge betweenness is similar to node betweenness already discussed. Edge betweenness is a count of the number of times an edge lies on a path between a pair of nodes (Borgatti et al., 2018; Galmés-Alba & Calvo-Trias, 2022). The Girvan-Newman algorithm occurs as follows:

1. Within the network, the edge betweenness of each edge is identified
2. The edges that have the highest edge betweenness are eliminated
3. The edge betweenness for the remaining edges is recomputed

4. Steps 2 and 3 are repeated until no more edges are left in the network (Girvan & Newman, 2002; Gleiser & Danon, 2003; Weidele & Brughmans, 2017).

In summary, network analysis has key analytical and conceptual advantages. Networks shift the focus from entity-defining to relations between entities. Coupled with various theoretical paradigms, such as relational theories (see Chapter 3), network analysis can assist with understanding the entanglement between things and people, people and people, and things and things (see Hodder, 2024).

4.4 Analytical approaches and ceramic sample

This study aims to trace and explain the entanglement and changing social identities of the design structure of ceramic material. Therefore, a sample with strong temporal and spatial control is needed. Ceramics from the Early Iron Age in the Southeastern Lowlands of South Africa provide sufficient data to examine these research aims. There are three main reasons why this region was selected. First, the culture-history sequence of the EIA in this region is the least contentious and securely dated for all of southern Africa. Secondly, these sites have strong time control based on stratigraphic and radiometric data. Lastly, over the last 15 years, in-depth ethnoarchaeological studies have been conducted on ceramic production and use amongst various Zulu communities (Fowler, 2006, 2008; Fowler et al., 2011, 2017). Such data will be invaluable to this project as they inform the behavioural aspects of ceramic production and identity from which to see if entities smaller than language groups can be identified. Furthermore, the sampling strategy was based on including ceramics from various spatial regions (Upper Thukela (UTh), Lower Thukela (LTh), and Coastal region (CR) of the Southeastern Lowlands of South Africa, and temporally (within the Msuluzi sequence, i.e. Msuluzi, Ndondondwane, and Ntshekane) as well as strict stratigraphical and carbon dating.

The sample consisted of 15361 ceramic sherds from 23 different Early Iron Age sites (see Chapter 5 for a complete discussion of the sites and locations). Ceramic sherds were analyzed based on sherd families (Orton & Hughes, 2013, p. 208). Sherd families are sherds that were deemed to belong to the same ceramic vessel. A single ceramic sherd in this context is equal to one ceramic vessel. Thus, 15361 individual ceramic vessels were analyzed for this study. However, four sites (Nsundukwazi, Mandendleni, Hilltop, and Glen) were excluded from the overall results, as their provenance could not be accurately ascertained and their sample size was also deemed as

being too small. Therefore, the results presented in Chapter 6 is comprised of 15337 vessels from 19 EIA sites.

4.4.1 Determining symmetries

Symmetry analysis focuses only on a single feature: design structure (Washburn, 2021). This approach has yet to be applied to African archaeology. Evers (1988) mentioned the technique in his study on Iron Age groups in southern Africa. However, he dismissed symmetry analysis as a viable technique in his research, arguing that "…symmetry analysis is not popular because it is quite difficult to master and because it lies at a high level of abstraction" (p. 37). Similar concerns have been echoed by Rice (2015, p. 400), arguing that symmetry analysis has limited application in archaeology due to the cumbersome vocabulary and the "…under-theorization of symmetry patterns…". Such criticism is somewhat misplaced, as Washburn and Crowe (1988) created an exceptional flowchart explaining the symmetry classes and their identification. The specific and structured nomenclature allows for more accurate inter-regional comparisons. Furthermore, a unified nomenclature is refreshing, especially since it "…appears that archaeologists have as many approaches to style as we have works on the topic" (Hegmon, 1992, p. 517). Thus, I argue that it is not the under-theorized approach but the conceptualization and interpretation of the symmetry patterns that need more detailed understanding.

The design symmetries for this study consisted of a detailed analysis of each vessel, where the symmetries were recorded based on Washburn and Crowe's flow charts (1988). Detailed photographs of each vessel were taken to determine the design symmetries. Nine possible design symmetries were identified (Table 4.2): translation (1), reflection (2), rotation (3), glide reflection (4), reflection and rotation (5), mirror and glide reflection (6), rotation and finite (7), asymmetry (21), and not possible to determine any symmetry (see Figures 4.5 and 4.6 for graphic representations of each of the seven symmetry types).

After design symmetries are identified, various analytical procedures will be introduced to assist with structuring and situating the temporal and spatial parameters. Firstly, Bayesian chronological modelling will be applied to establish a more strongly controlled and statistically accurate temporal data set. Secondly, a statistical method for apportioning ceramics based on the Bayesian model will be used. This will allow patterns between and within sites to be identified.

Lastly, the data sets will be outlined using SNA modelling. These analytical approaches will be discussed in more detail in the subsequent section.

4.4.2 Issues in controlling temporal and spatial continuity and variability

A critical issue facing EIA archaeology in southern Africa (as well as other regions) is the untangling of ceramic sequences, especially from sites occupied multiple times. This problem has been noted by various researchers (e.g. Maggs, 1984a; Maggs & Ward, 1984; Whitelaw, 1993, 1994, 1996) in southern Africa, where it became clear that many EIA sites had ceramics from multiple ceramic phases, leading to the understanding that prolonged or multi-occupations during this period were the norm. At KwaGandaganda, for instance, Whitelaw (1994) argues that because the village layout remained similar, with only a few small shifts in spatial layout occurring through all three ceramic phase changes, the site most likely was occupied continually for over three centuries. Discrete temporal zones during the EIA are usually identified through radiocarbon dates and ceramic sequences (see Chapter 2). However, in some instances, attributing ceramics to their proper phase can be extremely difficult, if not impossible. Msuluzi and Ndondondwane ceramics, for example, are especially difficult to separate because all Ndondondwane ceramic classes also occur amongst Msuluzi classes (Whitelaw, 1994a, p. 17; Maggs, 1980b, 1984b). Therefore, alternative analytical applications are needed to overcome the above-mentioned issues. This study will use three alternative approaches to control for temporal and spatial variability: Bayesian modelling and apportioning of ceramic material for controlling temporal difficulties and social network analysis of symmetry types from the study area, highlighting continuity and variability across space and time.

4.4.3 Bayesian chronological modelling

This study used Bayesian chronological modelling to establish more accurate and controlled temporal data from which various interpretations could be drawn. The Bayesian approach allows for analyzing "new data…collected about a problem in the context of our existing experience and knowledge about that problem" (Bayliss, 2007, p. 75). This permits new suppositions of the "problem which incorporates both…existing understanding of the problem and…new data" (Bayliss, 2007, p. 75). Using the related terminology, new data or observations (termed *standardized likelihoods*) are examined as past views and information about the phenomena (prior beliefs) (Buchanan et al., 2022; Lulewicz, 2018b, 2018a, 2019). Thus, a new understanding is reached by combining existing understandings of a problem with the new data

(posterior belief) (Bayliss, 2007, p. 75). Radiocarbon dates lend themselves well to Bayesian chronological modelling due to their strong focus on probabilities. Bayesian modelling allows for stricter control of absolute chronologies, where archaeological data can be understood at a historical scale (see Bayliss, 2015; Bayliss et al., 2007; Buck et al., 1996; Ramsey, 2009; Whittle et al., 2011).

Bayesian modelling allows for "an explicit, quantitative method which can combine raw scientific dates with other prior information included in a model to produce formal statistical date estimates" (Bayliss, 2007, p. 76). In the context of this study, radiocarbon dates represent the likelihood. Radiocarbon dates and their associated ceramic traditions (Msuluzi, Ndondondwane, and/or Ntshekane) represent the prior beliefs, while the results will represent the posterior beliefs.

Calibration to interpret radiocarbon ages as calendrical dates is necessary because C^{14} does not remain constant through time. The calibrated dates are shown along a calibration curve as

probability distributions, indicating the likelihood of existent dates (Lulewicz, 2018, p. 60). When calibrated dates are used on their own, it could lead to inaccurate understandings of the start and end dates of the phenomena or activity being studied because both the definite values as well as the statistical likelihoods in relation to these values are included in the probabilities (Lulewicz, 2018, p. 60). Thus, the probability distributions of the dates obtained from radiocarbon samples can be reorganized and restricted through the application of prior understandings to reevaluate the accuracy and distributions of radiocarbon dates (see Figure 4.8).

In archaeology, the most prudent prior data present are the stratigraphical and depositional metadata associated with radiocarbon samples (e.g.Bebber et al., 2022; Birch et al., 2021; Buchanan et al., 2022; Manninen et al., 2021; Manning & Hart, 2019). More relative prior data includes culture-historical frameworks, settlement patterns and ceramic sequences, and horizontal stratigraphy, which looks at contemporaneity between features across sites (Lucas, 2021), which can be used as prior beliefs. As is the case with this study, using general prior knowledge (ceramic sequences) is a working proposition on which the examination can be constructed (Ramsey, 2009). Thus, the cultural history of the Southeastern Lowlands provides a working hypothesis of the order in which ceramic assemblages are ordered in the region.

Various parameters were imposed on the radiocarbon dates to establish a Bayesian chronological model. A **Phase** is a group of radiocarbon dates which are not organized. When radiocarbon determinations are parsed into a phase, there is an inherent assumption made that the

dates in this grouping are equally likely to be found anywhere between the start and end boundaries of the phase (Lulewicz, 2018, pp. 60-61). The dates in phases need to be given a start and end **boundary** to serve as information parameters. Boundaries determine how measurements will be distributed in the phase. In total, 33 legacy radiocarbon dates were used to create the Bayesian model. The C^{14} results were calibrated with the southern Hemisphere calibration curve (Reimer et al., 2013) and plotted in OxCal 4.4 (Ramsey, 2009).

4.4.4 Apportioning of ceramics

An apportioning method for ceramic sequences based on site occupation dates and ceramic production and use dates, as applied to the ceramic material from the study area, assists in temporal control and contextualizing the ceramic sequences. The apportioning model allows the ceramic data to be statistically divided into chronological periods. This method, established by Roberts et al.(2012; also see Carlson, 1983; Ortman et al., 2007; Steponaitis & Kintigh, 1993), requires a start and end date for the ceramic sequences' lifespan, which were refined from chronometric data of the region. The start and end dates of a site's inhabitation are also required, obtained through chronometric and ceramic data for the region. The apportioning of the sites in the study area is established by dividing a site's inhabitation span into a series of periods (see Figure 4.9). The periods were divided into 100-year intervals.

4.5 Analytical approaches to constructing social networks for this study

Constructing social networks of the symmetrical classes identified in the study area requires converting two-mode data into one-mode data. In archaeology, in most cases, it is not possible to identify ties between actors directly; however, it is possible to infer or predict ties based on the presence of similar artifacts, particularly the artifact similarities of tabulated artifacts assigned to nominal categories in tabulations of artifacts ((Borgatti et al., 2013; Borgatti et al., 2018; Mills et al., 2013). Two types of entities are presented when starting with two-mode data sets (see example in Table 4.3a and Table 4.3b). The only connections in Table 4.3a are between two types of actors (e.g. sites and symmetry type) and not between actors of the same type (e.g. connections between sites). Thus, in shifting from two-mode data to one-mode data, the supposition that similarity in material culture types between actors (often sites) is most likely an indicator of some social, political, and economic connection suggests that it is possible to infer historical interactions based on these shared traits.

Transforming two-mode data to one-mode data can be accomplished through many similarity measures. However, in archaeology, the use of the Brainerd-Robinson Coefficient of Similarity is the most utilized method (e.g. Birch & Hart, 2018; Blair, 2015; Borck, 2018; Borck et al., 2015; Golitko & Feinman, 2015; Hart et al., 2017; Hart & Engelbrecht, 2012; Mills, et al., 2013; Mills,et al., 2013; Peeples, 2011; Peeples et al., 2016; Peeples & Haas, 2013) and will also be used in this study. The ceramic assemblage's similarity data (Brainerd-Robinson Coefficient of Similarity) was created and executed using a script by Peeples (2011) in RStudio version 4.3.0 statistical software.

The Brainerd-Robinson coefficient is a city block metric of similarity, where the measures range from 0, demonstrating no similarity, to 200, showing perfect similarity (Cowgill, 1990; Peeples, 2011, 2017, 2019a; Peeples & Roberts, 2013) and employing the Brainerd-Robinson similarity measure, converting two-mode data to on-mode data (Table 4.3b) where the relationship between two specific sites is expressed as the degree of similarity between those two sites' symmetry type.

The network data will be visualized temporally (as 100-year slices) and spatially (across the entire study area and within each ecozone) as Social Network maps. The social network visualization was constructed using RStudio version 4.3.0 statistical software. The network and node measures visualized in the Social Network maps were produced using an R script written by Peeples (2017) and Peeples and Brughmans (2023) and executed using RStudio version 4.3.0 statistical software.

4.6 Chapter Summary

This chapter discusses the various analytical applications of this study. The chapter highlighted the use of various design analyses of archaeological ceramics. The relevance and reasons for why symmetry analysis was introduced were also discussed. The use and validity of Social Network Analysis and how its application in this study will greatly assist with understanding the entanglement between objects/things and people synchronically and diachronically were highlighted. Furthermore, the ceramic sample used and the reasons why they were selected were introduced. Lastly, I examined the various analytical and statistical methods applied, which in totality will greatly assist in understanding the research aims of this study. The subsequent chapter will introduce the study area in more detail and the 23 sites chosen for this project.

Table 4.1 List of terms and definitions used throughout Chapter 4

Term	Definition	Reference
Attribute	"property, characteristic, or feature of an entity, typically of material, technique, style, or morphology"	Rice, 2015, p. 220
Classes	"any division of materials or events into groupings based on similarities and differences"	Hill & Evans, 1972, p. 233
Types	"a formal conceptual (or abstract) unit based on a consistent patterning of the materials"	Rice, 2015, p. 225; Hill & Evans, 1972, p. 233
Modes	the notions and habits which direct the producers of a community and will be handed down vertically from one generation to the next	Ford, 1952, 1954
Design	"as intentional action of visual organization or the output resulting from that action	Ewins, 2004, p. 181
Symmetry Design	"as a specific kind of figure", where figures apply to "any drawing, painting, set of points, etc."	Washburn & Crowe, 1988, p. 52
Decorative Style	"a manner or mode of expression…a visual representation, specific to a particular time and place". In this study style "refers to decorative or surface embellishment".	Rice, 2015, p. 482
Design Elements	the smallest portion or component, which is manipulated as a single unite and can stand alone	(Rice, 2015, p. 455; Sinopoli, 1991, p. 227
Design Structure	"the layout or arrangement of a design; the way the surface area to be decorated is conceptualized…and the arrangement of elements and motifs within the layout"	Rice, 2015, p. 455
Symmetry	study is used in the geometrical sense, as a rigid motion (or simply motion) or isometry	Crow, 2004, p. 3; Washburn, 2018a
Pattern	any design with recurrently repeating units of the same shape and color and admits translation symmetry-displacement or shift by a specific distance along a line	Washburn & Matson, 1984, p. 78; Rice, 2015, p. 459
Figure	any drawing, painting, set of points etc. As this study is concerned with plain pattern symmetries of ceramics, the figure refers to the decorative element, or as termed by Arnold (1993, p. 154), as the 'fundamental unit' of a symmetry pattern. The figure (or fundamental unit, or basic unit) is not the same as the motif of a design, which is a discrete unit of the design, a combination of design elements, which may or may not be repeated (Arnold, 1993, p. 154; Rice, 2015, p. 459). Here they will be used interchangeable to mean the same thing	Arnold, 1993, p. 154; Rice, 2015, p. 459
Plane	used here in its geometrical understanding, as a flat, two-dimensional surface which extends indefinitely. The plain is the axis across which the figure/basic or fundamental units move	Washburn, 1977, p 12)

Figure 4.1 Illustration of various finite designs. Cyclic (C), as shown here, are “designs that rotate around a central point.” On the other hand, Dihedral (D) are designs that “admit rotations and mirror reflections through the central point axis.” (Washburn, 2018b, Figure 21

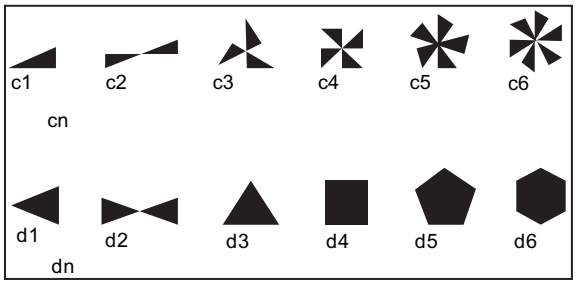


Figure 4.2 The four rigid motions of a plane discussed in the text are (a) translation, (b) rotation, (c) mirror reflection, and (d) glide reflection. Adapted from Washburn 2018, Figure 20

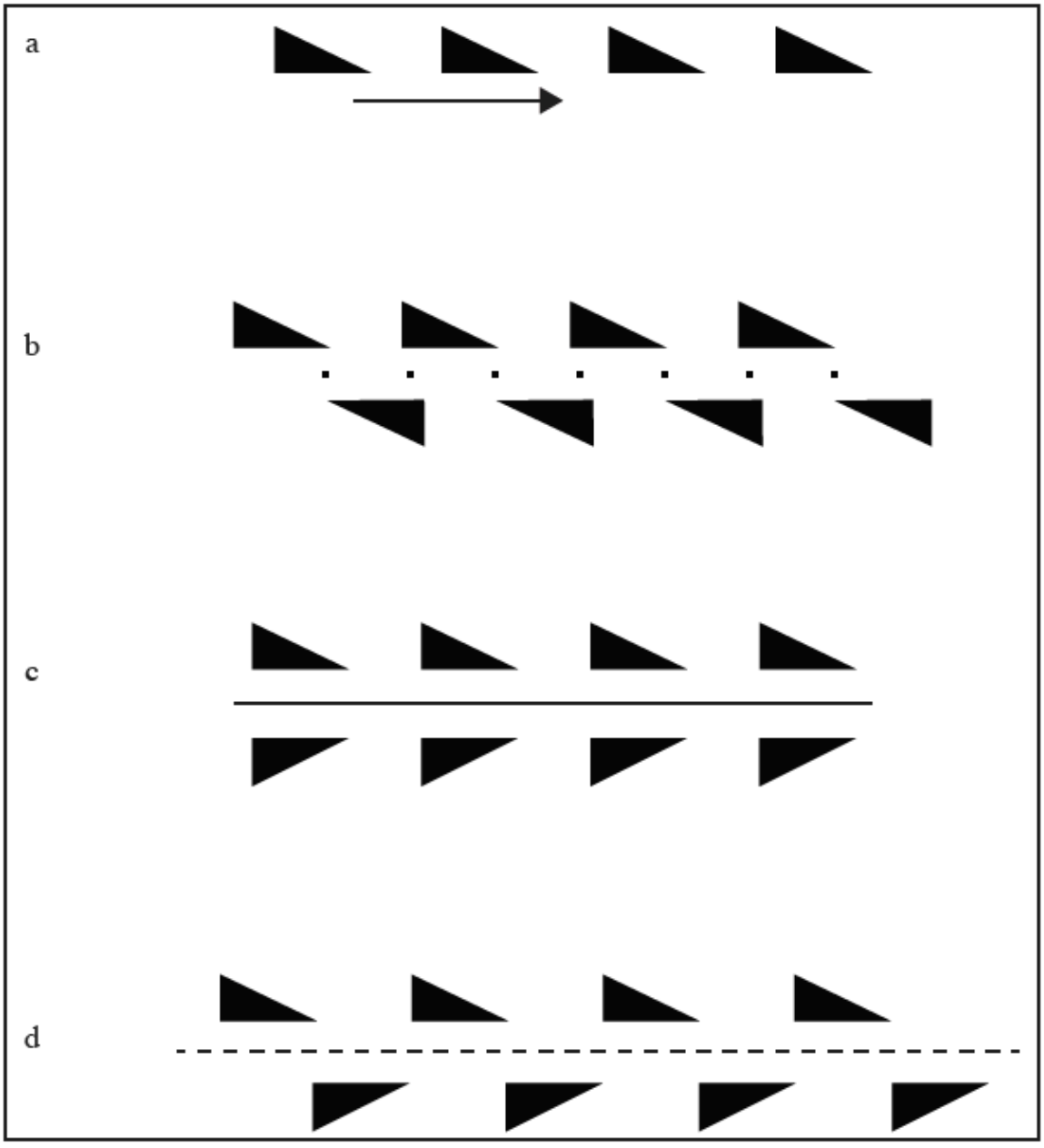


Figure 4.3 The seven one-colour, one-dimensional classes. Adapted from Washburn, 2018b, Figure 22

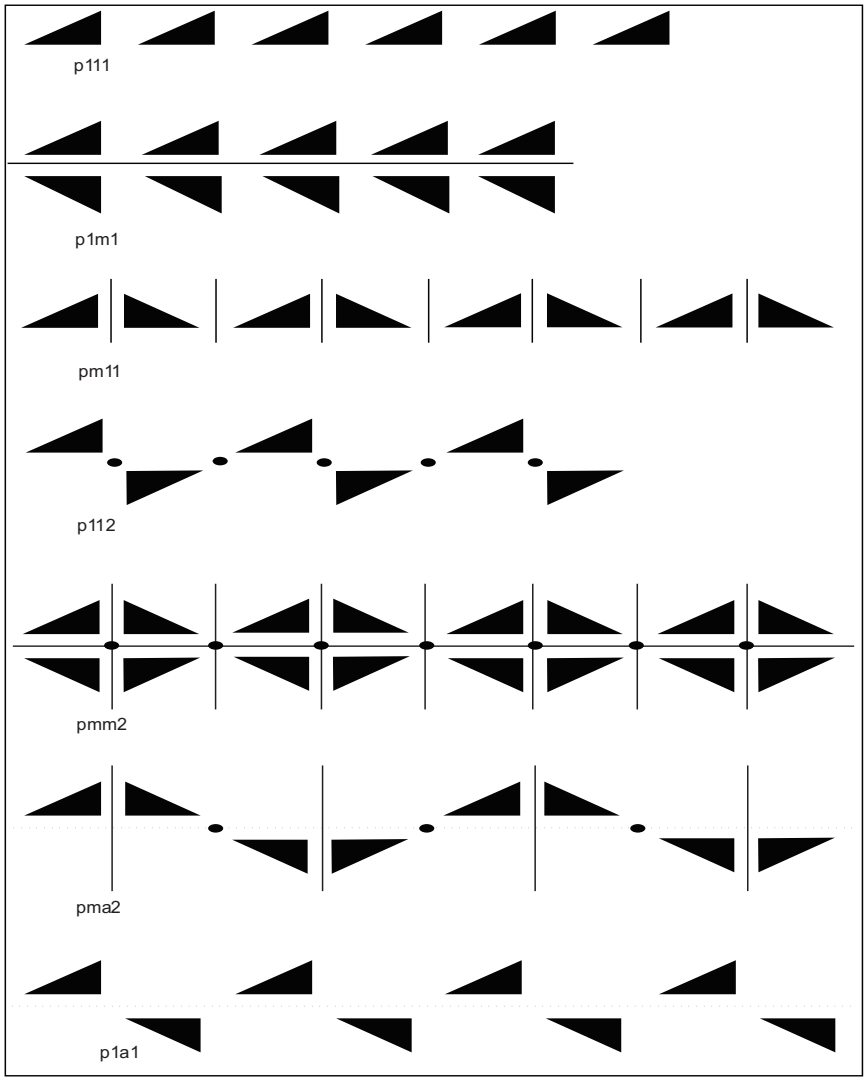


Figure 4.4 The 17 two-dimensional, one-colour infinite patterns. From Washburn, 2018b, Figure 23

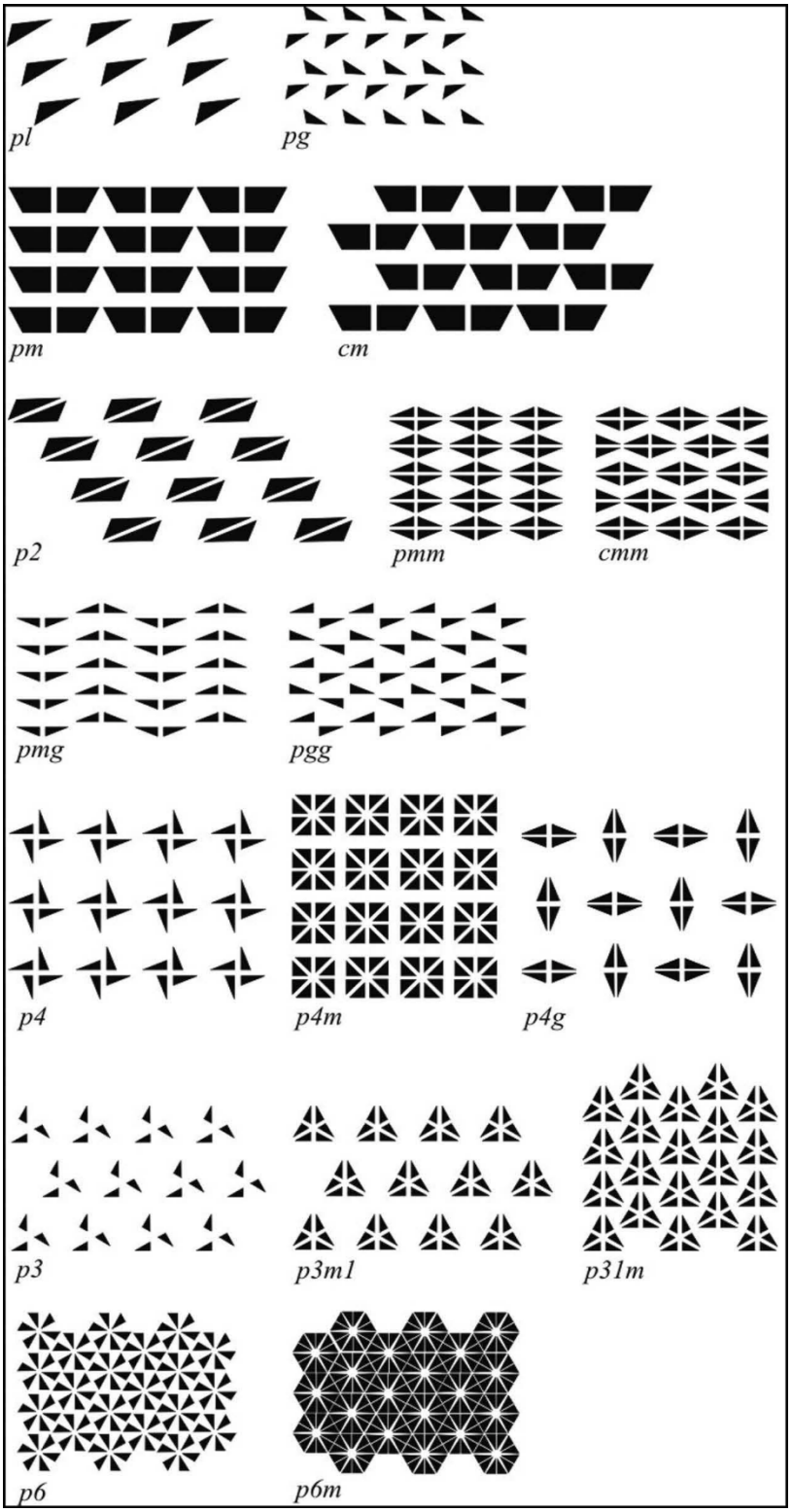


Table 4.2 The nine design symmetries identified.

Symmetry Types	Code
Translation	1
Reflection	2
Rotation	3
Glide reflection	4
reflection and rotation	5
mirror and glide reflection	6
Rotation and finite	7
Asymmetrical	21
Not possible to determine symmetry	99

Figure 4.5 Photographic examples of seven symmetry types



Figure 4.6 Illustrated examples of seven symmetry types

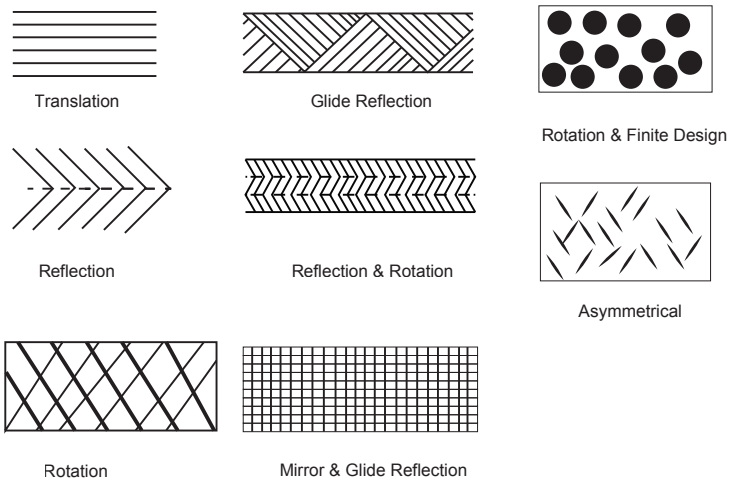


Figure 4.7 Examples of a binary network (left) and a weighted network (right). From Peeples and Roberts 2013, p. 3002.

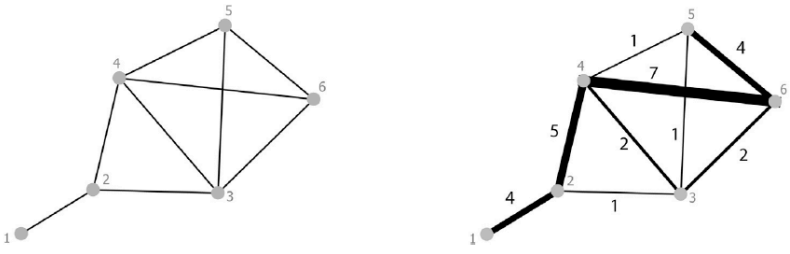


Figure 4.8 Different types of boundaries are used in Bayesian modelling. From Lulewicz, 2018, Figure 5.1, p. 159.

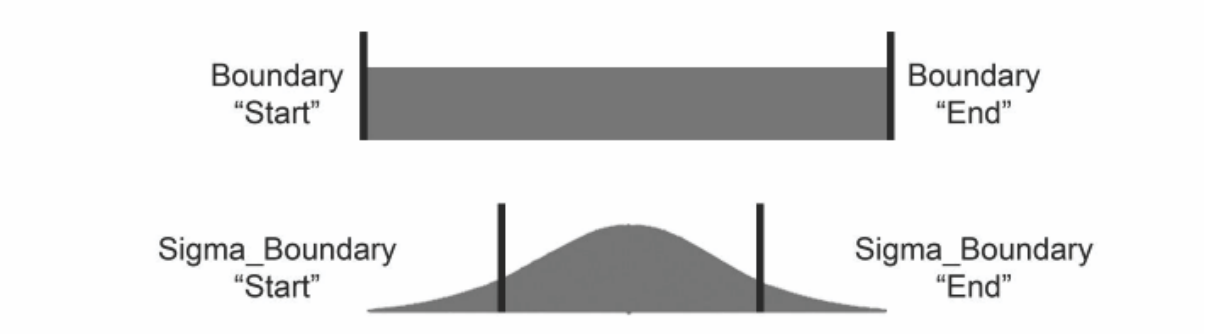


Figure 4.9 Illustration of the apportioning method used in this study. From Roberts et al. 2012, p. 1515.

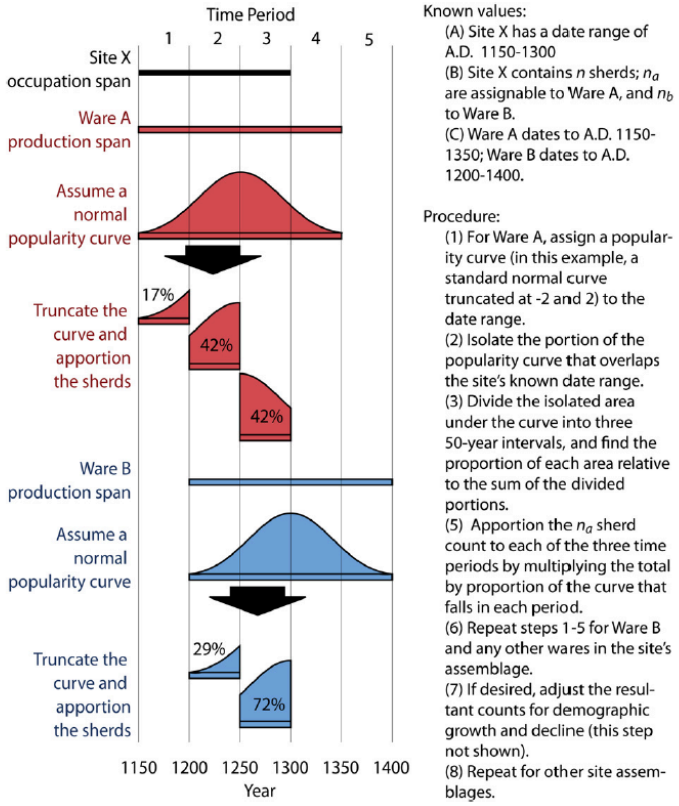


Table 4.3a Example of a two-mode data set.

Site	Dec 1	Dec 2	Dec 3	Dec 4	Dec 5	Dec 6
Site 1	115	77	155	147	83	9
Site 2	0	0	0	0	4	0
Site 3	1	1	1	9	6	0
Site 4	15	8	9	7	4	2
Site 5	0	3	0	0	0	0
Site 6	1	0	0	4	0	0
Site 7	82	37	85	57	39	14

Table 4.3b Example of a one-mode data set.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Site 1	200	147.826087	162.254902	141.666667	158.333333	154.347826	137.844612
Site 2	147.826087	200	153.11168	134.057971	151.268116	171.884058	175.471287
Site 3	162.254902	153.11168	200	169.607843	164.705882	168.039216	152.410438
Site 4	141.666667	134.057971	169.607843	200	154.166667	152.753623	148.496241
Site 5	158.333333	151.268116	164.705882	154.166667	200	175.253623	162.625313
Site 6	154.347826	171.884058	168.039216	152.753623	175.253623	200	181.223712
Site 7	137.844612	175.471287	152.410438	148.496241	162.625313	181.223712	200

Chapter 5. Study area: Southeastern Lowlands of South Africa

5.1 Introduction

This study examined 15,361 ceramic vessels from 23 Early Iron Age (EIA) sites in the Southeastern Lowlands of South Africa[4] to address the research goals (see Table 5.1 for a list of reviewed sites). The Southeastern Lowlands of South Africa, shown in Figure 5.1, stretches from the eastern part of Mozambique along the coast of the Indian Ocean into the province of KwaZulu-Natal. Temporally, the ceramic sample is situated within the Msuluzi ceramic sequence of the Kalundu Tradition, and as expressed in Figure 5.2, comprised three facies, Msuluzi, Ndondondwane, and Ntshekane (see Chapter 2 for a detailed discussion on these ceramic sequences), ranging from AD 650 to AD 1050. This chapter introduces the study area and a detailed discussion of the ceramic sample chosen for this project.

The archaeological footprint of first-millennium agriculturalists in the Southeastern Lowlands has been noted from as early as the 1920s (King & Chubb, 1932; Schofield, 1935, 1936, 1943, 1948). However, it was only during the late 1970s and 80s that Early Iron Age research became prevalent in the region through the initiation of several excavations (Hall, 1980; Hall & Vogel, 1980; Loubser, 1984, 1993; Maggs, 1980a, 1980b, 1984a, 1984b, 1993; Maggs et al., 1984; Maggs & Michael, 1976; Maggs & Ward, 1984; Voigt & Von den Driesch, 1984). These various projects contributed significantly to establishing a more robust culture-history sequence while also coming to grips with the socioeconomic structures of first-millennium farmers. Various Culture Resource Management (CRM) projects during the 1980s to 1990s saw the occurrence of several large-scale excavations, which produced an understanding of the lifeways and character of EIA societies (Fowler, 2002; Fowler et al., 2000; Greenfield et al., 1997b, 2000b, 2000a, 2005; Greenfield & van Schalkwyk, 2003a; van Schalkwyk, 1991, 1994b, 1994a, 1994c; van Schalkwyk et al., 1997; Whitelaw, 1993, 1994b; Whitelaw & Moon, 1996). Research has recently focused on ethnoarchaeological and compositional studies of ceramic production among Zulu potters and applied to EIA societies (Fowler, 2006, 2008, 2014; Fowler et al., 2011, 2017; Fowler & Greenfield, 2009).

[4] In total, ceramic samples from 23 EIA sites were examined. However, four sites (Nsundukwazi, Mandendleni, Hilltop, and Glen) were excluded from the overall results, as the provenance of the artifacts could not be accurately ascertained, and the sample size was deemed too small. However, they were included in Table 5.1, as they were recorded.

The subsequent section introduces the Southeastern Lowlands of South Africa, followed by a discussion of EIA sites from which the ceramic was selected. This discussion will be structured within the four discrete physiographical and geographical ecozones (Upper Thukela Basin, Lower Thukela Basin, uMngeni Valley, and the Coastal Belt) in which the EIA sites fall.

5.2 Study area

The study area falls within the province of KwaZulu-Natal (KZN), located along the eastern seaboard of South Africa (see Figure 5.1). KwaZulu-Natal is broadly separated into four physiographical and environmental zones (coastal plain, interfluvial region, broken basin and ridge, and the escarpment) moving Northeast to Southwest, from the coast inland (Arnold et al., 2013b; Edwards, 1967). These physiographic zones are connected by numerous West-East perennial rivers, such as the Thukela, uMngeni and Klip Rivers, to name a few (de Villiers, 2005; van der Zel, 1975). These perennial rivers flow through numerous narrow, steep basins, making navigation of these valleys challenging (Arnold et al., 2013, p. 130).

5.3 The Ceramic Sample

The ceramic sample used to address the aims of this study is comprised of 15361 ceramic vessels from 23 EIA sites in the Southeastern Lowlands of South Africa, within the Msuluzi Sequence of the Kalundu Tradition (see Table 5.1, Table 5.2, and Figure 5.3). The sites are located within one of four discrete ecozones, as expressed in Table 5.1, and Figure 5.3, while their temporal distribution is based on 31 C^{14} assays (see Figure 5.4). The reason why ceramic materials from this region were chosen is threefold.

First, the culture-history sequence of the EIA in this region is the least contentious and securely dated for all of southern Africa. Secondly, these sites have robust time control based on stratigraphic and radiometric data. Thirdly, over the last 15 years, in-depth ethnoarchaeological studies have been conducted on ceramic production and use among various Zulu communities (Fowler, 2006, 2008; Fowler et al., 2011, 2017). Such data are invaluable to this project for understanding the behavioural aspects of ceramic production and identity, helping to detect entities smaller than language groups. In the following sections, the EIA sites from which the ceramic sample was drawn will be discussed within the context of the four ecozones. The remainder of this chapter deals with detailed discussions of each EIA site from which the sample was taken. The sites will be discussed based on their location in the ecozone.

5.4 The Thukela River Basin

At 29,000 km^2, the Thukela River Basin stretching from the Ukhahlamba-Drakensberg Mountains to the Indian Ocean (Arnold et al., 2013, p. 130) is the most extensive river system in the Southeastern Lowlands of South Africa (Andersson et al., 2011).The Thukela Basin is identified as a single bioclimatic region in its entirety. However, temperature, rainfall, and vegetation cover variability exist as the gradient increases from the Indian Ocean to the Drakensberg (Fowler, 2008).

The Upper and Lower Thukela Basins are separated on physiographical and geomorphological grounds. The Upper Basin encompasses the northern and western sections of where the Mpofana (Mooi), the upper section of the Thukela, west of Tugela Ferry, and the uMzinyathi (Buffalo) Rivers converge (see Figure 5.1). The geography of the Upper Basin comprises a flat and open landscape, allowing for ease of access between the various tributaries (see Figure 5.5). The vegetation in the upper basin is drastically different from that in the lower basin (Fowler et al., 2020). The vegetation is characterized as Valley Bushveld (Mucina & Rutherford, 2006), and the topography is primarily flat and covered by vast grassland (Maggs & Ward, 1984).

The Lower Thukela catchment forms at the confluence of the Thukela and uMzinyathi (Buffalo) Rivers, south of Thukela Ferry. The lower basin becomes progressively narrower and ends as it flows through a constricted valley to the east of the Thukela and Silambo River confluence (Arnold et al., 2013, p. 130). This valley separates the lower basin from the coastal belt and the inlet of the Thukela Basin. The flat and open topography of the lower basin made it an ideal location for settlements. At the same time, early farmers would have favoured the region for its cultivation capacity thanks to deep alluvial soil (see Figure 5.6) (Arnold et al., 2013; van Schalkwyk, 1991).

The Lower Thukela vegetation comprises Eastern Valley Bushveld, falling within the Savannah Biome (Mucina & Rutherford, 2006). This vegetation type does not extend to the coast (see discussion on the physiography of the Coastal Belt) and only occurs between 100 and 1,000 m above sea level (ASL). It includes semi-deciduous savanna woodlands with thickets dominated by *Euphoria* and *Aloe* species (Arnold et al., 2013) and sweetveld grasses that can be used year-round.

The region's climate is subtropical, consisting of warm, humid summers between October and April), followed by cool, dry winters between May and September. The annual mean rainfall is 588 mm, mostly due to summer thunderstorms, making flooding a common occurrence (Mutema et al., 2023; Shulze, 1982). Diatom records from Lake Sibaya reveal that the precipitation during the first millennium was substantially higher, with wetter conditions prevailing more than at present, especially between AD 790 and AD 830, which saw a spike in rainfall (Coutu et al., 2016). The annual mean temperature for the basin is 27 ^{o}C (Mutema et al., 2023).

Most of the ceramic samples discussed in the rest of this chapter came from the Thukela Basin (see Table 5.2). The following section will discuss the EIA sites analyzed from the Upper and Lower Thukela Basins.

5.4.1 Upper Thukela sites

5.4.1.1 Ntshekane

Located near Muden, straddling the old farms Nietgedocht and Geluk Stadt (now inside communal land) (Figure 5.7), Ntshekane was excavated by Maggs in 1973 (Maggs & Michael, 1976) (Huffman & Whitelaw, 2019, p. 138), with further research occurring at the site from 2015 to present by members of the KwaZulu-Natal Museum.

Identified in 1973, Ntshekane was the first excavated EIA site in the Southeastern Lowlands of South Africa. The research at Ntshekane not only allowed for the Iron Age sequence of southern Africa to be completely revised but also indicated that EIA societies were already settled south of the Limpopo River before the start of the second millennium (Maggs & Michael, 1976; Mason et al., 1973; Whitelaw, 2019c).

Initially, the ceramics from Ntshekane were analyzed as a single assemblage, even though Maggs and Michael (1976) suggested a high likelihood of multiple occupations. Their suspicions were shown to be correct when a multidimensional scaling analysis accurately distinguished between Msuluzi-type and Ntshekane-type ceramics (Maggs & Ward, 1984, p. 137). With more research conducted on EIA sites in the region, especially at Magogo and Mhlopeni (Maggs & Ward, 1984, see discussion below), it became apparent that Ntshekane consisted of three occupational horizons, Ntshekane, Ndondondwane, and Msuluzi facies (Maggs & Michael, 1976). Two C^{14} dates illustrated in Figure 5.9 were obtained from Ntshekane, and in relation to ceramic styles dated to AD 885-AD 1069. More recent research by the KwaZulu-Natal Museum identified

a Late Iron Age phase, Blackburn at Ntshekane, and did extensive mapping of each facies features (Huffman & Whitelaw, 2019; Whitelaw, 2019a, 2019b, 2019c).

5.4.1.1.1 The 1973 excavations

Due to extensive gully erosion, as the example shown in Figure 5.8, exposing several concentrations of material culture and features at Ntshekane and fearing the next rainstorm might wash away the exposed material culture, a rescue excavation led by Maggs was instigated in 1973 (Maggs, 1993; Maggs & Michael, 1976). These distinct material culture concentrations, consisting of grindstones, manuports, ceramic, faunal remains, *Metachatina* shells, slag, and some daga (building mortar) pieces (Maggs & Michael, 1976, p. 707), were assigned letters (see Figure 5.7) for identification and surveyed tacheometrically. Four types of features were identified during the initial excavations: deep pits, shallow hollows, small features such as a buried pot and manuports, and a hut floor. Of the features, pits were the most abundant. Here, some of the more salient features of the 1973 excavation will be briefly discussed. For this project, only the ceramics from the initial excavations were used, as the more recent research at the site has not yet been fully accessioned and added to the Kwa-Zulu Natal Museum's collection. However, some of the recent data will be briefly discussed here, including the updated mapping of Ntshekane.

The pit at Feature O (Figure 5.10) yielded a skull of a Blue Duiker (*Cephalophus cf. monticola*) and a Late Stone Age arrowhead with the tip broken off. The ceramics from this pit consisted of pots with inward-sloping necks, which were attributed to the Ntshekane facies. A charcoal sample (Pta-1058) collected between 20 and 40 cm dated the feature to 1150±45, AD 885-AD 1134 (AD 980, median) (see Figure 5.10).

Feature V, a pit 2,2m deep and 1,5m in diameter, yielded a small vessel with a neck sloping inward slightly but curving out at the lip and was dark and burnished (see Figure 5.10). The upper section contained scattered pieces of ceramic, unworked ostrich eggshells, larger shell beads (*Metachatina*), bone and stone. A small vessel from this horizon had an inward-sloping neck with sharp angles at the body/neck junction. The fill contained more cultural material between 1.2 and 1.8m below the surface than in the upper layer. Material included broken grindstones, stone manuports, ceramic, bone, ash, charcoal, a natural spherical dolerite pebble with traces of polish from grinding, and a heavy cylindrical bone 'peg' of unknown function. No apparent stratigraphy was noted at this level, and these contents were likely deposited in one episode. There was much less stone from 1.8m to the base, but still bone and ceramic. This pit probably contained debris

from domestic hearths and sweepings. The ceramics were also associated with the Ntshekane phase, and a charcoal sample (Pta-1057) from 1.4 – 2.2m below the surface dated the feature to 1100±50, AD 885-AD 1134 (AD 980, median) (see Figure 5.10). Two features (W and N) yielded Ndondondwane phase ceramics (see Figure 5.11), while excavations at features B1 and B2 identified Msuluzi phase ceramics (see Figure 5.12) (Maggs, 1973a, 1973b; Maggs & Michael, 1976).

5.4.1.1.2 Ceramic Data

Maggs and Michael (1976) analyzed 156 individual jar and bowl vessels, all comprised of large sherds and nearly complete or complete vessels (Maggs & Michael, 1976, p. 712). Using the attribute matrix approach (see Chapter 2 for a detailed discussion of the attribute matrix), the aim was to test the association between the sample's different characteristics (vessel shape, decoration placement, and motif types). The results identified three discrete phases, Msuluzi (Feature B1 and B2), Ndondondwane (Feature W and N), and Ntshekane (Features, P, Q, D, AA, G, T, I, O, V, D, F, EE, and FF). Four vessels with upright rather than inward-sloping necks were identified during the initial research. An example of one such vessel can be seen in Figure 5.13. Maggs and Michael (1976, p. 725) argued that such variability was due to a single potter's idiosyncrasies.

For this study, 428 vessels were included, from which the site's design symmetry could be analyzed. The ceramic apportioning for Ntshekane was based on the statistical test conducted by Maggs, which divided the site's features into different ceramic phases.

5.4.1.1.3 Research at Ntshekane by the KwaZulu-Natal Museum team

Starting in 2015, a team from the Human Sciences Department of the KwaZulu-Natal Museum, led by Gavin Whitelaw and Thomas Huffman, continued research at Ntshekane (Huffman & Whitelaw, 2019; Whitelaw, 2019a, 2019b). Their aim was twofold; first, due to extensive erosion at the site, as Maggs and Michael (1976) noted in 1973, the project was a targeted rescue project to collect and record eroding archaeological material (Whitelaw, 2019a). Secondly, the more recent project at Ntshekane aimed to highlight the Central Cattle Pattern (CCP) 's applicability to describe this multi-occupational site's ancient worldview (Huffman & Whitelaw, 2019).

To this end, the site was mapped to identify and situate the various features associated with their ceramic sequences (Msuluzi, Ndondondwane, and Ntshekane) (see Figure 5.14, Figure 5.15, Figure 5.16, and Figure 5.17). After the conclusion of the mapping, various pits and burials were

excavated to examine their contents (Huffman & Whitelaw, 2019, p. 138). Identification of cattle dung within the pits was a crucial aspect of the excavations, as cattle dung is a more accurate indication of 'male' occupational areas on the site. Temporality and cultural affinity were ascertained by establishing feature plans based on ceramic in individual features. Thus, spatially and temporally, three occupational zones were identified: Msuluzi, Ndondondwane, and Ntshekane (Huffman & Whitelaw, 2019, p. 139).

The subsequent work at Ntshekane yielded some interesting findings. The 'idiosyncratic variation' noted on some of the vessels during the original research (Maggs & Michael, 1976, p. 725) was identified on several other vessels (Huffman & Whitelaw, 2019). Such vessels, combining Ndondondwane and Ntshekane decorative attributes, were placed as belonging to a 'late Ndondondwane' facies (Whitelaw, 2019c). Similar 'late Ndondondwane' vessels were found at KwaGandaganda (Whitelaw, 1994a; see below), and according to Whitelaw (1994a, p. 17), such vessels represent a transitional stage between Ndondondwane and Ntshekane.

During the recent research five human burials were identified at Ntshekane. One was a burial of young women between the ages of 15 and 24 years at death covered in red stone and associated with the Ntshekane phase. The second young adult was associated with either the Ndondondwane or Ntshekane phase. The burial of a child of 2-3 years was uncovered, eroding out of a pit. The burial of a woman who was around five months pregnant at the time of her death, associated with the Ntshekane phase, was also identified. The remains of the young women showed signs of dental modification, a phenomenon in which the canines and incisors are removed, chipped, and filled (Owens et al., 2023; Whitelaw, 2019b). Such modifications have been noted at other EIA sites across southern Africa, including at Broederstroom, where six incisors extracted from six young individuals were found (Mason, 1981). At Nanda (see discussion below) (Whitelaw, 1993), evidence of this phenomenon was also noted on two adult skeletons. Remarkably, similar dental alterations were stylistically represented on the EIA Lydenburg ceramic heads (Inskeep & Maggs, 1975; Morris, 1993). The representation of the medial dental hiatus in the otherwise stylistic and impractical ceramic heads has been argued to reflect ritual importance, especially initiation rites (Inskeep & Maggs, 1975, pp. 127–128; Morris, 1993, p. 97).

Subsequent excavations at Ntshekane recovered 52 glass beads (during the 1973 excavation, only one glass bead was recovered (Maggs & Michael, 1976, p. 740), all associated with the Ntshekane phase.

Overall, glass beads are scarce from EIA sites in the Southeastern Lowlands of South Africa. One was found at KwaGandaganda (Whitelaw, 1994a), and one from the Ntshekane phase pit at the site 2931AD 17, an EIA site along the iZinkwazi River (KwaZulu-Natal Museum records) (Huffman & Whitelaw, 2019; Whitelaw, 2019a, 2019b).

The presence of higher numbers of glass beads at Ntshekane has been used to bolster Huffman and Whitelaw's (2019a, p. 147) argument that Ntshekane, similar to KwaGandaganda (see below), was an important political centre. Research by Coutu et al. (2016) on ivory from various EIA sites in the region (Wosi, KwaGandaganda, and Ndondondwane) has suggested that the area was exporting elephant ivory into the East Coast trade system from as early as AD 700. Glass beads, such as those identified at Ntshekane, most likely were the goods received in return for the ivory (Huffman & Whitelaw, 2019; Whitelaw, 1994b, 2019a, 2019b).

Two excavated pits yielded *Blackburn* ceramic (Davies, 1971; Robey, 1980) mixed in with Ntshekane phase ceramic. Blackburn ceramics are associated with the start of the Late Iron Age, representing the first Nguni-speaking people in the region (Huffman, 1986; Huffman & Whitelaw, 2019). Ceramics combining decorative attributes from both Ntshekane and Blackburn were also identified at the site (Whitelaw, 2019a, p. 3). The pots of both phases were treated similarly, which Whitelaw (2019a, 2019b) argues is evidence that the ceramic was associated with the same households. Furthermore, evidence during the recent excavations highlighted a combination of Blackburn and Ntshekane decorative elements, such as graphite, black burnishing, and flat bases. An analogous phenomenon was noted at Garonga, an EIA site in the Lowveld of the Limpopo Province of South Africa (Burrett, 2007). At Garonga, ceramics combining decorative elements of the Urewe and Kalundu traditions were recovered. Some of the pots at Ntshekane comprised of Ntshekane phase decorative attributes (inward sloping and straighter necks, burnishing on some vessels, herringbone motifs applied with fine and thin tools), but the application was careless as if the person(s) applying the decoration was not instructed in Ntshekane decorative techniques (Whitelaw, 2019a, 2019b, 2019c). These aspects, Whitelaw (2019a, p. 3) argues, do not merely suggest an interaction between communities producing Ntshekane and Blackburn ceramics but intermarriage, with women associated with Blackburn ceramic marrying into communities who make Ntshekane ceramic (Huffman & Whitelaw, 2019). Marriage, in many ways, is a political act (see Whitelaw, 2013, 2019a); thus, the entanglement of Blackburn and Ntshekane ceramic-making communities can be explained as marriages occurring where alliances were sought between two

groups of agropastoralists, the one being new to the region, while the other is well established, embedded in the landscape (Whitelaw, 2019a, 2019b; Whitelaw & Hall, 2016).

These various findings have been interpreted by Huffman and Whitelaw (2019; also see Whitelaw, 2019a, 2019b, 2019c) as evidence that Ntshekane was a capital, which if historical accounts are considered (Huffman, 1986), supported 100 to 150 adults. The presence of LIA ceramic (Blackburn) at and within the site, for instance, can be understood as evidence of Ntshekane being a polity, as throughout southern Africa, marriage alliances with other political centers are a characteristic of chiefdoms (Huffman & Whitelaw, 2019, p. 147).

5.4.2 Msuluzi Confluence site

The Msuluzi Confluence site (hereafter referred to only as Msuluzi) was part of several excavations during the late 1970s aimed at understanding EIA lifeways and development patterns and establishing a temporal and typological context for the period AD 300 to AD 1000 in the Southeastern Lowlands of South Africa (Maggs, 1980a, p. 111). The Msuluzi site formed the namesake as the first excavated site for the Msuluzi facies.

Msuluzi is located west of where the Thukela and Msuluzi Rivers converge (Figure 5.18). Like Ntshekane (Maggs & Michael, 1976) research at Msuluzi was initiated in 1977 due to erosion exposing rich surface scatter of material culture (Maggs, 1977, 1980b). Maggs numbered the main concentrations of material culture, while the riches scatters were covered with a 2 m square and named Grid 1 (Figure 5.19). The most detailed work occurred within Grid 1.

5.4.2.1 Excavations of Grid 1.

Figure 5.20 identifies several features across Grid 1. At the western section of Grid 1 (Figure 5.20), where the largest scatter of material culture was identified, a charcoal sample (Pta-2195) was collected from a pit in Square E3 90 cm in diameter and dated 1310±40 (AD 744, median) (see Table 5.1, and Figure 5.4 and Figure 5.21).

Near the center of square C1, an almost complete but badly cracked vessel that seemed to have been intentionally buried was identified. Two burials were also uncovered: one infant burial (at least six months in age) in square D6 and an adult skeleton outside Grid 1 in feature 30.

A second radiocarbon sample (Pta-2197) was collected in square D7 below 45cm and was dated to 1370±30 (AD 751, median) (see Figure 5.21). Here, evidence of iron smelting was found in the form of slag, ore heaps, and tuyere. However, no furnace was uncovered.

5.4.2.2 Ceramic sample

The initial analysis of the ceramic from Msuluzi was based on vessels rather than sherds. Therefore, only 45 jar and 45 bowl vessels were included in the attribute matrix (see Chapter 2), as the aim was to list and identify incidences and interrelationships among various characteristics (vessel shape, decoration types, and decoration placement) of the ceramic sample. The results showed that jar vessels in the sample consisted of everted necked jars, with the majority of the vessels (95%) decorated, with 80% of the jar vessels comprising of decoration across the entire neck of the vessels (Maggs, 1980a). Therefore, in association with the radiocarbon dates and stratigraphy of the site, Msuluzi was a single occupation within the Msuluzi phase.

A further 270 jar and bowl vessels were included for the design symmetry analysis. The sample apportioning was based on stratigraphical ordering in association with the radiocarbon dates. All samples for which the provenience could not be determined were excluded from the apportioning model.

5.4.3 Magogo

Like the Ntshekane and Msuluzi sites, research at Magogo and Mhlopeni was instigated when extensive gully erosion exposed material culture across the site (Maggs, 1979; Maggs & Ward, 1984). Both sites are in the Muden region of the Upper Thukela Basin (Figure 5.22).

The Magogo site is situated between Magogo Hill and the Mpofana (Mooi) River. Maggs and Ward (1984) estimated that the original settlement at Magogo extended to approximately 7.6 hectares.

5.4.3.1 Summary of Excavations

Excavations were concentrated on the central parts of the site, where the erosion exposed several pits and smelting debris over a distance of 20 m (Maggs & Ward, 1984, p. 106) (see Figure 5.23).

Several dumping episodes of various materials were noted in Pit 1 (see Figure 5.24). The furnace fragments, shown in Figure 5.24, were dumped during a single episode. At the same time, various other materials were also identified, including ceramics, charcoal, hornfels flakes, carbonised seeds, faunal remains, ceramic figurines, slag, and tuyeres (Maggs & Ward, 1984, p. 110). A charcoal sample (Pta-2874) collected 0.5m below the datum of Pit 1, yielding a date of 1360±50 (AD 748, median) (Figure 5.25). Pit 2, unlike the other pits identified at Magogo, was

wide with a shallow central point. Maggs and Ward (1984) speculated that this pit's original intent might have been obtaining earth for building purposes, and then later used as a dumping locale.

At Pit 13B, an individually excavated feature outside the grid to the eastern periphery of the site, another charcoal sample (Pta-2875) was collected below 40 cm and dated to 1190±50 (AD 878, median) (see Table 5.1 and Figure 5.4 and Figure 5.25).

5.4.3.2 Ceramic sample

The ceramic sample from Magogo included in Maggs and Ward's (1984) analysis comprised 95 jars and 58 bowl vessels. Like Ntshekane and Msuluzi, the analysis was done on an attribute matrix. For this study, an additional 421 vessels were added to the sample. The ceramic apportioning similar to that of Ntshekane and Msuluzi was based on Maggs and Ward's (1984) attribute data in correlation with the C^{14} dates.

Based on the attribute matrix and C^{14} dates, Maggs and Ward (1984) identified a Msuluzi and Ndondondwane phase at Magogo. Most features (Pits 1, 2, 3, 5, and 13A) were Msuluzi pits, while Pits 6 and 13B yielded Ndondondwane phase ceramics. In Pits 4, 5A,7, and 15, ceramics with both Msuluzi and Ndondondwane decorative attributes were identified. These vessels were everted jars, with decoration confined mostly to the vessels' lower necks. Such ceramic with characteristics from both facies has been argued by Maggs and Ward (1984) to be associated with the transition from one ceramic facie to the next, similar to what Huffman and Whitelaw (2019) identified at Ntshekane. The apportioning of the sample was based on stratigraphical ordering in association with the radiocarbon dates.

5.4.4 Mhlopeni

Mhlopeni is located 3,5 km from Magogo up the Mhlopeni River, a small but perennial tributary of the Mpofana River. Mhlopeni is in a much narrower valley than Magogo; however, the valley sloping towards the stream is flat and more open, consisting of deep alluvial soils (Maggs & Ward, 1984, p. 129) (Figure 5.22). Substantially less research was done at Mhlopeni than Magogo by Maggs and Ward (1984). Their efforts were concentrated on a single pit, some surface scatters and two partly eroded human burials. The pit was approximately 1.65m deep and 1m in diameter. It contained a mass of ceramic and other material culture in the upper section of the pit. Ashy deposits with poor material culture were found in the bottom half of the pit. A charcoal sample (Pta-2878) was collected from this pit, dating the feature to 1400±50 (AD 749, median), a date closely associated with Pit 1 at Magogo.

5.4.4.1 Ceramic sample

Maggs and Ward (1984) analyzed 15 pots and five bowls, all belonging to the Msuluzi phase. A further 18 vessels were included in the sample for this study. The apportioning of the ceramic sample was done based on the stratigraphical ordering associated with the C^{14} date.

5.5 Lower Thukela

EIA research in the Lower Thukela was stimulated by Maggs's research at Ndondondwane in 1978 (1984a) and led to the site being excavated by several research groups. The rest of the EIA sites from the Lower Thukela, which formed part of this study and discussed below, were all, except for Ndondondwane, identified by Len van Schalkwyk during an extensive regional survey of the region. Van Schalkwyk's (1991) survey aimed to further the regional understanding of EIA in the Southeastern Lowlands. Before this survey, only three EIA sites were known: ShuShu Hot Springs, Nsuze West and Nsuze East. His survey between October 1983 and December 1985 was able to relocate these sites and identify 13 previously unknown EIA sites (Greenfield & van Schalkwyk, 2008; van Schalkwyk, 1991, 1994b). However, excavations occurred only at Mamba I, Mamba II, and Wosi, while surface collections were done at many other sites identified by van Schalkwyk.

5.5.1 ShuShu Hot Springs

The presence of the ShuShu hot springs EIA site has been known since the nineteenth century. The German community at New Hanover has used the hot springs annually for over a hundred years (Greenfield & van Schalkwyk, 2008).

The site is located on the left bank of the Mandlalati River, on a bluff overlooking the Thukela and Mandlalati Rivers. It is relatively small, between 3 and 4 hectares in size. The 29 ceramic vessels from ShuShu have been identified as belonging to the Ndondondwane phase.

5.5.2 Nsuze West

Nsuze West (also known as the Nsuze Store site) is located on the western bank of the Thukela River, opposite the mouth of the Nsuze River. The ceramics from this site were collected in 1931 by King & Chubb (1932). The site has not been excavated, as is the case with ShuShu, and was substantially disturbed by agricultural activities and urban developments (van Schalkwyk, 1991). The surface collection of the ceramic material was assigned to the Msuluzi and

Ndondondwane phases. The extent of the Nsuze West was substantially more significant than the previously discussed sites, approximately 10 hectares. However, it might be that this was not the extent of each site occupation. A total of 72 ceramic vessels were analyzed for this study. The division of the ceramics into two discrete phases (Msuluzi or Ndondondwane) was done based on Huffman's (1980, 2007) multi-dimensional typology model (see Chapter 2).

5.5.3 Mamba I

Mamba I is located at the confluence of the Mamba and Thukela Rivers, extending for approximately 8 hectares (van Schalkwyk, 1994a) (see Figure 5.26). Initially identified by Schofield (1948, p. 161), he noted an abundance of iron-smelting debris at Mamba I. During van Schalkwyk's (1991) regional survey, Mamba I was reidentified.

5.5.3.1 Excavations at Mamba I

Van Schalkwyk (1994a) recorded several visible surface features, followed by grids being laid out across various excavation areas (A). Three Test Trenches (TT1-3) were initiated within the excavation areas (see Figure 5.27) (van Schalkwyk, 1994a, p. 121). These three trenches aimed to ascertain possible relationships between iron smelting debris and identify other associated features. This led to two additional excavation units being opened. One unit was extended east for 100 meters, while another was excavated west of excavation unit two (AII) (see Figure 5.27).

The main stratigraphy across Mamba I comprised 20 to 30 cm of topsoil, which changed colour when the occupation horizon was reached and extended downward to sterile archaeological soil (van Schalkwyk, 1994a).

Van Schalkwyk (van Schalkwyk, 1991, 1994a, 1994b) identified several features during the excavations, including furnace remains (OVI and OVII), middens, dung deposits, and a floor area (Figure 5.28 and Figure 5.29). At OVI (see Figure 5.29), smelting debris was identified; however, no furnace remains were found. A sample of bone flakes (Pta-4164) from this feature was collected and dated to 1170 ± 60 BP (AD 887, median). Extension of test squares in excavation unit three (AIII), yielded a circular clay structure 70 cm in diameter, which upon further excavations, identified it as an iron-smelting furnace base. This furnace was different from the one identified at Ndondondwane (Loubser, 1993), as the Mamba example had no slag present, suggesting the furnace was used for smithing rather than smelting (van Schalkwyk, 1994a, pp. 124-125).

At excavation unit two (AII), an ashy midden was uncovered. This midden surrendered the most significant sample of ceramic and faunal remains at Mamba I. One bone (Pta-4114) and one charcoal (Pta-4093) sample were acquired from AII at 30 cm below the datum, dating the feature to 1300 ± 50 (AD 821) and 1390±50 (AD 760), respectively (van Schalkwyk, 1994a, p. 126) (see Figure 5.30).

A dung deposit was identified at excavation unit four (AIV), which exposed the dung deposit as part of a possible cattle byre upon further excavations. A bone sample (Pta-4132) collected from AIV dated the cattle byre to1300±50 (AD 821, median).

A compacted hard clay feature was exposed at excavation unit seven (AVII) (see Figure 5. 28). Extension of the excavations identified four post-holes suggestive of an earlier structure straddling the clay feature. The evidence suggests that this structure was a dung-smeared clay floor with a wood pole perimeter burnt down in a low-temperature fire (van Schalkwyk, 1994a, p. 128). Similar features were identified at Ndondondwane (Maggs, 1984a; Loubser, 1993), which was postulated as an area where specialty activities would occur. A bone sample (Pta-4132) from AVII was collected, which dated this structure to 1290±50 (AD 825) (van Schalkwyk, 1994a, p. 127).

5.5.3.2 Ceramic sample

The initial analysis of the ceramic assemblage was based on 19 complete pots, 36 rim/neck sherds and 18 bowls from dated deposits by van Schalkwyk (1994a). An attribute matrix similar to that employed for Ntshekane, Msuluzi, Magogo, and Mhlopeni (Maggs, 1980a, 1984a; Maggs & Michael, 1976, Maggs & Ward, 1984) was used to understand the occupational period(s) of Mamba I. The ceramic style at Mamba I in association with the five C^{14} dates for the site, firmly establishes Mamba I as a Ndondondwane facies occupation during the late eight to early ninth century AD (van Schalkwyk 1991, 1994a). To determine the design symmetry of the ceramics from Mamba I, 49 ceramic vessels were added to the analysis. The ceramic apportioning model for Mamba I was based on the fact that Mamba I was a single occupation associated with strict stratigraphic control and C^{14} dates.

5.5.4 Mamba II

On the eastern banks of the Mamba River, van Schalkwyk (1991, 1994a, 1994b) identified five middens, each approximately 20 to 25 meters in diameter. Various cultural materials exposed on the surface, including slag, faunal remains, and ceramic, were noted during the initial inspection. Van Schalkwyk noted that the ceramics from Mamba II differed significantly from that

found at Mamba I. Therefore, aiming to collect as large a ceramic sample from the site as possible, he excavated a 1 x 2-meter test pit, 80 cm deep to sterile archaeological soil on the largest of the five middens (van Schalkwyk, 1994a, p. 128).

5.5.4.1 Ceramic Sample

The initial ceramic analysis of van Schalkwyk was carried out on 30 rim sherds, four complete vessels, and 10 bowls. The attribute matrix on the ceramics from Mamba II showed that the site formed part of the Msuluzi phase and based on this, could be dated to the late seventh and early eighth century AD (van Schalkwyk, 1994a).

5.5.4.1.1 Discussion: Mamba I and Mamba II

Van Schalkwyk's research at the two sites postulates that Mamba II was occupied first, comprising a larger population than the neighbouring Mamba I (van Schalkwyk, 1994a). At Mamba I, the C ^{14} dates indicate that the site was occupied in the late eighth century and again in the late ninth to mid-tenth century AD. Even though Mamba I was much smaller (4-5 hectares) than Mamba II (9-10 hectares), a drastic increase in iron smelting was noted at Mamba I. The variation in smelting debris between the two sites has been attributed to ironworking Mamba II most likely only served the homestead, while the large quantities at Mamba I might be related to the widening trade networks in the Thukela Basin and beyond during the ninth and tenth century AD (Greenfield & van Schalkwyk, 2008, p. 138).

5.5.5 Wosi

Wosi is a large (10 hectares) EIA site located at the confluence of the Wosi and Thukela Rivers (van Schalkwyk, 1991, 1994c) (Figure 5.31). During initial reconnaissance, van Schalkwyk (1994c) identified 22 surface scatters, representing 11 middens (see Figure 5.31). Six of the most intact and undisturbed middens were earmarked for further research. Two of the six middens (GI and GII) were extensively excavated. The other four middens (GIII-GVI) were only sampled to determine their relation to midden G1 and GII (van Schalkwyk, 1994c).

5.5.5.1 Grid I excavation

The excavation was initiated at the Grid I midden after a human burial near the midden was discovered eroding from a trail leading to the Wosi River (Figure 5.32). Initially, the midden was excavated in 10 cm spits. However, as illustrated in Figure 5.32, it became apparent that three stratigraphic horizons were discernible: a 20 cm layer rich in humic content and dark red-brown colour (van Schalkwyk, 1994c, p. 68). Below this layer, a grey-brown ashy soil matrix was

uncovered, from which most material culture was recovered. This ashy layer was about 45 cm thick and extended to sterile archaeological soil. The upper layer, which did not contain many cultural materials, was removed over 50 m^2 after excavating the second ashy layer. After the two layers were removed, various features (Figure 5.32) at the bottom of the midden were exposed, including a pit and a large area of compacted clay. The pit (Figure 5.33) was 100 cm in diameter and 125 cm deep and was associated with a section of clay accretion, which was exposed during the burial excavation. Figure 5.33 illustrates the various objects, including broken grindstones and worked talc schist, purposefully filling the pit. Over time, this section became a dump site, with an inevitable accumulation of the midden's residues over the pit (van Schalkwyk, 1994c, p. 70). The clay accretion seemed to border the raised compacted clay area (Figure 5.32). Three post holes identified as black circles in Figure 5.32 were identified along the periphery of the clay compaction, which suggests that the clay accretion was the edges of hut floors from sequential building episodes. A charcoal sample (Pta-4094) was collected from this clay compaction at 30 cm, dating the feature to 1290 ± 50 BP (AD 825, median) (Figure 5.34).

The midden at Grid I was attributed to the Ndondondwane facies in association with the stratigraphy, radiocarbon date, and ceramic. The ceramic style was similar to that identified at Mamba I, with decoration occurring primarily on the lower part of the neck. The neck of the jar vessels was upright and less curved than that of Msuluzi facies vessels. However, van Schalkwyk (1994c, p. 77) noted that some decorations were located on the entire neck of the vessel, a common Msuluzi-type attribute.

5.5.5.2 Grid II excavations

Grid II was placed over the most extensive midden at Wosi. Two test squares were initiated on this 675 m^2 midden (Figure 5.35), aimed at determining the nature of the deposit (van Schalkwyk, 1994c, p70). Figure 5.36 illustrates the four stratigraphic layers identified to a depth of approximately 105 cm. Three charcoal samples, one each from Layers 2, 3, and 4, were submitted for C^{14} dating (Figure 5.34).

These three dates, in association with the calibrated median date from Grid I, suggest that Wosi was occupied twice, once during the eighth century AD and then again during the ninth century AD, which was further corroborated by the ceramic styles (van Schalkwyk, 1994c, p. 72).

The deposit depth and various cultural horizons at Grid II, shown in Figure 5.37, allowed van Schalkwyk (1991,1994c) to assess changes in ceramic styles over almost two centuries. He

noted that the neck shape of the jar vessels curved everted necks throughout the deposit did not change. However, complete neck decorations were more prevalent in the bottom two horizons and less so in the upper two. Furthermore, lower neck decorations were absent in the lower horizons but increased in the top horizons (van Schalkwyk, 1994c, pp. 76-77). The ceramic from the older two horizons (Layers 3 and 4) was attributed to the Msuluzi phase, while the more recent occupation (Layers 1 and 2) could be ascribed to the Ndondondwane phase.

5.5.5.3 Excavations at Grids III-VI

Four other middens were sampled to determine their association and relationship with the corresponding periods of occupation identified at Grids I and II. The stratigraphy and taphonomy of these middens were contemporaneous with the cultural horizons of Grid I and Layers 1 and 2 of Grid II (van Schalkwyk, 1994c, p. 72).

Excavations at Grid III, a 2 x 3m unit, as seen in Figure 5.38, yielded a small but essential ceramic sample. A circle of packed stone was exposed at 88 cm below the surface. The removal of the purposefully packed stone identified a pit comprised of charcoal flecks and ashy soil. No other material was identified, and it became evident that the pit was purposely filled with hearth sweepings. The ceramic from Grids III-VI was assigned to the Ndondondwane phase (van Schalkwyk, 1991, 1994c).

5.5.5.3.1 Discussion: Wosi

An abundance of varying objects was identified at Wosi, including a large quantity of shell disc beads (n = 1, 742). Many of these beads were made from the giant land snail Metachatina kraussi, suggesting that the environment of Wosi was a closed, wooded habitat, as this species cannot survive in direct sun (van Schalkwyk, 1994c; Voigt & Peters, 1994).

Large quantities of raw and worked ivory throughout all culture horizons at Wosi. The largest quantities of ivory came from the lower levels in Grid II (Coutu et al., 2016; Voigt & Peters, 1994). Unique to Wosi, considerable amounts of talc schist in various forms, including beads, pendants, and bowls, were identified (Figure 5.39). The talk-schist was most likely obtained from a micaceous talc-schist outcrop at the western periphery of the site (see Figure 5.31). This type of soapstone is a highly mailable hydrous magnesium silicate (Woguia et al., 2021), which would have been ideal for several uses in the past, including ceramic decoration and tempering (Giustetto et al., 2013; Kaiser & Kersen, 1989), carving of bowls and jars (Brown, 2018; van Schalkwyk, 1991, 1994c), projectile points for hunting (Cunnar et al., 2009), personal adornment and beads

(van Schalkwyk, 1994c) and cosmetics (van Schalkwyk, 1991). Besides the talc-schist beads, pendants, and bowls, 75% of the excavated talc-schist seem to have been utilized by Wosi's occupants. Many pieces had conical depressions from drilling into the substance, after which parts were removed and grounded into a powder (van Schalkwyk, 1991, p. 98). The presence of such activities and the high mica content in the talc (Rosenstein, 2008; van Schalkwyk, 1991, 1994b, 1994c) supports the postulation that it was used as a shiny talcum powder, possibly for cosmetic uses (van Schalkwyk, 1991, pp. 98-99). Talc deposits are not common (Woguia et al., 2021) in southern Africa; they have been identified at only a few sites in the north (Murphy et al., 1994; Rosenstein, 2008). Therefore, due to its scarcity as a regional resource, excessive production, and varied applicability, talc-schist processing at Wosi was possibly intrinsically linked to a broader trade network. An idea supported by the abundance of ivory at Wosi in the production phase and as finished products (Coutu et al., 2016; van Schalkwyk, 1994c, p. 95).

The ceramic sample from Wosi consisted of 716 vessels and yielded some interesting results. Van Schalkwyk (1994b, 1994c; also see Greenfield & van Schalkwyk, 2008) noted that a clear stylistic transition occurred between the earlier and later occupation of the site. While Msuluzi phase ceramic was identified during the early occupation, a significant change in the ceramic style was noted during the later occupation. The ceramics from the later occupation were similar to the Ndondondwane phase; however, many of the Msuluzi characteristics, such as everted rim profiles, were retained during this later occupation. The change in ceramic decorative style, van Schalkwyk (1994c, p. 94) argues, occurred in situ during the later occupation, as there is no evidence of an influx of new groups of people, and no other shifts were noted in any of the other material culture. This later occupation is especially significant as it shows the interface and amalgamation of two discrete ceramic facies over a short period (van Schalkwyk, 1994c). Similar significant shifts were identified on a much smaller temporal scale at Ndondondwane (Fowler & Greenfield, 2009; see discussion below).

5.5.6 Ndondondwane

Ndondondwane is located on a flat section of the eastern banks of the Thukela River (Figure 5.40). The site is located on deep colluvial soil in savanna bushveld vegetation, typical for most EIA sites in the region (Fowler, 2002; Fowler & Greenfield, 2009; Greenfield et al., 2000; Greenfield & van Schalkwyk, 2008; Loubser, 1993; Maggs, 1984a). Ndondondwane is one of

southern Africa's best-preserved and researched Early Iron Age sites. Its importance is reflected in its Provincial Heritage Site protection allocation (Prins & Hall, 2013). Over the last five decades, Ndondondwane has been studied by several research teams (Fowler, 2002, 2011; Fowler et al., 2000, 2004; Fowler & Greenfield, 2009; Fread, 2007; Greenfield, 1998; Greenfield et al., 1997a, 2000; Greenfield & Miller, 2004; Greenfield & Schalkwyk, 2006; Greenfield & van Schalkwyk, 2003; House et al., 2023; House & Bamford, 2019; Loubser, 1984, 1993; Maggs, 1984a; Malainey, 2000; Singer, 2008; Voigt & Von Den Driesch, 1984; Whitelaw, 2005).

5.5.6.1 The 1978 Excavations

Initial excavations of Ndondondwane were directed by Maggs (1984a) over three weeks in 1978 as part of broader research to understand EIA settlement and subsistence patterns of the region (see Maggs, 1980a, 1980b, 1980c, 1984a, 1984b), Maggs aimed to excavate a site rich in ash deposits, faunal remains, and carbonized plant seeds (1984a, p. 71). Ndondondwane fulfilled these criteria, and over the three weeks, only a small section of the site was excavated (approximately 40 m^2), which yielded a considerable quantity of material culture (Maggs, 1984a). The initial research revealed that Ndondondwane was well preserved, with no erosion or site degradation evident, an issue identified at many other sites (see above). The 1978 excavations occurred on a large midden (termed the Mound area, see Figure 5.41) from which cultural debris associated with various activities (iron smelting, ivory working, and ritual practices) was uncovered (Maggs, 1984a). Through constructing a ceramic typology anchored in radiocarbon dates, Maggs demonstrated that the site consisted of a new ceramic phase within the EIA sequence, which he had begun to map in the Southeastern Lowland region (Mason et al., 1973; Maggs & Michael, 1976), leading to Ndondondwane becoming the name-site for the facies.

Two charcoal samples from the 1978 field season were submitted (Maggs, 1984a, p. 78) and calibrated by Whitelaw and Moon (1996). Pta-2388-1220 ±50 (AD 790-AD 905), with a midpoint of AD 879, was collected among a pile of stones from a depth 50-60 cm below the datum. The Bayesian model in this chapter, illustrated in Figure 5.42, places the date range to AD 771-AD 981(AD 852, median). The second sample, Pta-2389-1190±50 (AD 867-AD 974) with a midpoint of AD 892, was collected from a 40-50 cm depth next to a rich faunal concentration (Maggs, 1984a). The Bayesian model places the date range at AD 775-AD 980 (AD 877, median). Maggs concluded that even though the sample Pta-2389 dated later than the other sample, statistically, they are contemporaneous (Maggs, 1984a, p. 78). Therefore, based on the radiocarbon

dates, stratigraphy, and ceramic sample, Maggs argued that the Ndondondwane was only occupied once for no more "than a few decades" (Maggs, 1984a, p. 78). The initial excavations also yielded large-scale collections of botanical (Maggs, 1984a) and faunal remains (Voigt & Von Den Driesch, 1984), a feat never done before. Realizing the intrinsic value of the site and motivated by the proposed construction of several dams in the Lower Thukela basin, which would flood the valley above 400 meters above sea level, destroying all archaeological sites (Prins & Hall, 2013), further research with more extensive excavations at Ndondondwane was recommended.

As was the case at Ntshekane, Msuluzi, Magogo, and Mhlopeni, Maggs (1984a) applied an abundance matrix to determine variation and similarities between the decorative aspects of the ceramics from Ndondondwane. A total of 89 complete or near-complete vessels were used in his (1984a) analysis.

5.5.6.2 The excavations coordinated by the South African Defence Force

Due to the planned dam construction, the South African Defence Force assigned Jannie Loubser to the KwaZulu Homeland Government, where, under the command of Richard Wade, he would extend Maggs's initial research at Ndondondwane (Loubser, 1984, 1993; Ndlovu & Smith, 2019). Loubser's main aim, through the excavations of an additional 208 m^2, was to extend Maggs' original trenches on the Mound area (see Figure 5.41) and to sample other site regions (Loubser, 1993, p. 109). He identified three additional activity areas and showed that the mound accumulated due to a sequence of activities, including intensive ivory carving, hut construction, and ritualistic practices (Loubser, 1993, pp. 141-142). Loubser (1993) uncovered an accumulation of dung approximately 40 m north of the Mound area through a series of auger samples and test trenches around the Mound area. The dung cluster was about 15 meters in diameter (Loubser, 1993, p. 121). Loubser argued that the dung accumulation (named the Dung area) is evidence of a cattle enclosure, which may have shifted horizontally during the site occupation. To the east of the Mound area, Loubser placed a few test trenches as evidence of daga was noted on the surface. He identified a daga floor and an ash deposit, which he argues were part of a domestic complex (Figure 5.42). Loubser discussed the ceramic and iron smelting remains in detail (see Loubser, 1993). However, in 1983, the South African Defence Force terminated Loubser's term as field director, the reasoning most likely due to Loubser's dislike and abscission of the apartheid regime and his unwillingness to seek out and report African insurgents to the army (van Schalkwyk personal communication, 2018; also see Ndlovu & Smith, 2019) which was the terms of being allowed to

excavate at Ndondondwane. This, furthermore, led to Loubser's imprisonment. After Loubser was imprisoned, research at Ndondondwane was taken over by Richard Wade. He continued excavating in the Dung area and worked there for approximately three months. However, no field notes of his research were ever submitted.

Loubser (1984) combined the 89 ceramic vessels Maggs (1984a) used to analyze the Ndondondwane ceramics with 103 ceramic vessels from his excavations. The 192 vessels were analyzed using the multi-dimensional typology, combining the vessel shape, decoration type, and decoration placement to form complex discrete vessel classes (Loubser, 1984, p. 124).

5.5.6.3 Research by a Canadian Team

From 1995 and 1997, additional excavations were conducted at Ndondondwane, which was followed by an extensive analysis of the material culture recovered during the excavation period (Fowler, 2002; Greenfield, 1996, 1997, 1998, 1999; Greenfield et al., 1997b, 2000, 2005; van Schalkwyk et al., 1997). The recent excavations aimed to collect spatially representative samples from Ndondondwane to test models of intra-settlement socioeconomic interaction (Fowler, 2002; Fowler & Greenfield, 2009). Expanding on the previous excavations, this research investigated different regions on the site (Greenfield 1998, 1999; Greenfield et al., 1997; van Schalkwyk et al., 1997). They were able to confirm that Ndondondwane was indeed a single occupational settlement. These large-scale excavations allowed for two main activity areas to be identified: the central zone, surrounded by an arc of peripheral activity zones (Fowler & Greenfield, 2009) (see Figure 5.41).

The Central Zone is located near the Thukela River and is surrounded at some distance by a semicircle of domestic and distinctive activity zones, extending from north to south (Fowler & Greenfield, 2009, p. 348). The Central Zone is further divided into three activity areas, which are arranged north to south in a line: the livestock enclosure (Dung Area), large hut floor (Transect 1), and a 'specialty' area (Mound Area) (see Figure 5.43 and Figure 5.44) which seems to be reserved for iron smelting, ivory carving, and possible ritual practices (Fowler & Greenfield, 2009, p. 348). To the east of the Central Zone, the Peripheral Zone consists of several activity areas arranged in an arc. The two zones are separated by a vast open space (60-100 meters). The Peripheral Zone comprises three activity areas (Midden 1, 2 and 3) and a fourth possible specialty area used to fire ceramic and prepare charcoal and iron ore for smelting (Fowler & Greenfield, 2009; House et al., 2023; House & Bamford, 2019).

With the large-scale excavations at Ndondondwane, it became possible to untangle the temporal layout of the settlement. Three superimposed stratigraphical cultural horizons were revealed, which extended across the entire Central Zone (Fowler & Greenfield, 2009). These three cultural zones (upper, middle and lower) were sandwiched between a plough zone and a sterile base (see Figure 5.45). Because of the tight spatial-temporal control available at Ndondondwane, Fowler and Greenfield (2009) could discern generational changes through a micro-chronological analysis of the ceramics from the site. Various material cultures recovered from multiple excavations were identified as trade goods. These included ostrich eggshell beads, which Maggs (1984a) noted were not broken during bead production, meaning the beads must have come from somewhere else, a copper bead (Maggs, 1984a) and three pieces of copper wire (Loubser, 1993), which could have been trade items (Coutu et al., 2016).

Furthermore, a substantial quantity of ivory was also recovered in different stages of production. A recent study found that the ivory was obtained from multiple regions and could have been produced for trading (Coutu et al., 2016). Various researchers (Coutu et al., 2016; Whitelaw, 1994b, 2015, 2019a) have argued that Ndondondwane, like Wosi, Ntshekane, KwaGandaganda (see below), and possibly Mamba I, was a political centre in which trade formed an integral aspect of the site's economy and political value.

5.5.6.4 Ceramic Sample

Nearly 50,000 ceramic sherds were collected from the three research projects at Ndondondwane between 1978 and 1997 (Fowler & Greenfield, 2009, p. 364). However, many of these sherds were not included in this analysis, as they had questionable provenience, and it was impossible to discern between individual vessels from many of the sherds accurately. Fowler (2002) reduced the sample to 2,211 complete, near complete, or vessels consisting of the rim, neck and part of the body. For this study, a further 5058 vessels were included. These vessels were insufficient for the small-scale temporal variational studies Fowler and Greenfield (2009) conducted but did suffice for design symmetry analysis. The ceramic apportioning was done based on the site's tight temporal and spatial control associated with the two C^{14} dates.

5.6 **Umgeni River Valley**

The Umgeni River comprises 4 418 km ^{2} and is approximately 257 km long, originating at the uMngeni vlei, a wetland biome around 1,760 m above sea level. From here, the Umgeni catchment moves east, flowing into the Indian Ocean near Durban (Namugize et al., 2018; Van Der Zel, 1975) (see Figure 5.46). Four large dams regulate the flow of the Umgeni River (Midmar, Albert Falls, Nagle and Inanda). The Inanda Dam and its surrounding regions are essential to this study, as it was in 1983 that the Department of Water Affairs requested an archaeological survey of the area where the proposed Inanda Dam would be constructed (Maggs et al., 1984). The subsequent survey identified 24 sites from the Stone Age to the Late Iron Age. Eight of the sites consisted of EIA material. After the initial survey, two more EIA sites were exposed during the early stages of the dam construction (Maggs & Ward, 1986c). The EIA sites pertinent to this study include the Inanda Dam site, KwaGandaganda, Nanda, Inanda Quarry, 2930DB 48, and Inanda Mission Reserve (see Figure 5.46).

The topography around the Inanda Dam is characterized by steep gradients to the north, rising towards the base of the Nanda Mountain. To the south, it is much flatter and drops towards the river in natural terraces (Whitelaw, 1993). The soil of this region ranges from sandy alluvial deposits near the Umgeni River, like that found in the lower Thukela basin, to more clayey soils further afield. The temperature varies greatly, from hot summers to cool winters, with annual rainfall in the region measuring 870 mm, while the vegetation also fluctuates substantially, from KwaZulu-Natal Sandstone Sourveld, Eastern Valley Bushveld, to KwaZulu-Natal Hinterland Thornveld (Mucina & Rutherford, 2006). The region surrounding the Inanda Dam region is characterized by what Moll (1976, p. 52) terms Spirostachya Africana (commonly known as Tambotie) Woodland.

5.6.1 KwaGandaganda

Due to numerous archaeological sites identified during the 1983 survey of the uMngeni Valley, scheduled for flooding with the construction of the Inanda Dam, the Department of Water Affairs agreed to fund a CRM project in the region (Whitelaw, 1994b). Located on a sharp eastern bend of the uMngeni River (Figure 5.47), KwaGandaganda was excavated by Whitelaw (1994a, 1994b) between 1986 and 1989. The use of earthmoving equipment made large-scale horizontal excavations possible (the site was named KwaGandaganda after the Zulu ugandaganda, meaning tractor or bulldozer [Whitelaw, 1994a, p. 5]) before the site was to be flooded by the current Inanda

Dam (see Figure 5.48, highlighting the strips that were excavated by the earth moving machinery). The project's primary aim was to investigate settlement patterns of EIA communities (Whitelaw, 1994a, 1994b). Guided by material culture scatters on the site's surface, Grids 1, 2, 3, 5 and 6, consisting of 2 x 2 m squares, were placed over five of these surface scatters (see Figure 5.49). Grid 4, represented as excavation unit A in Figure 5.50, was placed in a region where animal borrowing brought dung nodules to the surface. Meter-wide trenches (Trenches 1-8) were divided into parts consisting of two to four meters in length (see Figure 5.50), while test squares (TS) 1-77 were excavated in 1 m^2 and placed around various features to establish the boundaries of these features, while squares 1-26 (initially 3 x 3 m) were placed around and between the features to identify other archaeological material below the surface (Whitelaw, 1994a).

Towards the terminal stages of the research, two-wheel dozers were brought in to assist with the excavations. Wheel dozers produced a clear four-meter-wide strip, making identifying artifacts and other materials easier (see Figure 5.51). In the subsequent section, the stratigraphy, C^{14} dates (see Figure 5.52 and Table 5.3), ceramic facies, and their accompanying features will be discussed.

The natural stratigraphy of KwaGandaganda consisted of 20-30 cm of brown topsoil over a red-brown subsoil. A cultural horizon varying in texture, colour, thickness, and depth was discernible between these two natural horizons. The cultural horizon was more complex in specific site sections, consisting of two to three layers. It became apparent that KwaGandaganda was occupied across three EIA ceramic phases, Msuluzi, Ndondondwane, and Ntshekane, while there was also evidence of more recent LIA occupation at the site.

5.6.1.1 The archaeological features at KwaGandaganda

Whitelaw (1994a, 1994b) temporally associated the excavated features across the site with the Late Iron Age, Ntshekane, Ndondondwane, or Msuluzi facies. The LIA data will not be discussed here, as it falls outside the purview of this project.

5.6.1.1.1 Ntshekane features

Several Ntshekane features were identified at KwaGandaganda, including four different types of daga features illustrated in Table 5.4. The spatial organization of these features is shown in Figure 5.53, and Whitelaw (1994a) assisted with identifying the various structures and activities present at KwaGandaganda during this phase. Other features included several pits, ashy middens, artifact concentrations, and slag debris associated with Ntshekane were identified (see Figure

5.53). As shown in Figure 5.53, the ironworking debris from this phase was located at the center of the site (Whitelaw, 1994a, p. 19). Vast quantities of the ironworking remains came from the coarse, dark grey-brown layer of TS 22 and Trench 7 (see Figure 5.54).

A charcoal sample from Square 14 (Wits 1920) was submitted, and the Stuiver and Pearson (1986) calibration curve dated the square to 1080±60 (midpoint of AD 870) (see Table 5.3). The Bayesian model illustrated in Figure 5.52 places the date range to AD 771-AD 1139 (AD 955, median).

5.6.1.1.2 Ndondondwane features

Six Ndondondwane phase byres were identified during excavation (Whitelaw, 1994a). Typical stratigraphy of this phase's features is shown in Figure 5.55. The brown topsoil was void of any archaeological material, while at specific parts of the site, the coarse, dark, grey-brown layer yielded Ntshekane features (TS 22; Grid 3, and Trench 7). However, at Grid 4, this specific layer yielded few artifacts. The light-grey dung layer comprised cattle dung, while the red crust below exposed a few artifacts (Whitelaw, 1994a, pp. 19-20). The presence of Byre 1, first identified in Grid 4, is illustrated in association with surrounding features in Figure 5.56. Subsequent excavations of Byre 1 exposed several other features, including a cylindrically shaped pit, multiple channels, which most likely supported wooden palisades, and or screens during this period of occupation (Whitelaw, 1994a, p. 23; see Figure 5.56). A midden and hearth adjacent to Byer 1 were also exposed. Similar adjoining ashy middens were also identified at Byre 5, 7, and 9 (see Figure 5.57). The ceramics recovered from the Byres, as would be expected, were highly fragmented, which limited the temporal information that could be extrapolated from them (Whitelaw, 1994a, p. 24). However, Whitelaw (1994a) could still identify some tentative chronological ordering. The dung layer at Byre 1, across several squares, yielded multiple sherds that could be either placed in the Msuluzi or Ndondondwane phase. However, Whitelaw (1994a, p. 24) noted that when the Dung layer across the entirety of Grid 4 is considered, more Ndondondwane phase ceramics, and therefore more Ndondondwane features than Msuluzi phase ceramics are present. The opposite pattern was noted with the content of the Red Crust layer, where more Msuluzi phase ceramics were identified. Byres 3, 4, and 6 have a high probability of being contemporaneous with Byre 1, based on the stratigraphic layout between these features. Ndondondwane ceramic was recovered from the Dung layer in Square 2 (Byre 3). In contrast, the Brown layer above yielded Ntshekane ceramic, and the layer below was identified as ceramic

belonging to the Msuluzi phase (Whitelaw, 1994a, pp. 24-25). This chronological ordering was present at the test squares surrounding Square 2, including Byre 6. Figure 5.57 highlights how the use of space during this occupational horizon changed, where Ndondondwane-type ceramics covering the Dung layer of Byre 3 in TS19, 21, and 22, which places an upper limit on the date of the byre (Whitelaw, 1994a, p. 25). Further evidence of this was seen at Grid 3, where at Square F5 (see Figure 5.58a) intersecting dung spreading from Byre 3 and sandwiched between a Ntshekane level and Msuluzi midden (Whitelaw, 1994a, p. 25). The boundaries of the dung deposit in Grid 3 were found between sections F5 and H6 (see Figure 5.58). In TS6 (Figure 5.59), the ceramics found below the dung in the ashy deposit belonged to the Msuluzi phase, which points to Byre 4, where ceramics were either Ndondondwane or Msuluzi, most likely dating to the Ndondondwane or terminal Msuluzi phase (Whitelaw, 1994a, p. 25). Byre 7 did not yield enough ceramic for accurate dating, but Whitelaw (1994a, p. 25-26) argued it most likely dated to the late Msuluzi phase, based on stratigraphic relationships between features. Various middens, iron-working debris, and daga features were also identified. At Grid 2, especially at squares D3, D4, and E6, ashy midden deposits were uncovered rich in ceramics, slag, worked bone, shell disc beads, and tuyeres. Here, the ceramics date the features to the Ndondondwane occupational period, but the possibility that the deposits terminated at a transitional period between Ndondondwane and Ntshekane based on the decorative styles of some of the ceramics remains a strong possibility (Whitelaw, 1994a, pp. 29-30). Underneath this midden, at least six Ndondondwane phase pits were uncovered. Pits 2, 4, and 6 in Grid 6 were dug into a mostly Msuluzi midden (see Figure 5.60).

Two charcoal samples from Square 22 (Wits 1919 and Wits 1937) were submitted, and the Stuiver and Pearson (1986) calibration curve dated the square to 1245±60 (midpoint of AD 705) (Wits 1919 (see Table 5.3) and 1260±60 (midpoint of AD 690) (Wits 1937). The Bayesian model illustrated in Figure 5.52 places the date range of Wits 1919 to AD 678-AD 960 (AD 819, median). Wits 1937, dated to AD 680-AD 964 (AD 822).

5.6.1.1.3 Msuluzi features

A large Msuluzi phase midden at Square 25 (see Figure 5.61 and Figure 5.62) was excavated and yielded substantial well-preserved Msuluzi-type ceramics. A mound covering an area of approximately 400 m^2 and 90 cm deep stretched across the midden at Square 25. Initially, 9 m^2 of the midden was excavated, with a further 9 m^2 of the midden removed at a later stage. The latter units were labelled C7, E10, E11, etc., and TS51, as shown in Figure 5.61 (Whitelaw 1994a,

p. 32). The stratigraphy of the midden (see Figure 5.61) suggests that the refuse in the midden accumulated rapidly (Whitelaw, 1994a, p. 32). Well-preserved Msuluzi ceramic and faunal remains uncovered, further suggesting a rapid accumulation of refuse. Five Msuluzi phase pits were identified, of which three (Pits 1,3 and 5) were found below the midden in Grid 6 (see Figure 5.60 and Figure 5.62), while four possible byres shown in Figure 5.62 associated with the Msuluzi occupational period of the site were also identified.

Two charcoal samples from Square 25 (Wits 1918 and Wits 1938) were submitted, and the Stuiver and Pearson (1986) calibration curve dated the square to 1395±60 (midpoint of AD 555) (Wits 1918 (see Table 5.3) and 1315±60 (midpoint of AD 635) (Wits 1938). The Bayesian model illustrated in Figure 5.52 places the date range of Wits 1918 to AD 605-AD 875 (AD 740, median). Wits 1938, dated to AD 662-AD 890 (AD 776, median).

5.6.1.2 KwaGandaganda Ceramics

The ceramics were used to temporally situate the various features on the site. Based on vessel classes identified at the site (Huffman, 1980), the ceramics were placed in either Ntshekane (Square 12 and 14), Ndondondwane (Square 22) or Msuluzi (Square 25). Thus, these features and ceramic sequences became a baseline for comparing ceramics with other features.

Based on various characteristics, sherds that were insufficient to be assigned to a vessel class could be allotted to the three EIA ceramic phases.

5.6.1.2.1 Ntshekane sherds

Sherds associated with this phase were relatively easy to identify through the presence of the characteristic straight or inturned necks. However, the same diagnostic characteristics were not discerned with Msuluzi and Ndondondwane sherds, as accurate vessel profiles were not distinguishable from these facies on small sherds. The decorative motifs from Ntshekane were identifiable based on their intricate and refined application compared with especially Msuluzi vessels. The motif types amongst Ntshekane sherds were dominated by hatching and cross-hatching bands. It was possible to assign sherds to this facie based on characteristic Ntshekane motifs, “bands of apposed hatching without intervening grooves,” as identified by Maggs and Michael (1976, p. 716).

5.6.1.2.2 Msuluzi and Ndondondwane ceramics

Bowl sherds of Msuluzi and Ndondondwane ceramics were impossible to distinguish from one another but easily separated from Ntshekane bowls, which were characteristically open-shaped.

However, distinguishing between Msuluzi and Ndondondwane phase ceramics was particularly cumbersome because all the Ndondondwane vessel classes also occurred amongst Msuluzi vessel classes. A key, albeit not foolproof, characteristic which can assist in distinguishing between Msuluzi and Ndondondwane facies is the shift of decoration placement from complete and upper neck decoration on Msuluzi jar vessels to decoration occurring on the lower half of the neck during the Ndondondwane phase (Whitelaw, 1994a; Maggs, 1980c, 1984a). However, as stated by Whitelaw, "this is not a reliable indicator when there are few sherds" (Whitelaw, 1994a, p. 17).

The decoration on Msuluzi vessels is more complex than amongst Ndondondwane sherds, and shoulder and body decoration occurred less frequently on Ndondondwane vessels at KwaGandaganda.

5.6.1.3 Discussion: KwaGandaganda ceramics

The above discussion regarding apportioning decorated ceramic sherds into various phases highlights an imperative limitation of current analytical methods to place ceramics into more nuanced temporal and spatial parameters. This is an issue at most multi-occupational (persistent places) sites in southern Africa (e.g. Maggs, 1980a,1980b, 1980c, 1984a; Whitelaw, 1996). I argue that this limitation can be overcome through an apportioning method first introduced in Southwestern archaeology (see Chapter 4 Apportioning of ceramics).

To date, the excavation of KwaGandaganda is one of only a couple of excavations on a large scale of EIA sites in southern Africa, the other being Ndondondwane. Thus, this allows for substantial interpretations of the data gathered at KwaGandaganda. The radiocarbon dating, stratigraphy, and ceramic sequences, Whitelaw (1994a, 1994b) argued, are evidence that KwaGandaganda was occupied continually for a substantial period, from the seventh to the end of the tenth century AD.

The Ndondondwane and Ntshekane features exposed and mapped during the excavation show that the village was occupied uninterruptedly throughout both phases (see Figure 5.63 and

Figure ***5.64***). Furthermore, the cattle dung, middens and ironworking residues associated with the Msuluzi phase of the village demonstrate a layout similar to that of the Ndondondwane and Ntshekane phases. Evidence of substantial overlap between the Msuluzi, Ndondondwane, and Ntshekane central zones showed negligible shifts in the village layout. For the duration of the village occupation, the structure remained 'fixed' (Whitelaw, 1994b, p. 42). Therefore, most archaeological remains at KwaGandaganda should be treated as a single village, which merely shifted as the population density increased and decreased (Whitelaw, 1994b). Whitelaw (1994b) argues that the layout of the village is best understood through the Central Cattle Pattern (CCP) model (see

Figure ***5.64***).

A critical contribution of the research at KwaGandaganda was a shift in EIA societies' economic and political understanding. It has been argued that EIA communities were socially, economically and politically independent (Hall, 1984; Maggs, 1984a). However, Whitelaw's research at KwaGandaganda shows this might not have been the case for all EIA villages. The continuous long-term occupation of sites such as KwaGandaganda and Ntshekane is a feature associated with chiefly settlements (Coutu et al., 2016; Whitelaw, 1994a, 1994b, 2019; Whitelaw & Hall, 2016). Such sites would usually comprise a wide range of features and deposits, such as pits, granaries, cattle pens, and middens (Whitelaw, 2019a, p. 162), as was the case at KwaGandaganda. The fixed spatial layout, Whitelaw argues, with the gradual shift shown in Figure 5.63 and

Figure ***5.64*** in the south and east was due to succession within the ruling line (Whitelaw, 1994b), while the rapid accumulation and size of the main Msuluzi phase midden is characteristic of political capitals rather than mere homesteads. Large quantities of elephant ivory at KwaGandaganda made into bangles and armlets have been argued to be further evidence for KwaGandaganda being politically and economically more important than other EIA sites in the Southeastern Lowland. Ivory has only been found at Wosi and Ndondondwane (Coutu et al., 2016). Large quantities of 'foreign' objects, such as ostrich-eggshell beads, a marine shell from more than 300 km away, copper objects which might have come from the copper-rich Limpopo region, and a glass bead and an Islamic sherd, can point to the important status of KwaGandaganda.

For this study, 4158 vessels were analyzed, following Whitelaw's (1994a, 1994b) ceramic analysis with the site's C^{14} dates and stratigraphy; the ceramics were apportioned into 100-year slices.

5.6.2 Nanda

Similar to KwaGandaganda, Nanda was first recorded in 1983 as part of an archaeological survey (Maggs et al., 1984) and excavated in 1986 by Whitelaw (1993). Located three kilometres east of KwaGandaganda (see Figure 5.65) on the northern bank of the uMngeni River, Nanda was flooded due to the construction of the Inanda Dam in 1989 (see Figure 5.43). Unlike many other EIA sites, Nanda was not plagued by erosion; however, determining the site's boundaries and features could not be accurately determined (Whitelaw, 1993).

As shown in Figure 5.66, excavations at Nanda occurred at three different sectors of the site. The eastern excavations were launched after Mzonjani phase ceramics were identified during the 1983 survey. The eastern excavations will not be discussed here as the recovered ceramics fall outside the scope of this study (see Whitelaw & Moon, 1996 for a discussion on the eastern excavations of Nanda). The other two excavation units were concentrated on the central and western parts of the site (see Figure 5.66). Trenches were placed where artifact scatters were visible, around, and between various features to determine the site's layout (Whitelaw, 1993). These trenches were numbered 1-16, except Trench 3, which became Grid 3 and Trenches 6 and 7, amalgamated with Trench 4. A further 40 test squares (TS 1-40) were positioned around and between the trenches aimed at understanding the site's layout (Whitelaw, 1993, 1994b) (see Figure 5.66).

Four discrete types of stratigraphy were identified during the central excavation of the site. Type one consisted of a brown soil top layer 20 to 30 cm thick, followed by a lighter brown to reddish-brown layer, and was identified at TS 3, 4, 12, 13, 16-31, 39,40, and Trenches 5, 8-11. 14, 15 and parts of Trench 4 (Whitelaw, 1993, p. 49) (see Figure 5.66 and Figure 5.67).

The second type of stratigraphy was a 20-30 cm layer of brown topsoil, followed by light brownish-grey sand and reddish subsoil and was noted in TS5-10, 14, 15, 32 and 33.

The third stratigraphy type consists of four horizons: brown topsoil 0-30cm deep, red-grey ashy soil between 30 and 50 cm deep, fibrous ash-grey soil at 50-85 cm, followed by a red-brown subsoil. The last stratigraphy type consists of shallow light brown soil over cloddy yellow-brown earth (Whitelaw, 1993, pp. 49-52).

Research at the western section of the site consisted of two excavated trenches (see Figure 5.65). Trench 1 was excavated to inspect a rich scatter of sherds in a ploughed field, 18 m long and divided into nine two-meter-long units (H1-H9). The stratigraphy was grey-brown, sandy soil from 0-35 cm; dark brown, sandy soil between 35-55 cm; and archaeologically sterile orange sand (Whitelaw,1993). Two pits were identified in Trench 1, and a charcoal sample (Wits-1917) collected below 45 cm dated the feature to 1275 ±60 (AD 746, median). The Bayesian model illustrated in Figure 5.68 places the date range of Wits 1917 to AD 669-AD 966 (AD 818, median).

During the excavation, several pits, human burials with dental alterations (Morris, 1993), a cattle byre, middens, and the remains of a raised granary were identified. Whitelaw (1993) argues that the data from Nanda, similar to that at KwaGandaganda, supports the CCP model.

5.6.2.1 Ceramic sample

The ceramic sample from Nanda was analyzed based on a multi-dimensional typology (Huffman, 1980). The results in association with the C^{14} date place Nanda during the Msuluzi phase between the seventh and early eighth century AD; however, it was most likely also occupied at an earlier date and possibly during the LIA. A total of 873 ceramic vessels were used in the sample from Nanda for this study.

5.6.3 iNanda Dam Site

In 1985, during the construction of the Inanda Dam wall, large earthmoving machinery exposed an EIA site on the southern bank of the uMngeni River. The site was identified, recorded and excavated by Michael Moon, an amateur archaeologist, before further earthmoving eradicated the site (Maggs & Ward, 1986). The site comprised one large pit (Pit 1), whose edge was exposed by earthmoving machinery (Figure 5.69). The pits exposure also revealed the presence of five other small pits. Evidence of iron-smelting activities occurring at the site was found to the east of the pit (see Figure 5.69).

Maggs (Maggs & Ward, 1986) analyzed 37 vessels that Moon recovered.

Based on the analysis and a single C^{14} date (Pta-4303, AD 745, median), the site was dated to the mid-sixth century AD (see Figure 5.70). The Bayesian model illustrated in Figure 5.68 places the date range of Pta-4303 to AD 670-AD 886 (AD 778, median).

Most of the collected ceramic was assigned to the Msuluzi phase; however, two Ntshekane phase pots were also identified (Maggs & Ward, 1986c). The ceramic sample for this study comprised 77 ceramic vessels.

5.6.4 Inanda Quarry

Inanda Quarry was located on the eastern bank of the Umgeni River, 14 km from the Indian Ocean. Large-scale quarries near the uMngeni River destroyed a large section of the site; however, several *in situ* archaeological features were identified at the edge of the quarried area. Erosion at a different part of the site revealed ceramics belonging to both the Msuluzi and Mzonjani phases. Smelting debris and four pits were among the features identified. Pits 1 and 4 contained Msuluzi phase ceramics and occurred in large amounts of smelting debris, including vitrified and unvitrified furnace-wall blocks, tuyere fragments and slag (Whitelaw & Moon, 1996, p. 55).

Charcoal (Pta-5492) was recovered from Pit 3 and was dated to AD 524 (median). The Bayesian model illustrated in Figure 5.71 places the date range of Pta-5492 to AD 417-AD 635 (AD 526, median). The ceramic sample for this study comprised 59 ceramic vessels.

5.6.5 2930DB 48 & Inanda Mission Reserve/Bridge site/2930DB 48 Extension

DB 48 is located only a few km north of the Inanda Quarry site, on a slope of a hill east of the Umgeni River. The ceramics recovered from the site were placed within the Ntshekane, Msuluzi, and possibly Mzonjani phases, with many of the ceramics being part of the Msuluzi phase and only a few vessels being ascribed to the Ntshekane phase. Five pits and burial were recovered, shell-disc beads and Brown mussel shells. The presence of the Msuluzi phase ceramics dates the site relative to the late seventh or eighth century AD (Whitelaw & Moon, 1996, pp. 56-57) (Figure 5.72).

This study included 50 ceramic vessels. It excluded all ceramic vessels falling outside the Msuluzi sequence or whose provenance could not be accurately determined.

5.7 Coastal Belt

The coastal belt of Kwazulu-Natal stretches from near Mtunzini in the north via Durban and Margate and ends close to Port Edwards in the South. The altitude of the KwaZulu-Natal Coastal Belt ranges from 20 to 450 m above sea level (Mucina & Rutherford, 2006, p. 578) and consists of highly dissected rolling plains, which sub-tropical coastal forests would have covered during the first millennium AD (Hall, 1980, 1981; Horwitz et al., 1991; Maggs, 1980b; Moll, 1976; Neumann et al., 2012). However, the area is mainly covered by sugarcane fields, timber plantations, and coastal holiday resorts (Mucina & Rutherford, 2006). For this study, the coastal

belt comprises the section between the Lower Thukela and the uMngeni Rivers (see Figure 5.1). Five EIA sites from this region were included in the analysis: Emberton Way, Mhlanga Lagoon, Shrimp Lane, Sinkwazi, and Glen.

5.7.1 Emberton Way

Emberton Way is a shell midden site on the northern coast of KwaZulu-Natal on the outskirts of the coastal town Ballito north of Durban (see Figure 5.3), no more than 100 meters from the shoreline when recorded and excavated by Horwitz, Maggs and Ward (1991). Excavations were launched at the site in the mid-1980s when it became known that it would be destroyed due to regional residential developments.

As illustrated in Figure 5.73, an area of 400 m^2 was cleared of vegetation, after which a grid marked in 1 m^2 square was positioned. An area of 16 m^2 was excavated. The site's deposit, shown in Figure 5.74, stretched approximately 1,5 meters deep, and four relatively discreet layers could be identified.

Layer 1 consisted of four spits 40 cm thick. The deposit was dark-brown to black soil and included high volumes of fragmented shells. Various pits were identified in this layer; however, it is believed that the pits were formed through recent construction activity. Due to the substantial disturbances identified in the layer, no charcoal samples were collected for dating purposes. The ceramic recovered here was attributed to the EIA and LIA, which was further evidence of disturbances.

Layer 2 incorporated five stratigraphic features (White Shell Spit1, White Shell Spit 2, Brown Shell Spit 1, Clay Lens, and a Fake Clay Lense (see Figure 5.74). The boundary between Layers 1 and 2 was visible in the stratigraphy, while Layer 2 comprised a high concentration of shell. Several hearths in association with ceramic were identified in this layer. Charcoal associated with a hearth was collected from this layer, from which two radiocarbon dates were obtained: Pta-2879, 1050 ± 60 BP (AD 1001, median). The Bayesian model illustrated in Figure 5.75 places the date range of Pta-2879 to AD 890-AD 1328 (AD 1109, median).

The second radiocarbon date, Pta-2880, 1130 ± 40 BP (AD 967, median), was collected from the base of Layer 2 (Horwitz et al., 1991, p. 5). The Bayesian model illustrated in Figure 5.75 places the date range of Pta-2880 to AD 882-AD 1309 (AD 1096, median).

Layer 3 was excavated as a single unit named Brown Shell Spit 2. The deposit in this layer was darker than the overlying Layer 2 but became lighter towards the base. Towards the southern

part of the site, the division between Layers 3 and 4 became less clear, with evidence of possible admixture and merging occurring between the two deposits. A third radiocarbon date was obtained from a charcoal sample (Pta-2881) collected in Layer 3 and dates to 1270 ± 60 BP (AD 746, median). The Bayesian model (see Figure 5.75) places the date range of Pta-2881 to AD 681-AD 1237 (AD 959, median).

Layer 4 comprises deposits of sandy soil from yellow to white, with small beach pebbles, some shells, and a small quantity of ceramic, but no charcoal.

Evidence that Emberton Way was covered by coastal dune forest during its occupation(s) comes from numerous female cysts of the genus Margarodes insects, which feed on plant root sap, found throughout Layers 1 to 3. These egg-shaped cysts are resistant to decay and indicate the type of vegetation present in the region during the first millennium (Horwitz et al., 1991).

During the initial stages of analysis, especially the refitting of ceramics and the material from the site, it became clear that a much larger degree of disturbance throughout the site was present. A Mzonjani phase vessel, for instance, was reconstructed from nine sherds at the base of Layer 4, three sherds from the base of Layer 3 and a single sherd in the top section of Layer 1. Because of such extensive disturbance, the authors decided to subdivide the ceramic assemblage only on a typological basis and then compare this subdivision with the stratigraphy provenance of the assemblage to see any inconsistencies. They found that, broadly, there is a correspondence between stratigraphy and typological phases. However, there was also some overlap at each stratigraphic interface (Horwitz et al., 1991, p. 7). Thus, the ceramic vessels were subdivided into four ceramic phases of the EIA (Mzonjani, Msuluzi, Ndondondwane, and Ntshekane) and the LIA based on typological grounds established from other excavated sites in the region. This method was also used with the unexcavated ceramic at the Mhlanga Lagoon site.

Emberton Way was the first excavated site in the Southeastern Lowlands, comprising four expressions of the EIA and LIA ceramic (Horwitz et al., 1991, p. 8). The ceramic assemblages, stratigraphic data, and radiocarbon dates show that the site was occupied for at least five distinct periods; however, it is possible that during the site's lifespan, there might have been periods when it was not in use.

Interestingly, the authors have identified some EIA vessels from the site that share Msuluzi and Ndondondwane characteristics, which they call the Msuluzi/Ndondondwane phase. The differences between these two phases are not always clearly divined, compared with Mzonjani and

Ntshekane assemblages (Horwitz et al., 1991, p. 9). The two phases also share several attributes. Only one Ostrich Eggshell bead was found at Emberton Way from Layer 2. Many stone manuports in the form of round cobbles, some showing signs of being used as hammerstones, were found throughout Layers 1 to 4. Many of the larger cobbles indicated heat spalling, which is indicative of being used as firestones, while only two grindstones were found throughout the entire site. The grindstones showed very little evidence of griding, with only the protruding portions of the surface being flattened. The paucity of grindstones suggests that agricultural activities, such as grinding foods, were not practiced at Emberton Way (Horwitz et al., 1991, p. 16). Most of the faunal assemblage comprised mollusc shells, whereas remains from fauna other than shellfish were rare and only recovered from Layers 1 and 2. Only 124 pieces of fauna from terrestrial animals were found throughout the excavation. The ceramic sample from Emberton Way was comprised of 96 ceramic vessels.

5.7.2 Mhlanga Lagoon

The Mhlanga Lagoon is a shell-midden site located on the north bank of the Mhlanga River on the northern coast of KwaZulu-Natal (see Figure 5.3). The site has been steadily eroding due to the northward migration of the Mhlanga River, with a large section of the site washed away after various floods in the 1980s. The midden most likely was extensive, as in 1974, it was noted to be 19 meters in length and 2 meters thick, comprising layers consisting of Brown Mussel shells (Perna Perna) layers, hearths and several ashy layers (Horwitz et al., 1991; Schoute-Vanneck & Walsh, 1959, 1960). No excavations occurred at Mhlanga Lagoon, with Horwitz, Maggs and Ward (1991) only collecting ceramic from the slip and river's edge. The collected ceramic belonged to the same phases (Mzonjani, Msuluzi, Ndondondwane, and Ntshekane and an unknown LIA phase) from Emberton Way and exhibited similar attributes. A single radiocarbon date, Pta-3268, 1080 ±70 BP (AD 917, median), was collected from an in situ part of the midden, 90-100 cm below the surface and approximately 5 cm above a Msuluzi/Ndondondwane phase sherd (Horwitz et al., 1991). The Bayesian model (see Figure 5.76) places the date range of Pta-3268 to AD 780-AD 1516 (AD 1148, median). A decoration technique different from what was previously recorded at other EIA in the region was identified among the Ntshekane vessels from Mhlanga Lagoon, namely rocker-stamping. A total of 104 vessels were included in this study.

5.7.3 Shrimp Lane

Shrimp Lane was excavated as part of a Cultural Resource Management project by eThembeni Cultural Heritage. Shrimp Lane is a shell-midden site on the southeastern coast of KwaZulu-Natal, approximately 40 km north of Durban (Middleton, 2010). Excavations were conducted in six trenches, each in spits of 10cm. Like Emberton Way and Mhlanga Lagoon, Shrimp Lane comprises Mzonjani, Msuluzi, Ndondondwane, Ntshekane ceramic, and an unknown LIA phase. A total of 46 vessels were included from Shrimp Lane for this study.

5.7.4 Sinkwazi (Zinkwazi) and Glen Sites

The Sinkwazi shell midden is approximately 100 kilometres north of Durban. The site was identified by Chubb and King (1932a, 1932b). They collected ceramic and faunal material from the site's surface. Similarly, Chubb and King also collected a ceramic sample from the shell-midden site Glen, located close to Mhlanga Lagoon, south of Durban.

5.8 Chapter Summary

This chapter introduced the 24 Early Iron Age sites and their accompanying ceramic samples, which made up the data for analyzing the design symmetries of decorative ceramic vessels from the Msuluzi sequence. A few critical implications from the discussion of the sites and their previous research will be briefly mentioned here, as they form key tenants in the succeeding chapters.

At many of the sites mentioned in this chapter, it became evident that there are difficulties in accurately decerning between ceramics belonging to the Msuluzi and Ndondondwane facies. Such difficulties led Maggs (Horwitz et al., 199, pp.9-12) to establish a transitioning phase called the Msuluzi/Ndondondwane phase. Such difficulties, I argue, are due to the analytical methods used, which are created to identify large-scale variations and not changes or similarities on smaller scales. Therefore, as discussed in the following chapters, applying alternative analytical procedures could assist in alleviating such difficulties. Many of the sites discussed in this chapter, including Wosi, Ndondondwane, KwaGandaganda, and Ntshekane, yielded various "trade goods" such as ivory, talc-schist, and beads. The presence of such trade goods at some sites but not others is due to these sites being political capitals which played important political and economic roles in the region. The following chapters will further test these notions by applying Social Network

Analysis. In the following chapter, the results of the design symmetry from the various sites and ceramic samples discussed here will be presented.

Table 5.1 List of Early Iron Age sites, their total ceramic vessels analyzed, the geographical region within the Southeastern Lowlands, ceramic facies, radiocarbon

Site Name	Ceramic Vessels (n)	Region	Ceramic facies[a]	C^{14} Age bp (mu)	C^{14} Age bp (sigma)	C^{14} Age bp (Median)
Nsundukazi[b]	4	Lower Thukela	Ndo.	not dated	–	–
ShuShu Hot Springs	28	Lower Thukela	Ndo.	not dated	–	–
Nsuze West	72	Lower Thukela	Msz., Ndo.	not dated	–	–
Mamba II	53	Lower Thukela	Msz.	not dated	–	–
Mamba I	122	Lower Thukela	Ndo.	816	55	823
Wosi	716	Lower Thukela	Msz., Ndo.	777	48	789
Ndondondwane	7269	Lower Thukela	Ndo.	864	58	865
Mandendleni[c]	4	Lower Thukela	Ndo.	not dated	–	–
Inanda Dam site	77	uMngeni	Msz., Ndo., Nth.	744	30	745
KwaGandaganda	4158	uMngeni	Msz., Ndo., Nth.	828	46	831
Nanda	873	uMngeni	Mz., Msz.	746	32	746
Inanda Quarry[e]	50	uMngeni	Mz., Msz.	519	59	524
2930DB 48[g]	103	uMngeni	Msz., Ndo., Nth.	not dated	–	–
Hilltop Site[d]	3	uMngeni	Mz.	not dated	–	–
Magogo	574	Upper Thukela	Msz., Ndo.	785	40	791
Mhlopeni	38	Upper Thukela	Msz.	737	34	749
Ntshekane	584	Upper Thukela	Msz., Ndo., Nth.	965	43	969
Msuluzi	360	Upper Thukela	Msz.	742	30	748
Glen[f]	13	Coastal	Mz., Msz., Ndo.	not dated	–	–
Sinkwazi	14	Coastal	Mz., Msz., Ndo.	not dated	–	–
Mhlanga Lagoon	104	Coastal	Msz., Ndo., Nth.	918	68	917
Emberton Way	96	Coastal	Msz., Ndo., Nth.	902	44	905
Shrimp Lane	46	Coastal	Mz., Msz., Ndo., Nth.	not dated	–	–
Total vessels	15361					

Note. The C14 dates presented here are based on a Bayesian Model (see Appendix I for the code used). [a] Mz.=Mzonjani, Ndo.=Ndondondwane facies, Msz.=Msuluzi facies, Nth.=Ntshekane facies [b, c, d, f] These four sites (Nsundukwazi, Mandendleni, Hilltop, and Glen) were excluded from the overall results, as their provenance could not be accurately ascertained. The sample size was also deemed as being too small.
[e] The C14 date from the Inanda Quarry site does not fall within the Msuluzi Sequence. However, the site was still included as a later ceramic phase (Msuluzi) was also identified. [g] Site 2930DB 48 also goes by the name of Inanda Mission Reserve.

Figure 5.1 Map of the Southeastern Lowland study area, highlighting the four geographical regions. Adapted from Fowler, 2006, Fig. 1

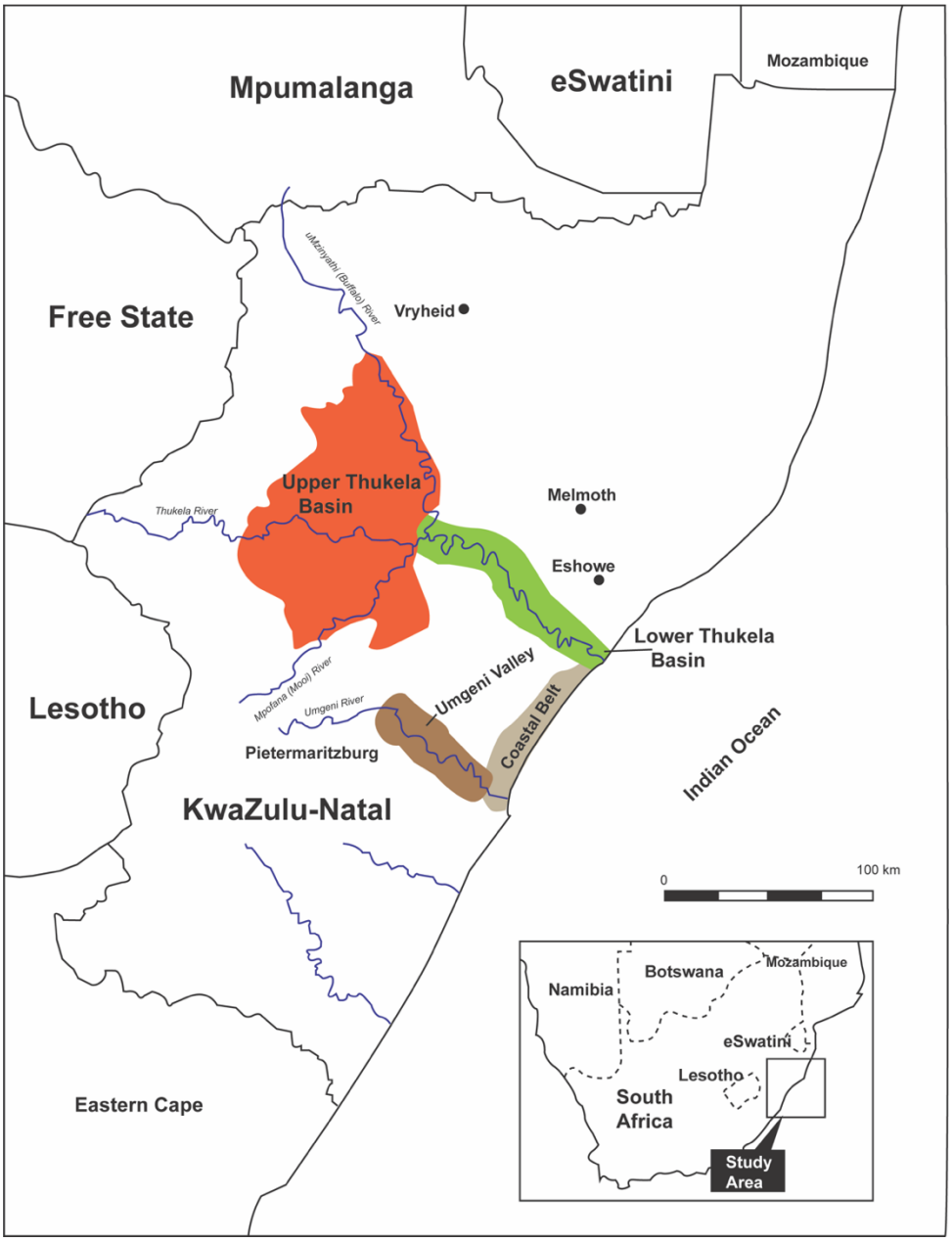


Figure 5.2 Msuluzi Ceramic Sequence. Adapted from Huffman, 2007, Table 16.7

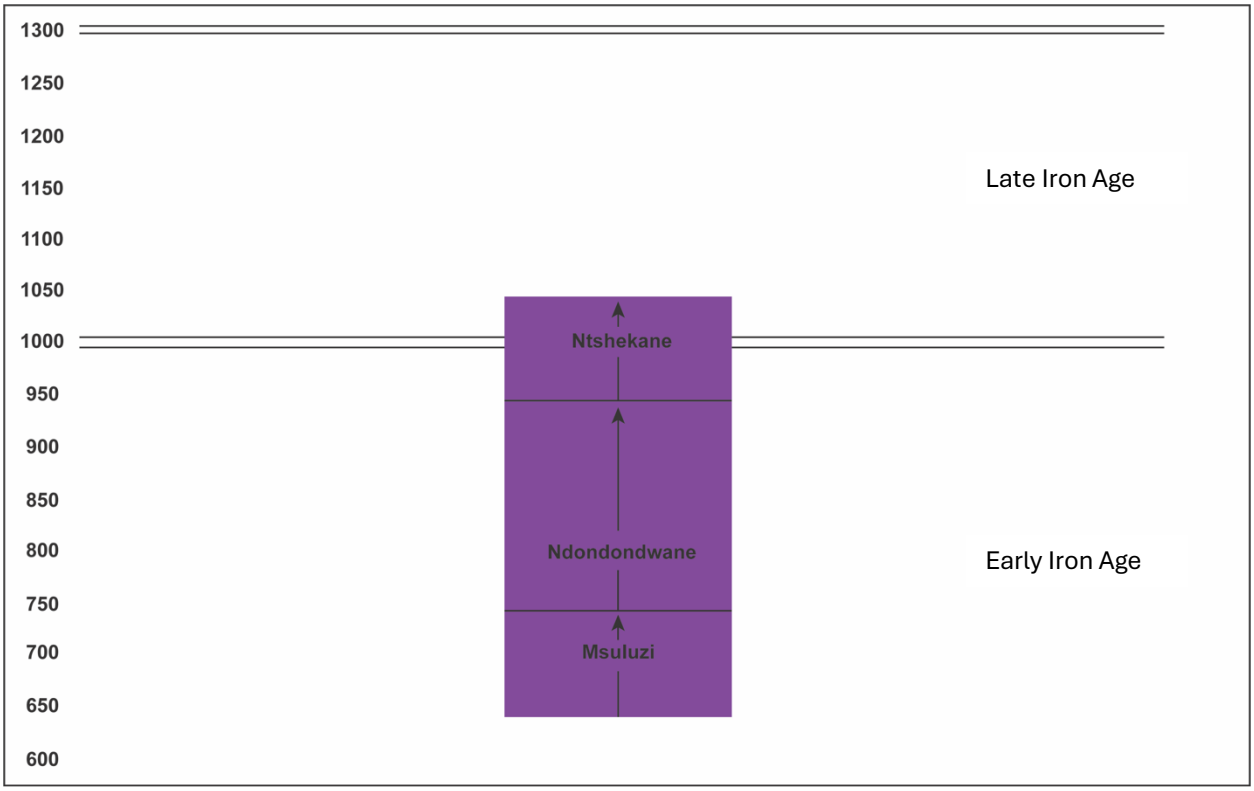


Table 5.2 The distribution of the ceramic sample across the four ecozones of the study area.

Region	n	rel.freq. %
Lower Thukela	8295	54
iNanda Valley	5264	34
Upper Thukela	1556	10
Coastal	246	2
Total	15361	

Figure 5.3 Early Iron Age sites and rivers mentioned in this chapter

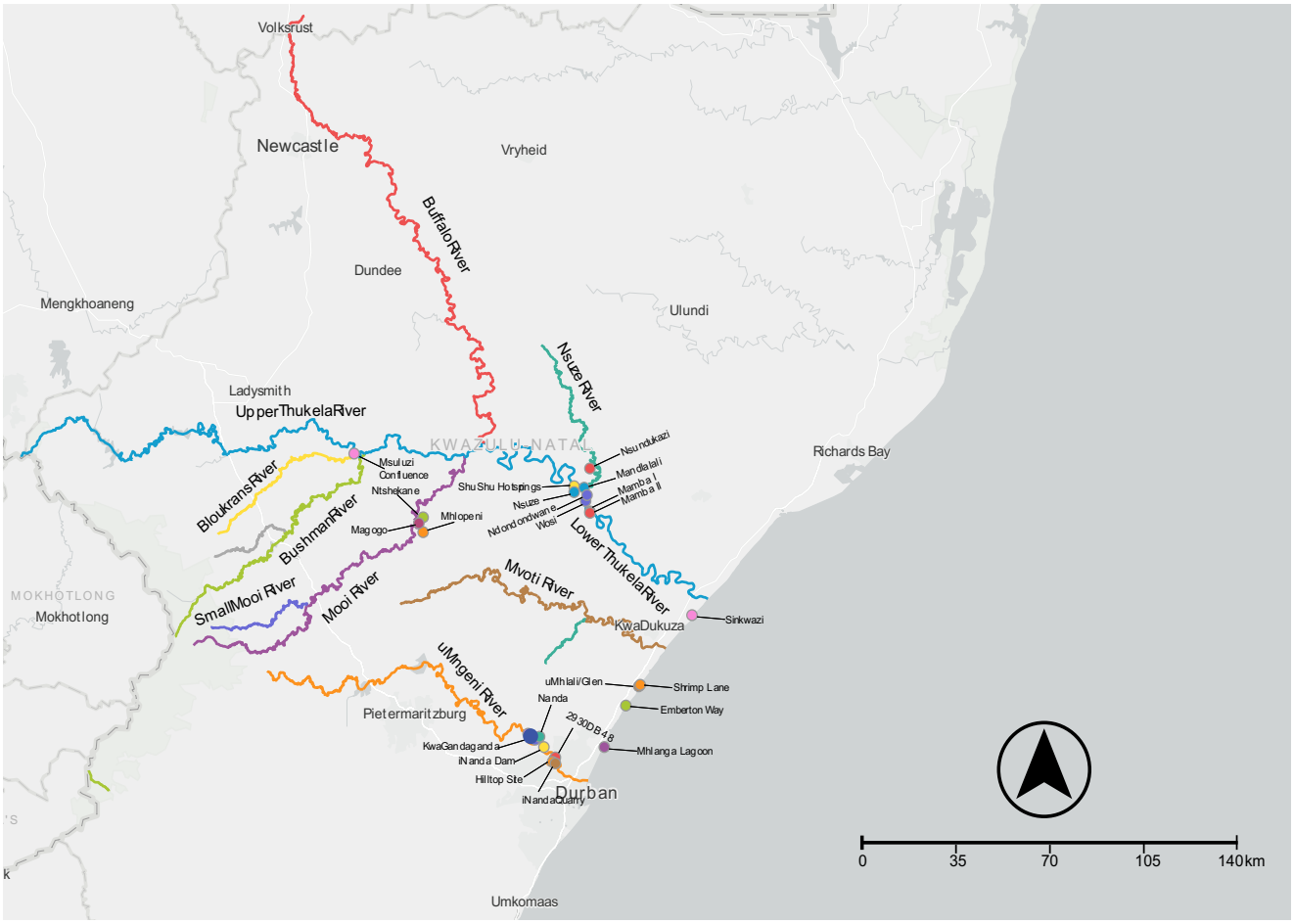


Figure 5.4 Bayesian radiocarbon model #16 of sites discussed in this chapter

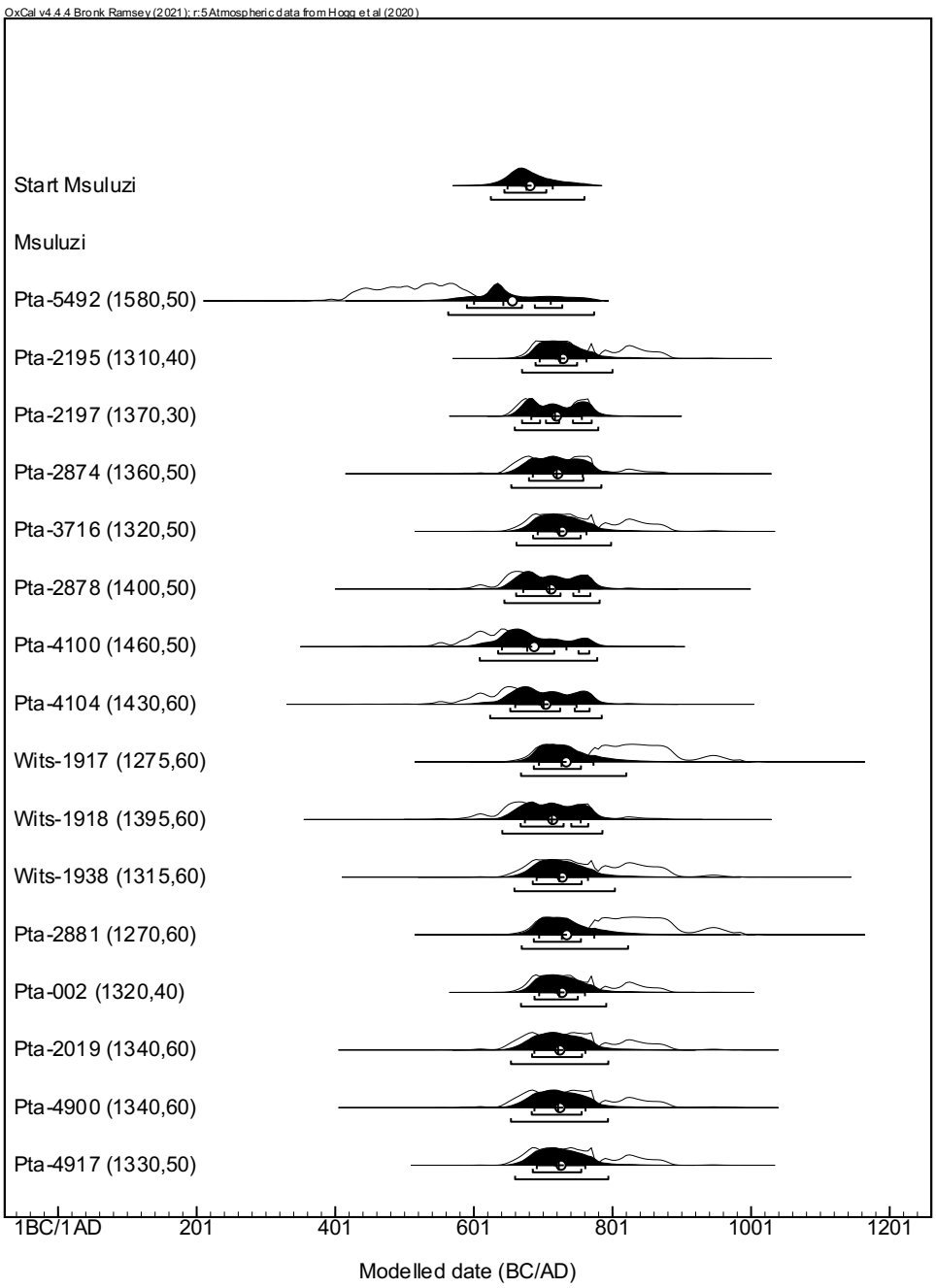


Figure 5.4 continued Bayesian radiocarbon model #16 of sites discussed in this chapter

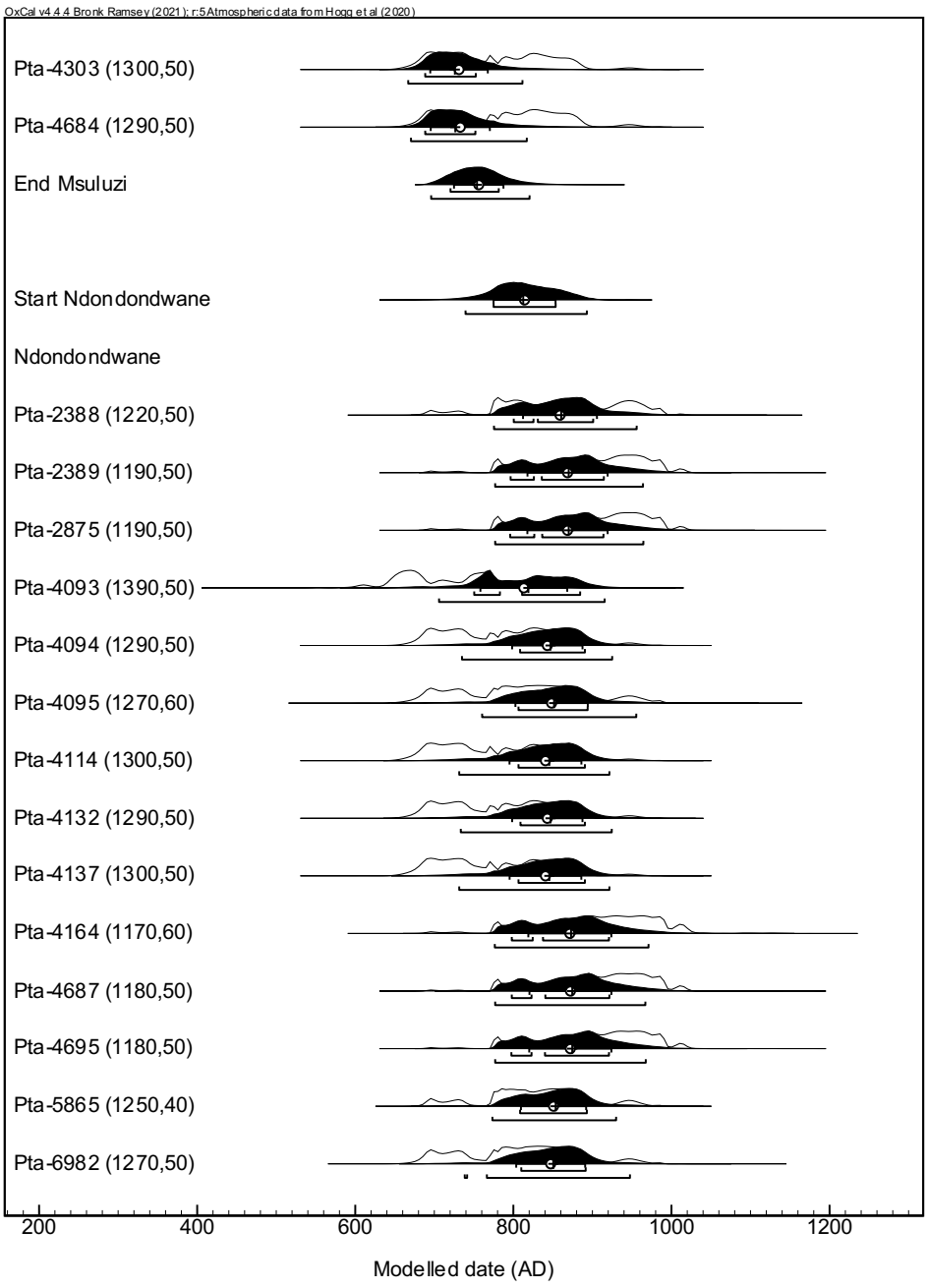


Figure 5.4 continued Bayesian radiocarbon model #16 of sites discussed in this chapter

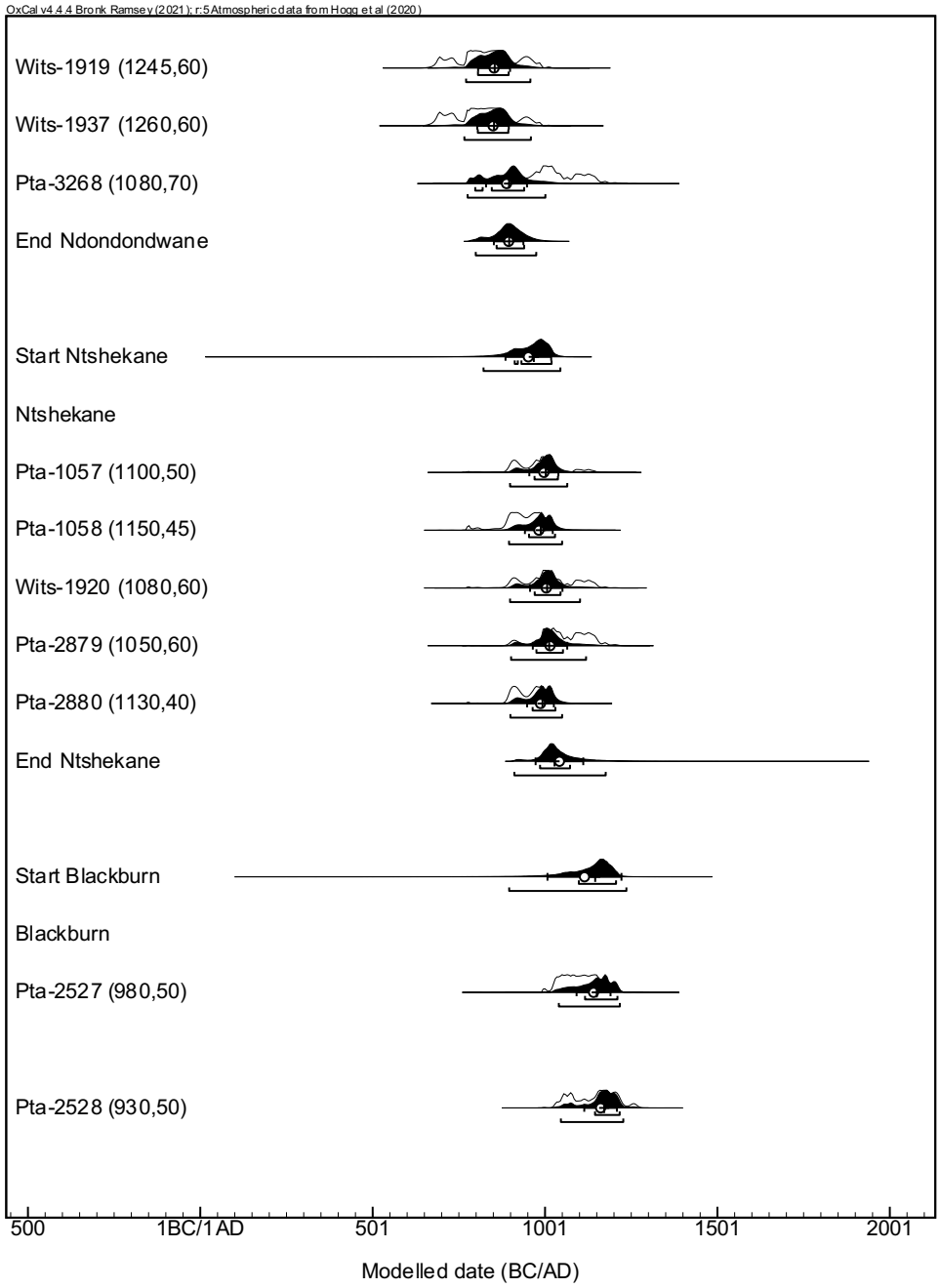


Figure 5.5 The Upper Thukela River Basin, west of Thukela Ferry. Note the flat open landscape. Image from Fowler, 2011, Fig.2



Figure 5.6 The Lower Thukela River Basin. Note the narrow and deeply incised topography. Image from Fowler et al., 2011, Fig.3



Figure 5.7 The geographical location of Ntshekane (top left), and its position to the Mpofane and iTshekana Rivers (top right). The bottom image highlights features, and material culture scatters identified by Maggs in 1973. (Modified from Maggs & Michael, 1976, Fig. 3)

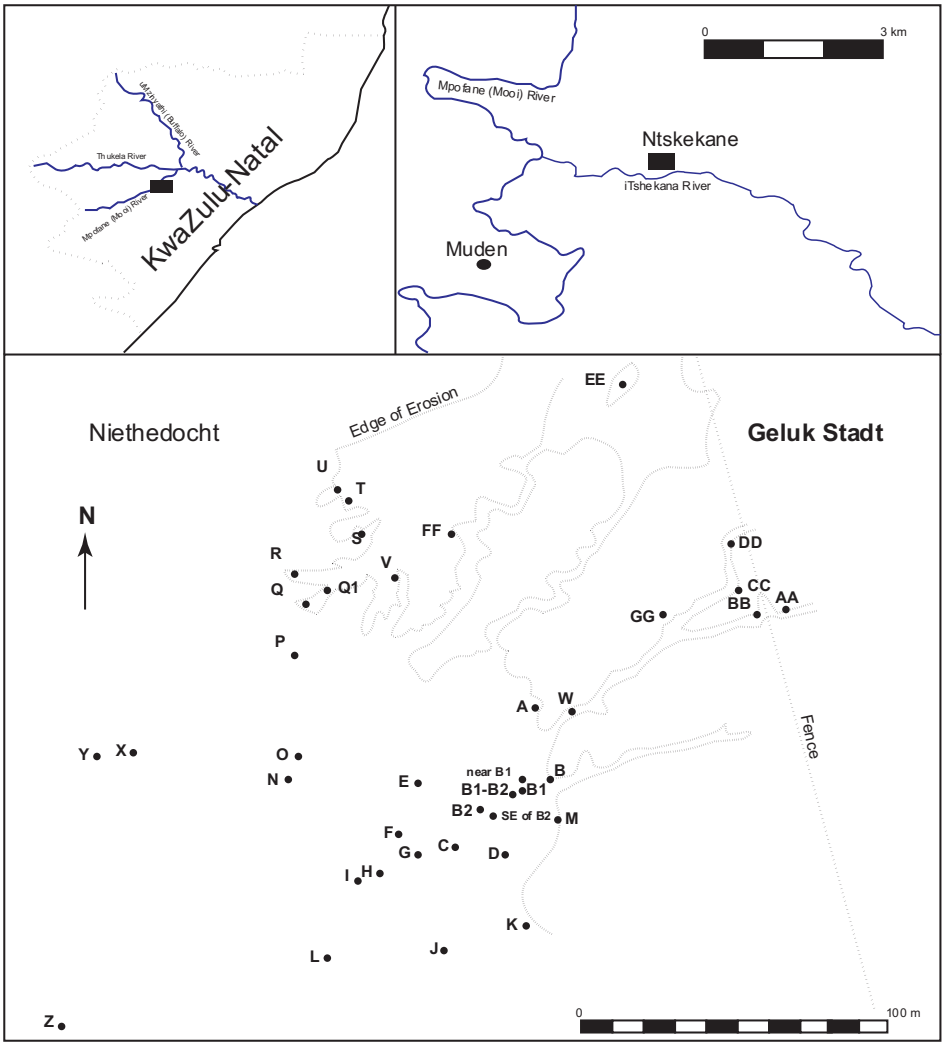


Figure 5.8 Ntshekane. Note extensive gully erosion. Image from Whitelaw, 2019b, p.1



Figure 5.9 Cross-sections of a) Feature V, b) Feature O, and c) Feature P at Ntshekane. Adapted from Maggs & Michael, 1976, Fig.4)

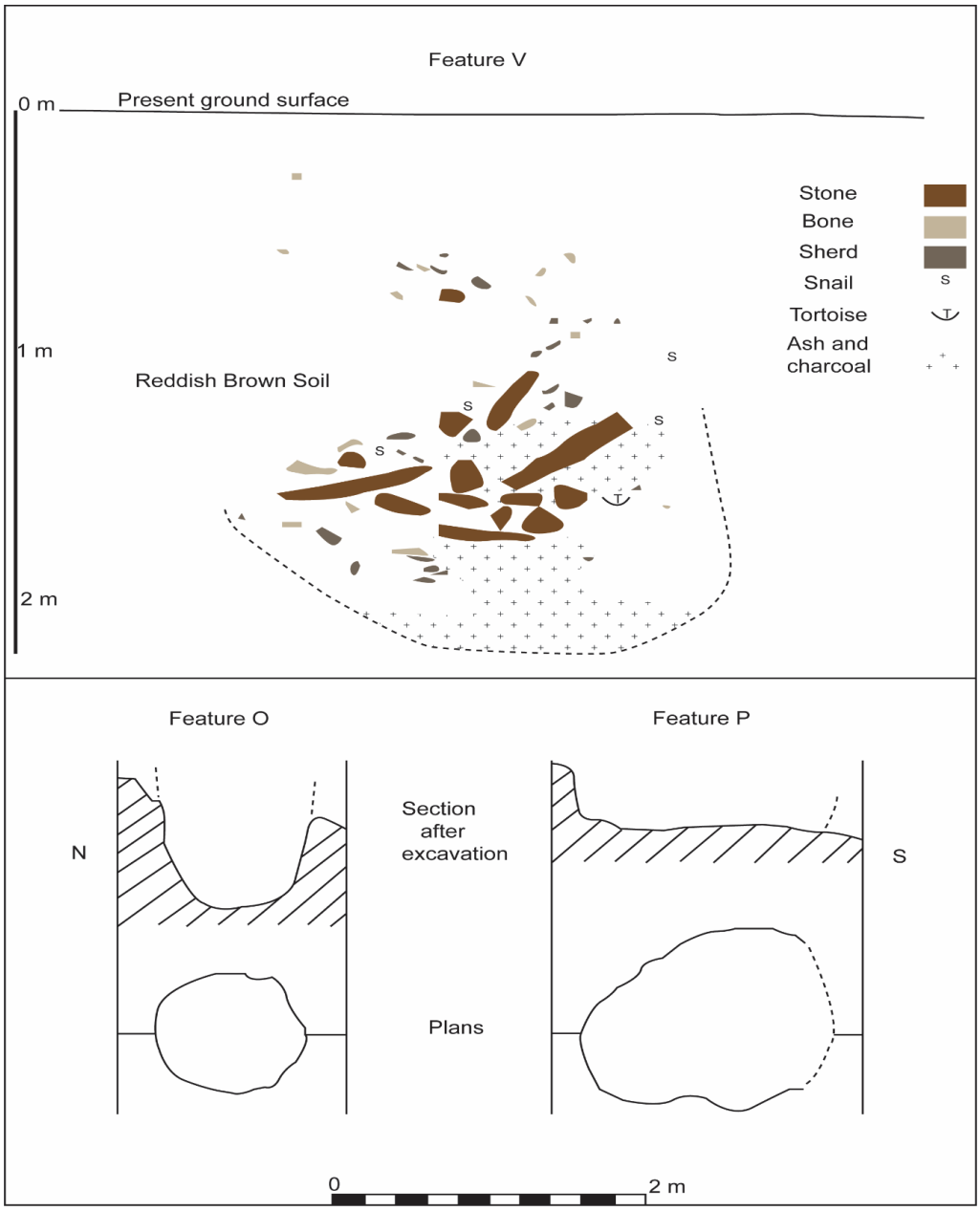


Figure 5.10 The two C^{14}dates from Ntshekane. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed, were a Phase grouping, and Sigma Boundaries. The confidence interval was set at 95.5%

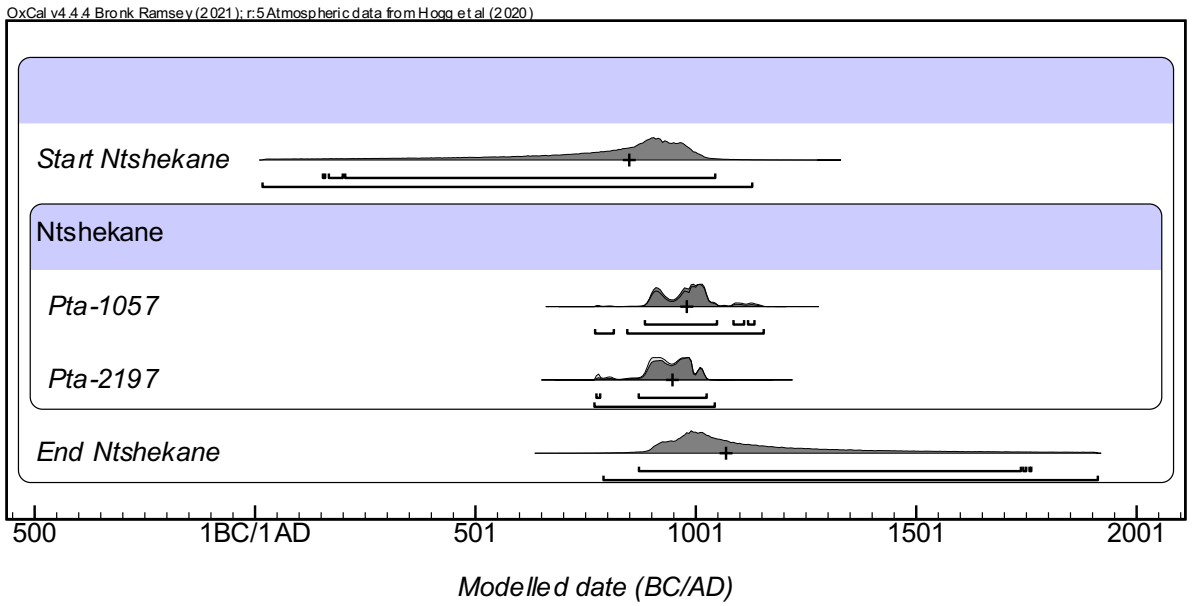


Figure 5.11 Ndondondwane-type vessel from Feature W at Ntshekane. The image was taken by K. Fowler and used with permission



Figure 5.12 Msuluzi type vessel from Feature B1 at Ntshekane. Image taken by K. Fowler, used with permission



Figure 5.13 An example of a vessel with an upright neck that Maggs and Michael argued was a potter's idiosyncrasies. Photo credit: F.G. Jordaan



Figure 5.14 Msuluzi phase features at Ntshekane. Adapted from Huffman & Whitelaw, 2019, Fig. 6.6.

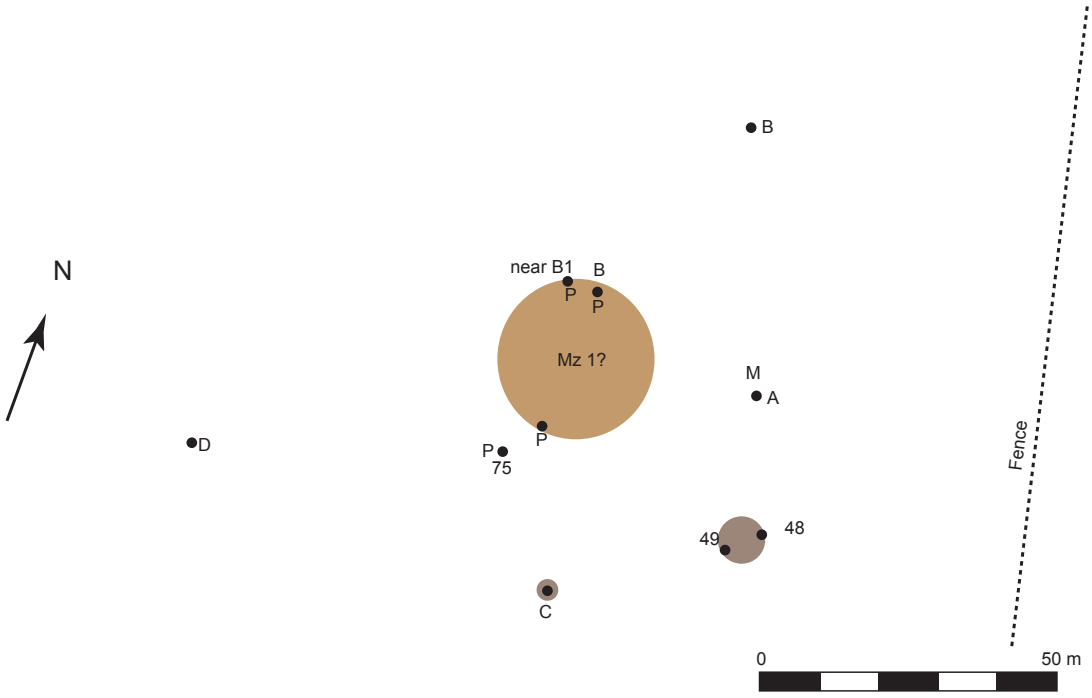


Figure 5.15 Ndondondwane phase features at Ntshekane. Adapted from Huffman & Whitelaw, 2019, Fig. 6.4

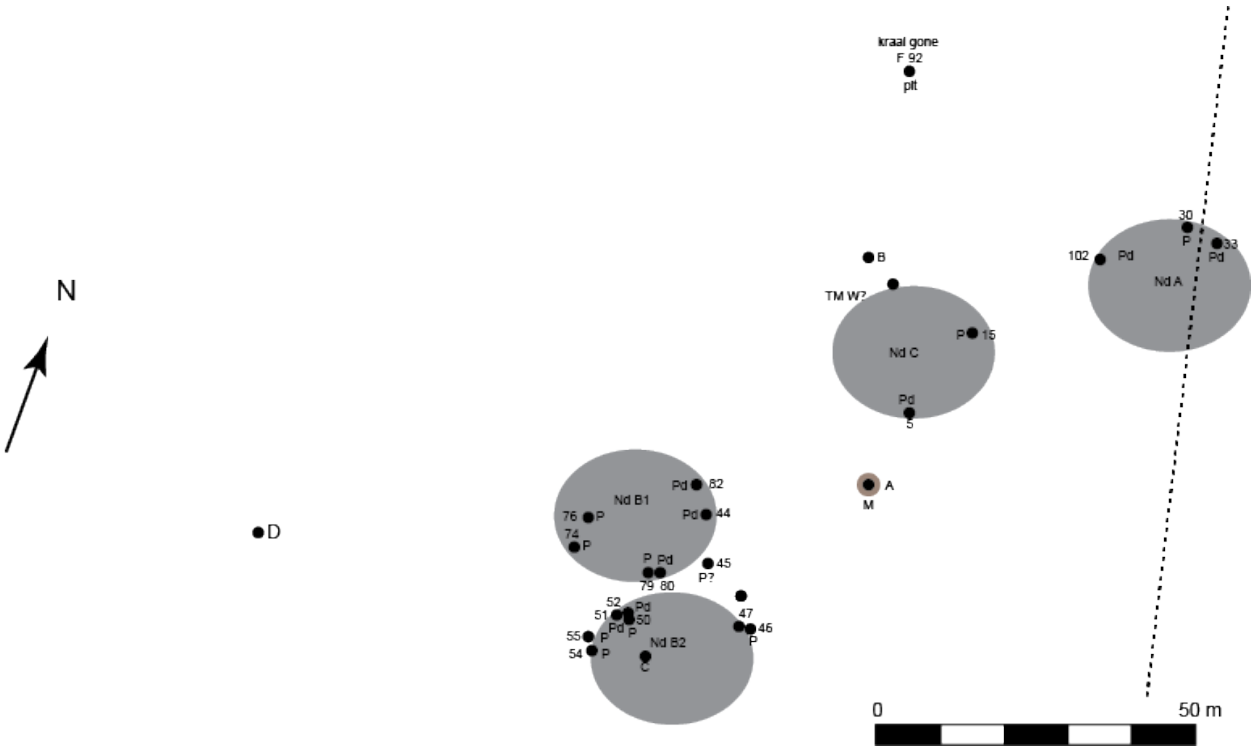


Figure 5.16 Ntshekane phase features at Ntshekane. Adapted from Huffman & Whitelaw, 2019, Fig. 6.3

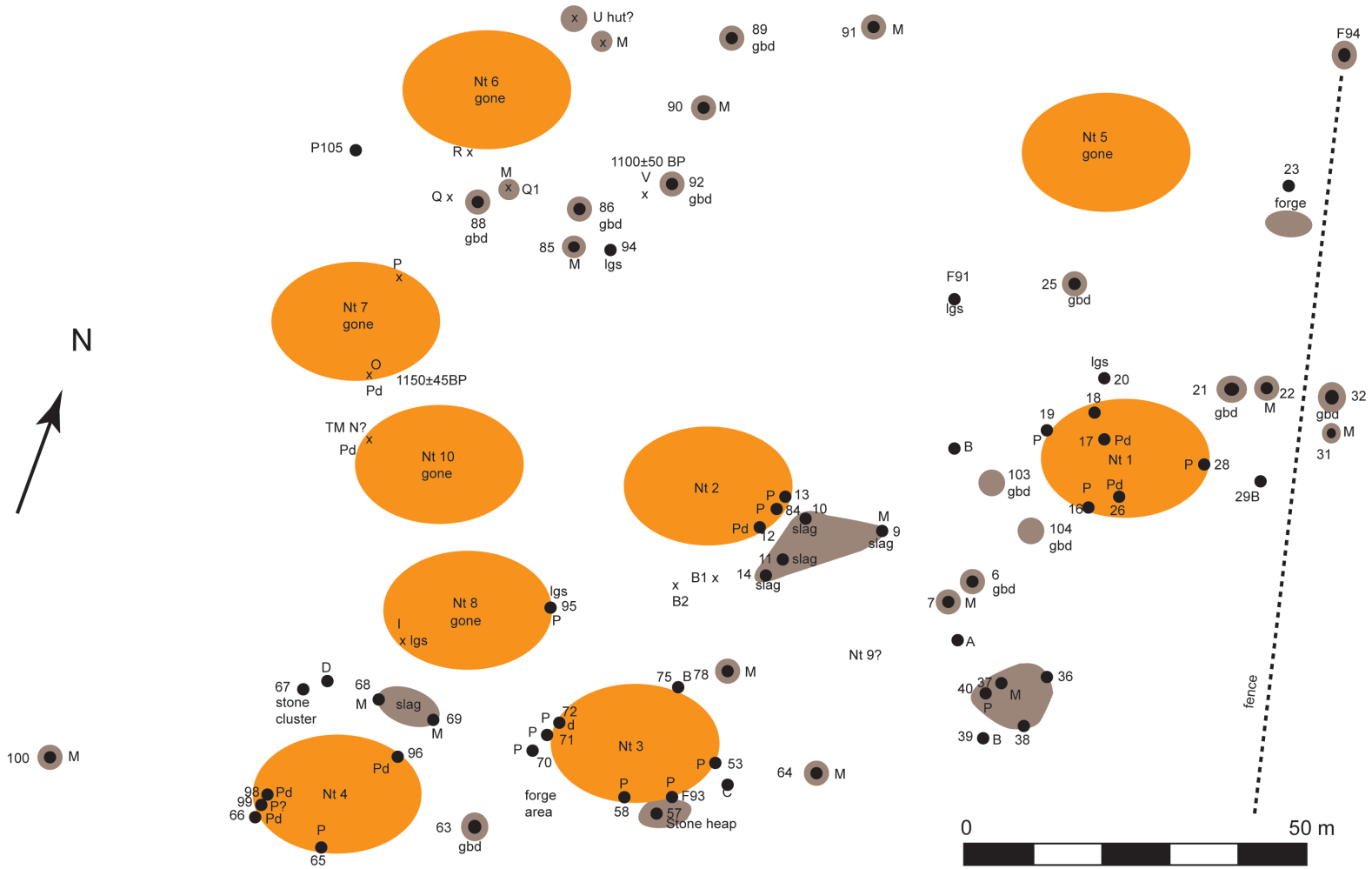


Figure 5.17 Superimposition of the Msuluzi, Ndondondwane, and Ntshekane phase features at Ntshekane. Adapted from Huffman & Whitelaw, 2019, Fig. 6.3-Fig. 6.6

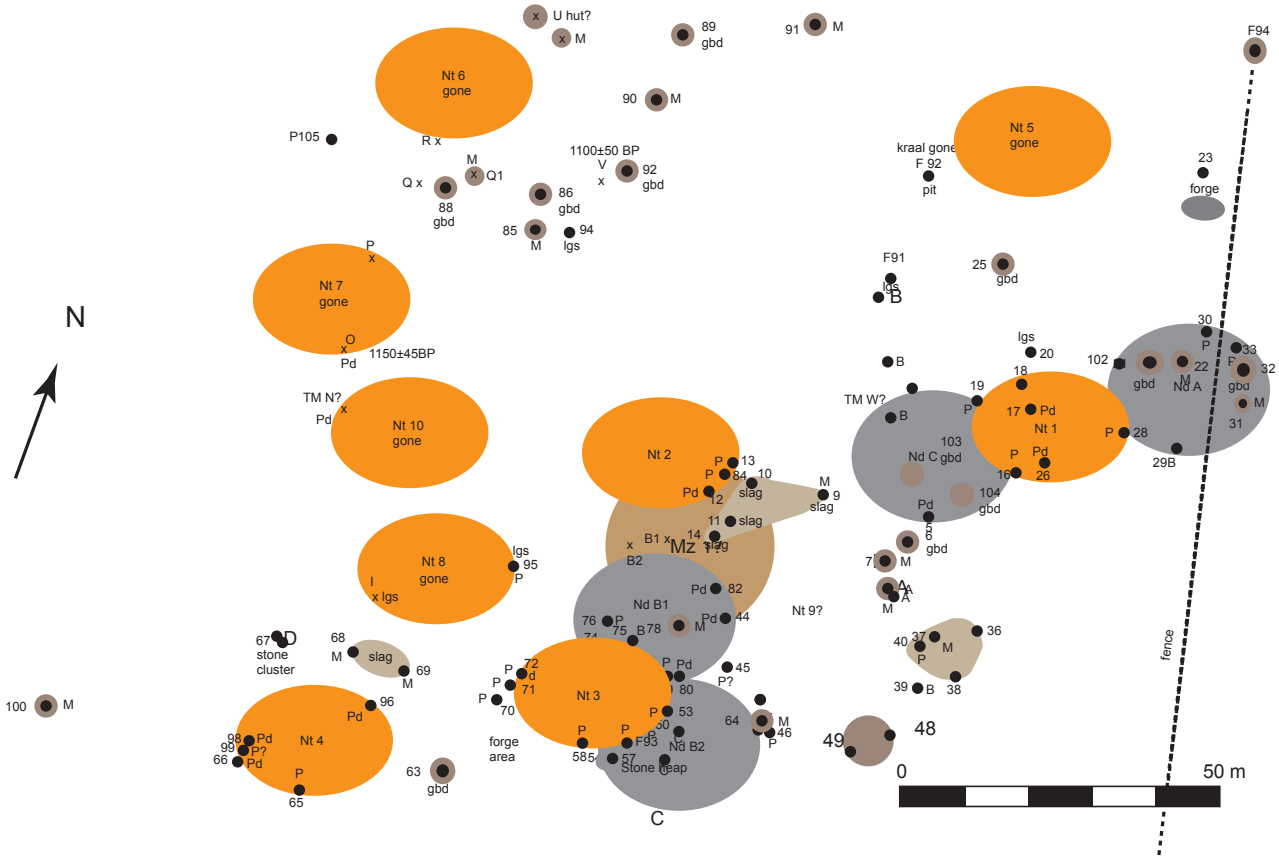


Figure 5.18 The geographical location of the Msuluzi Confluence site, at the confluence of the Thukela and Msuluzi (Bloukrans) Rivers. Adapted from Maggs, 1980a, Fig. 1

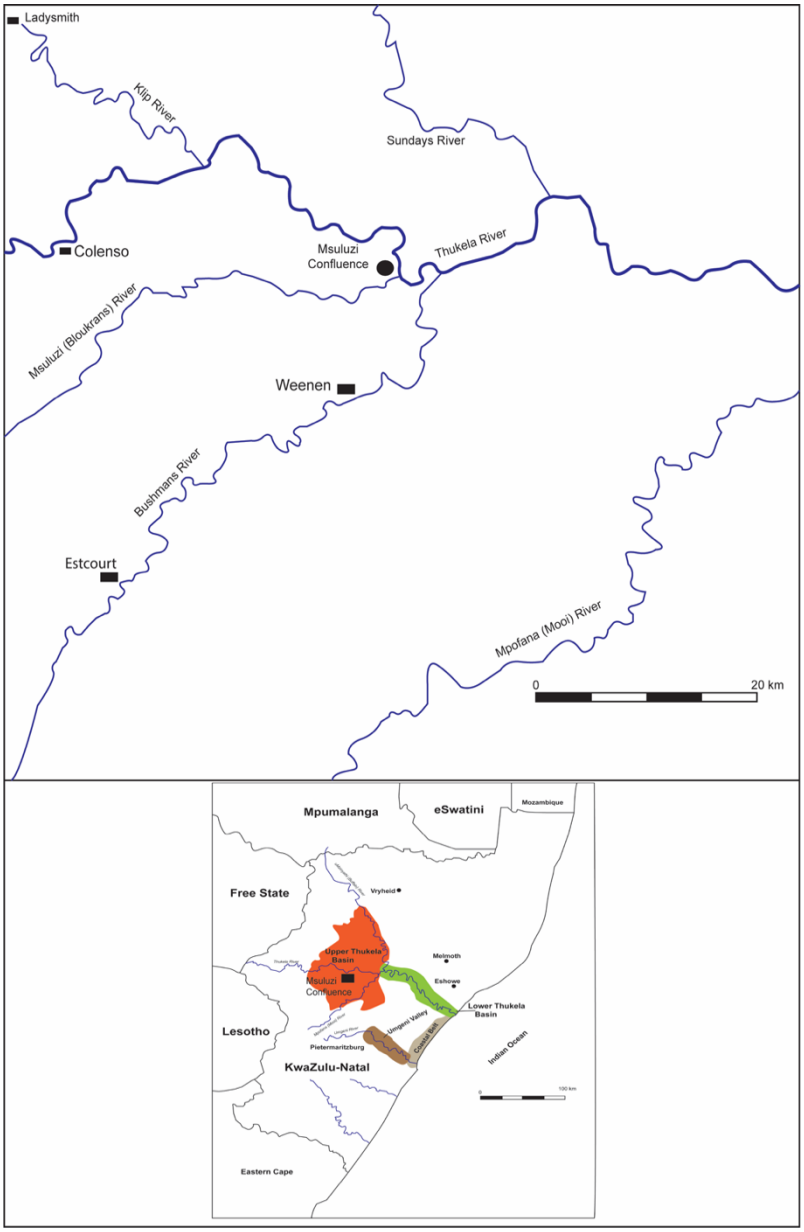


Figure 5.19 Site plan of excavations at Msuluzi. Adapted from Maggs 1980a, p. 112

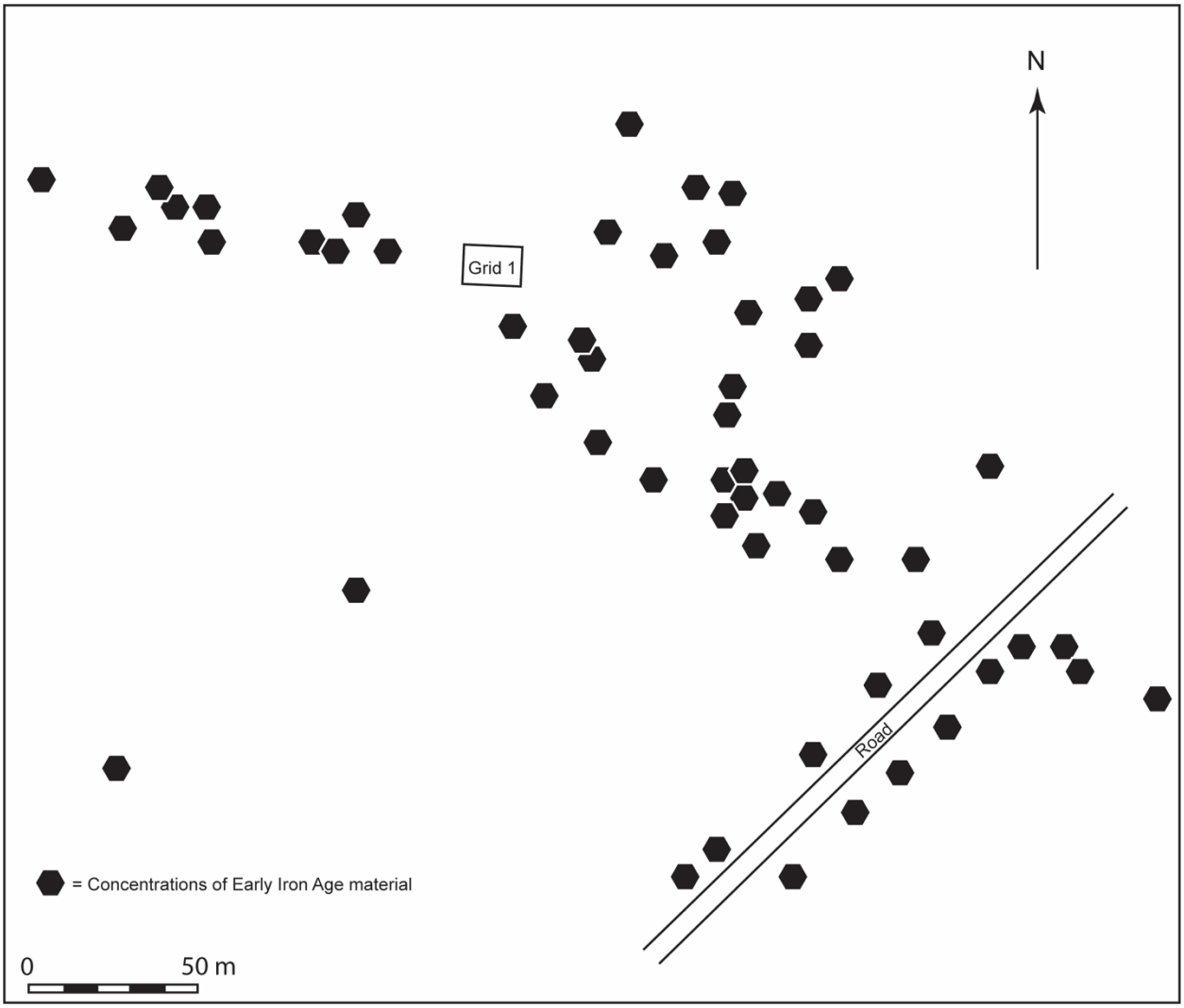


Figure 5.20 Plan of Msuluzi Grid 1 excavation with section illustrations of three pits. Adapted from Maggs, 1980a, Figs.5&6

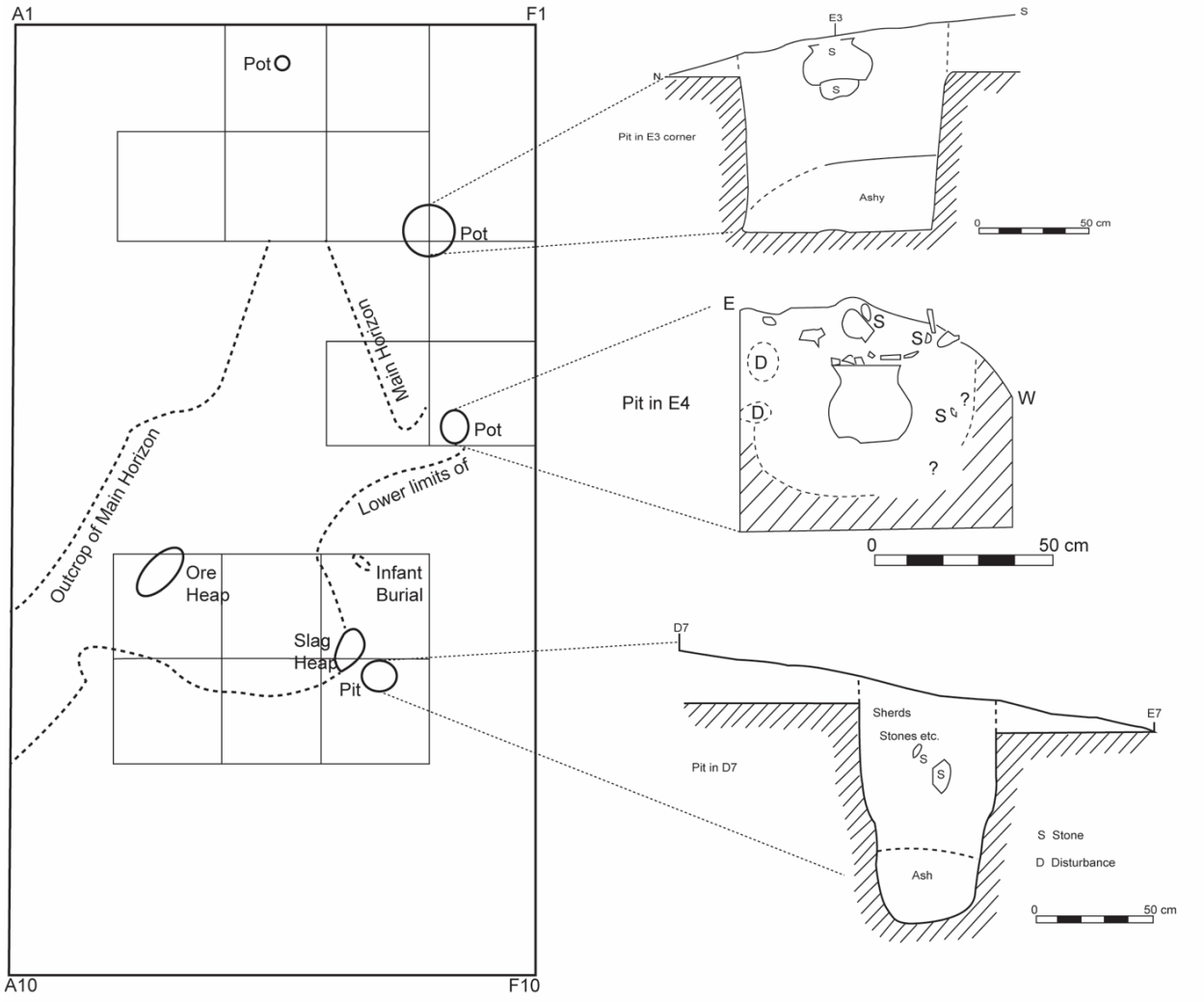


Figure 5.21 The two C^{14} dates from Msuluzi. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed, were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

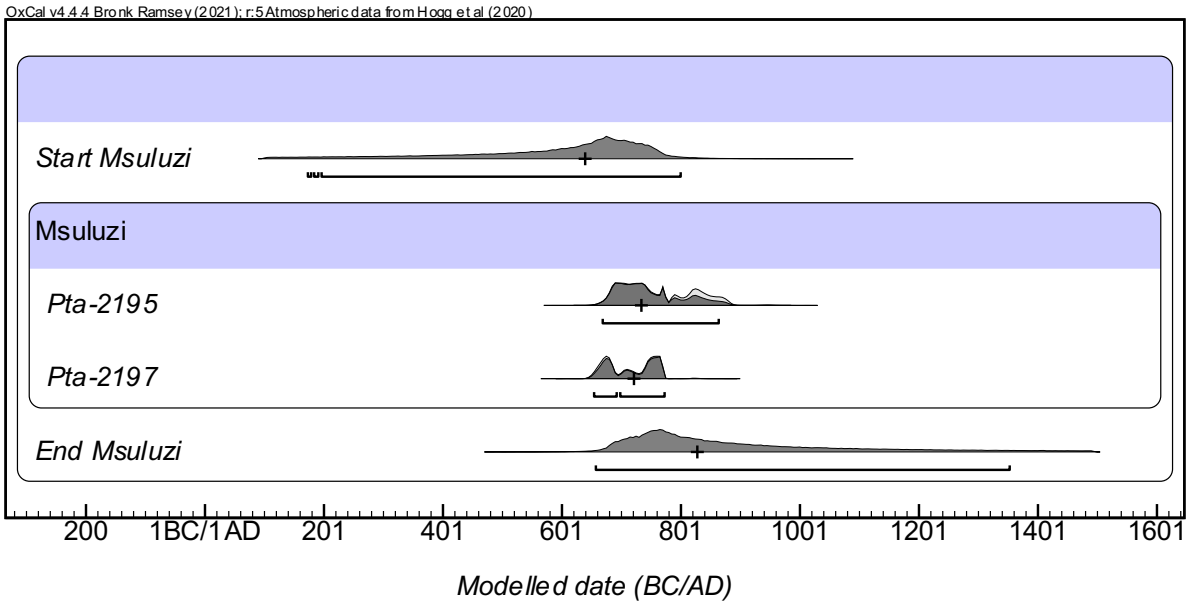


Figure 5.22 Site locations of Magogo and Mhlopeni in the Upper Thukela Basin. Adapted from Maggs & Ward, 1984, Fig. 1

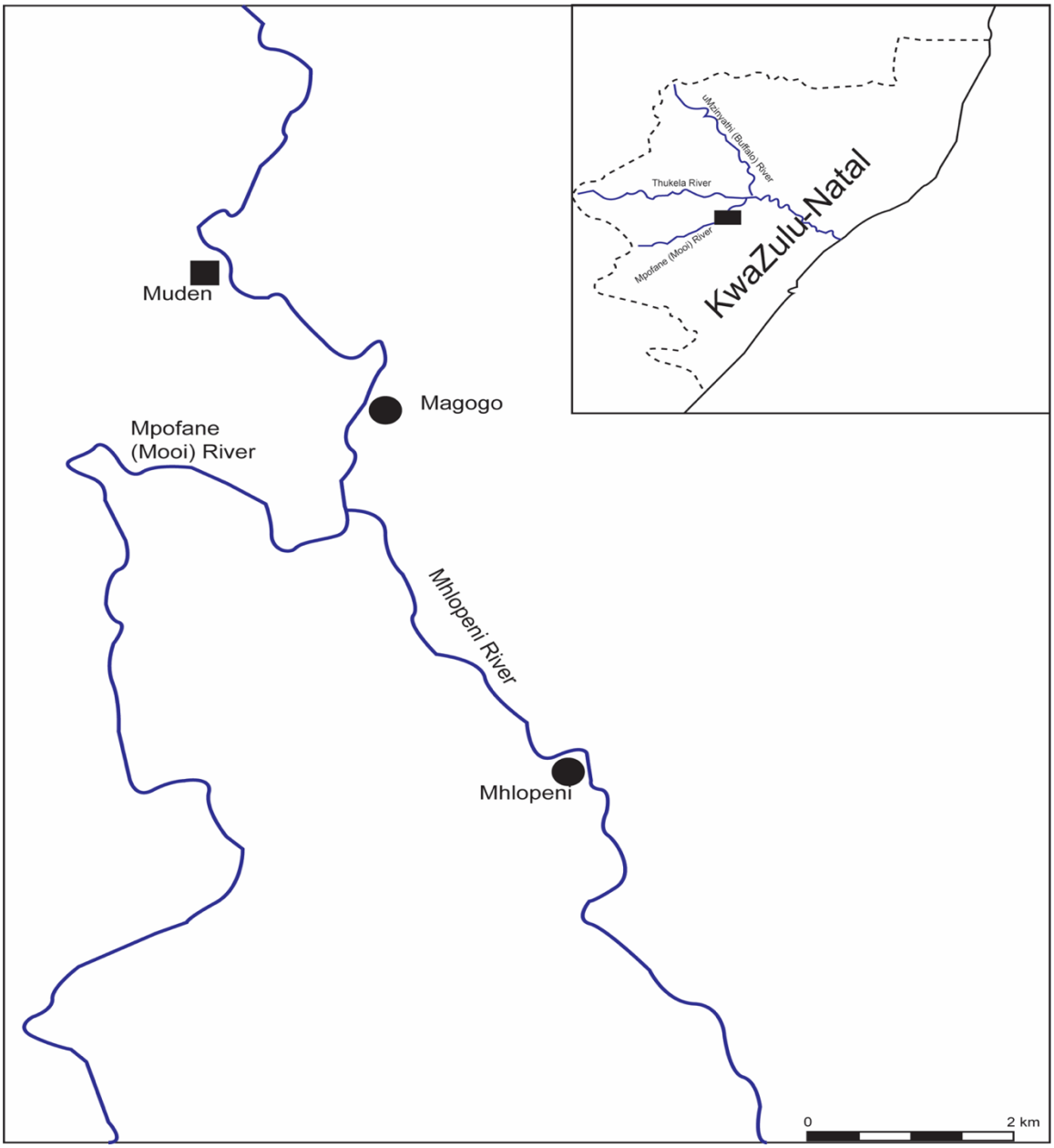


Figure 5.23 Excavation plan and detailed plan of Grid area at Magogo. (Adapted from Maggs & Ward, 1984, Figures 2 and 3

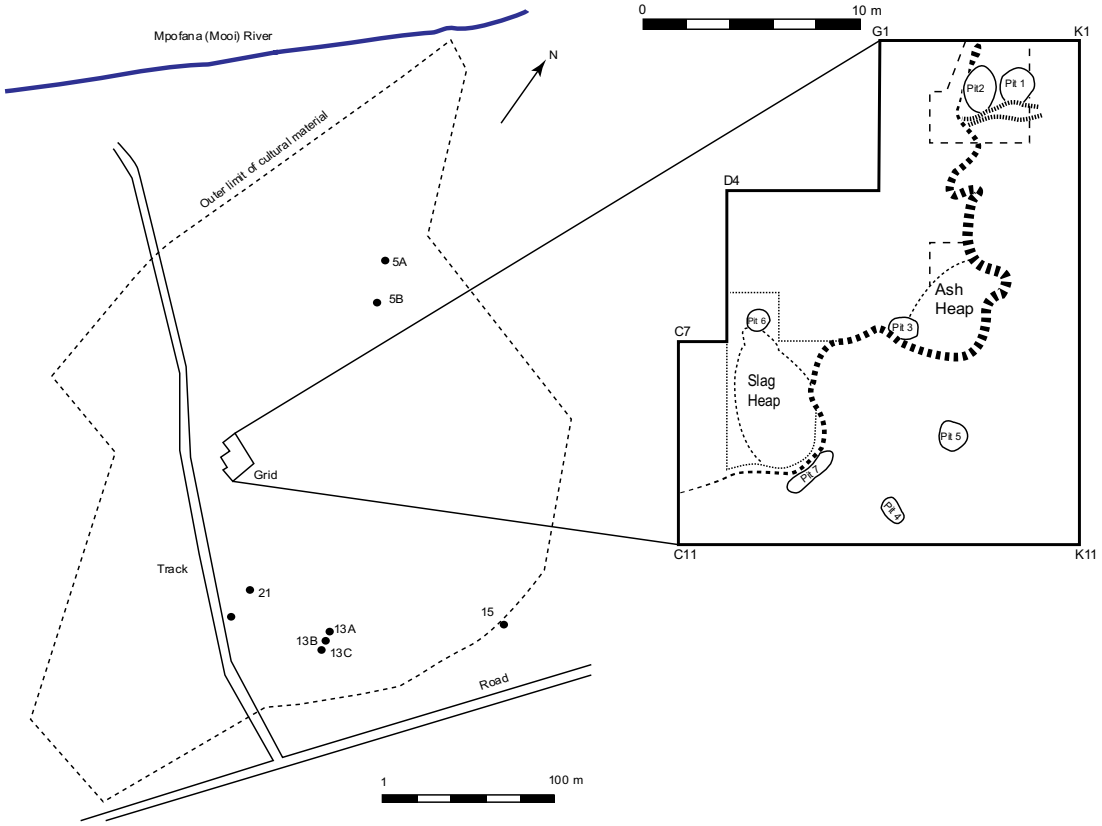


Figure 5.24 Cross-sections of Pits 1 and Pit 2 from the Grid area at Magogo. Adapted from Maggs & Ward, 1984, Fig. 6

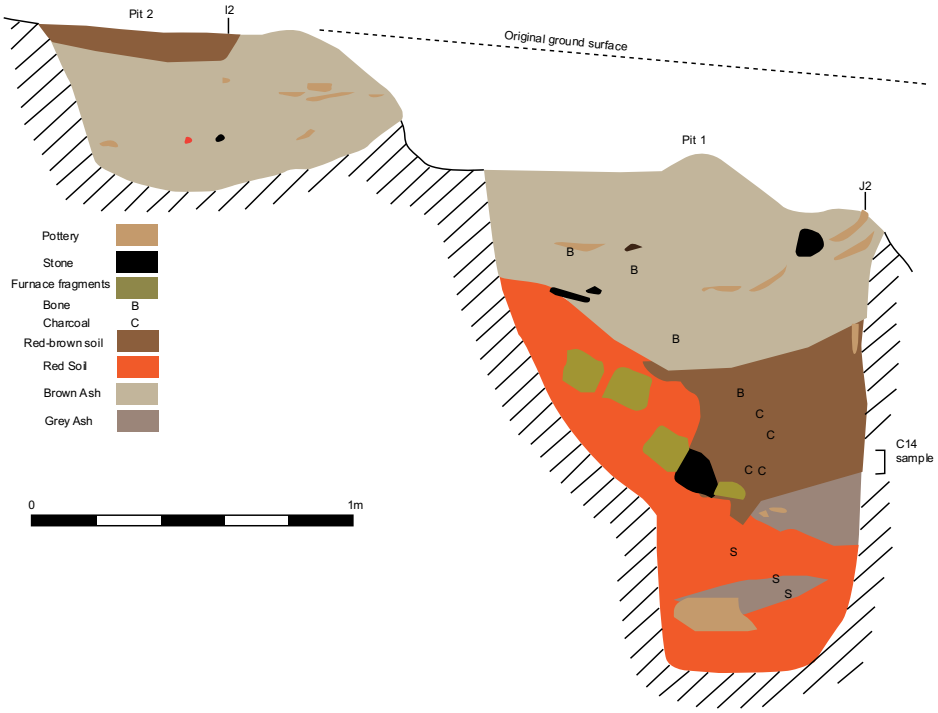


Figure 5.25 The two C^{14} dates from Magogo. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed, were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

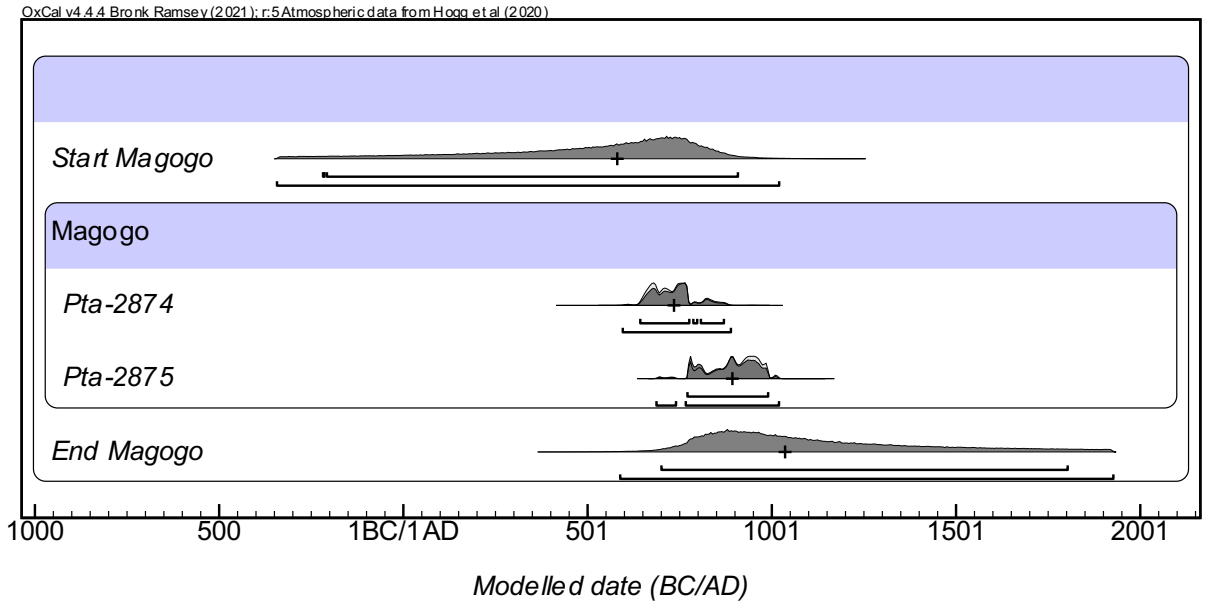


Figure 5.26 Location of Mamba I and Mamba II. Adapted from van Schalkwyk, 1994, Fig.1

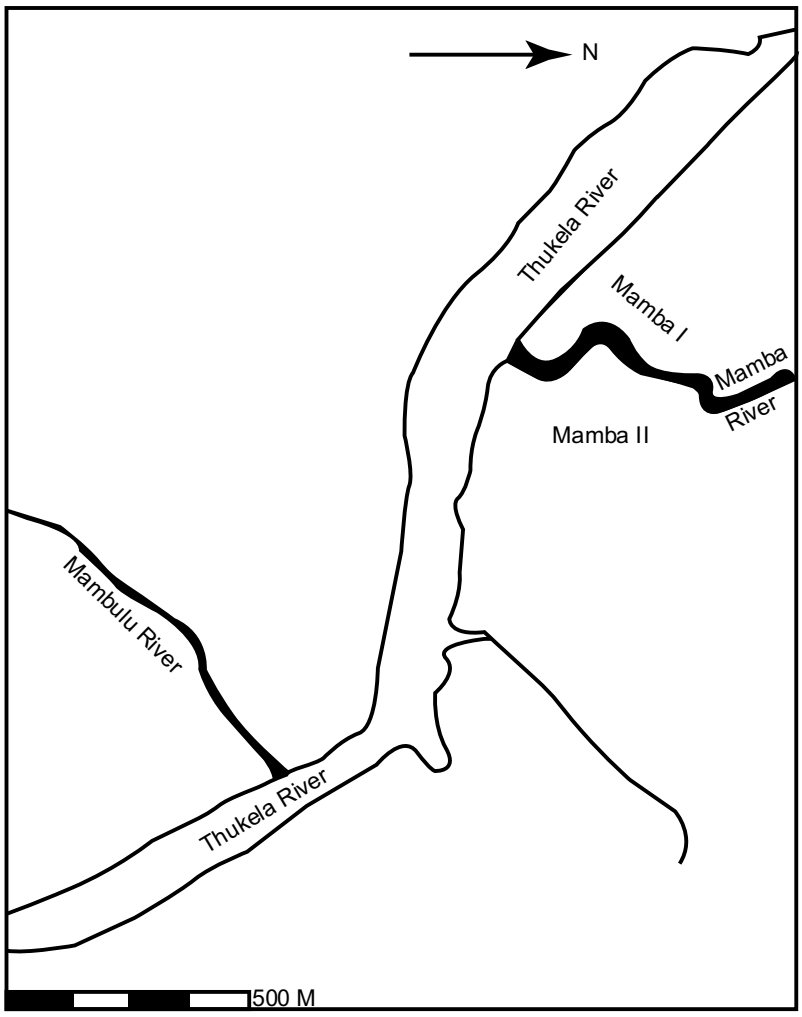


Figure 5.27 Plan of excavation at Mamba I. Darkened sections indicate excavated areas. Adapted from van Schalkwyk, 1994, Fig.2

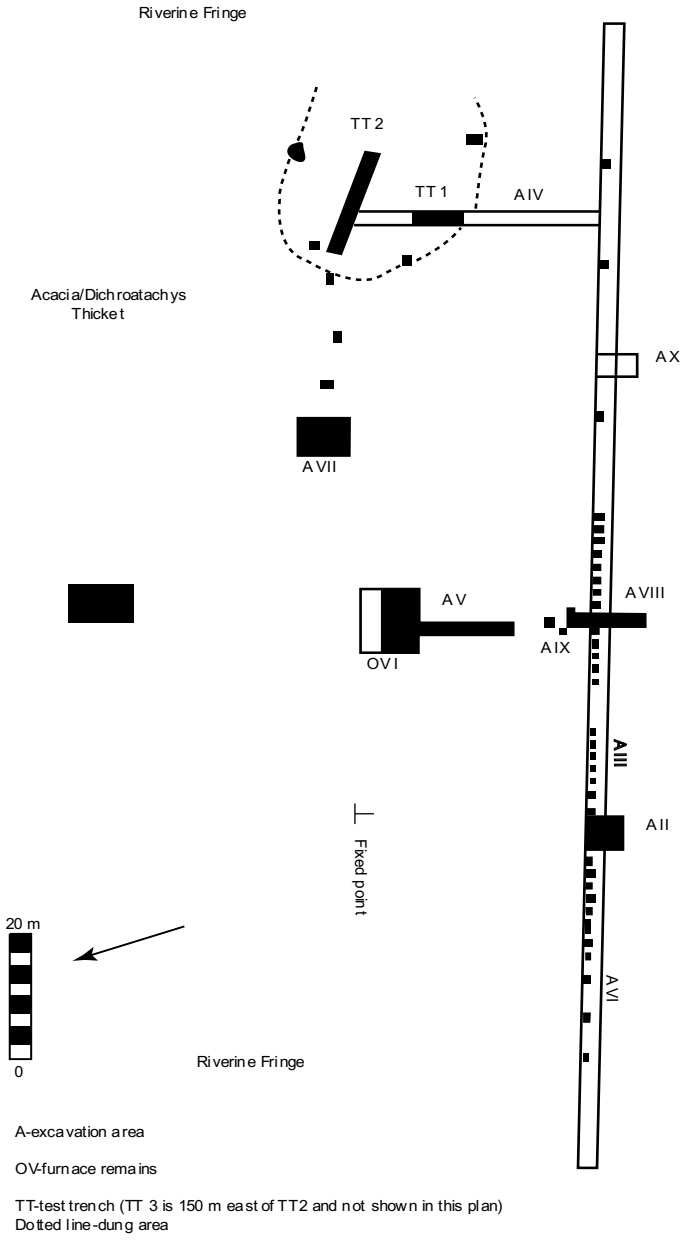


Figure 5.28 Plan of the excavated floor at Mamba I AV II. Adapted from van Schalkwyk, 1994, Fig.6

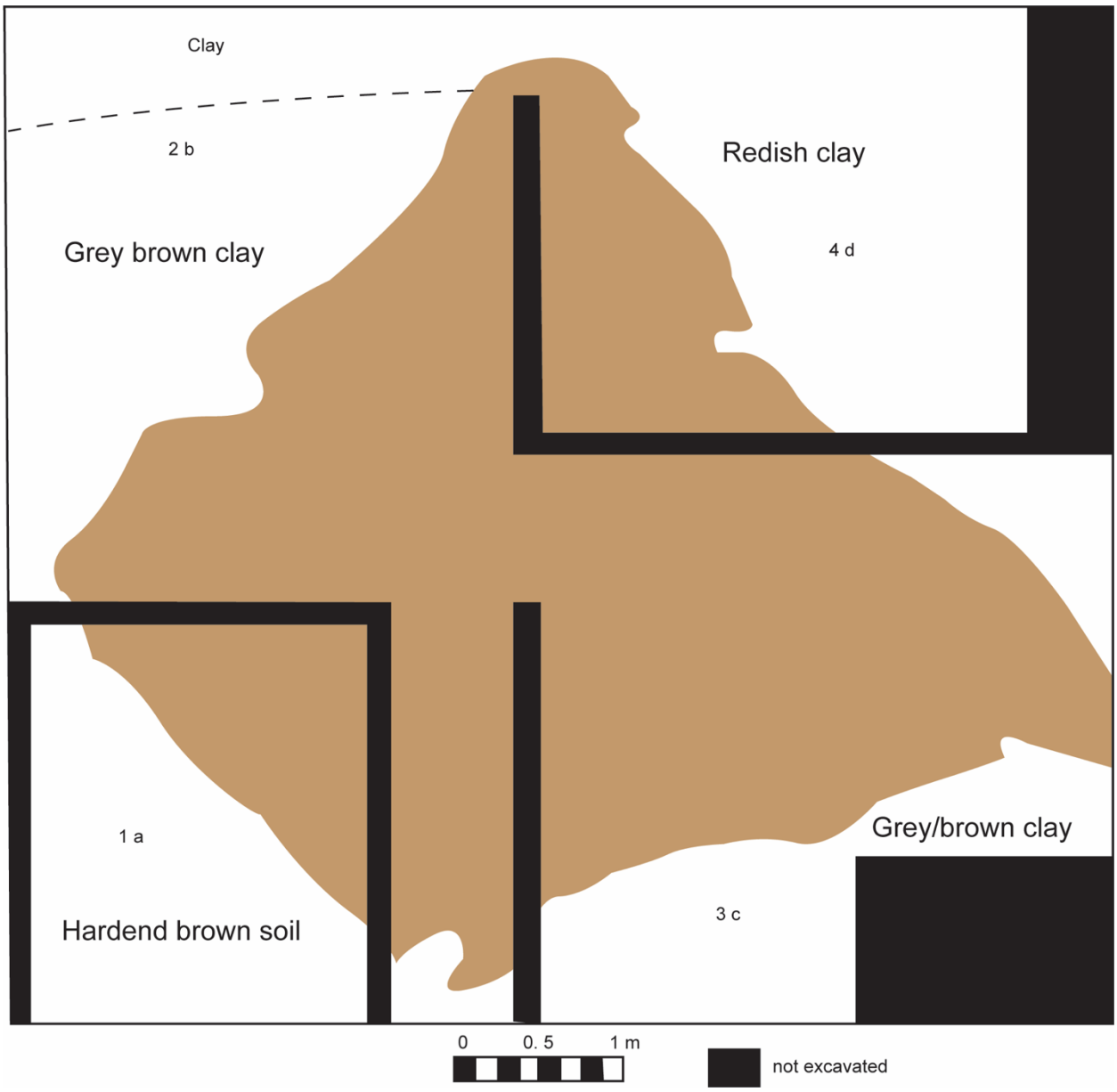


Figure 5.29 Plan of excavation at Mamba I OVI. Adapted from van Schalkwyk, 1994, Fig.4

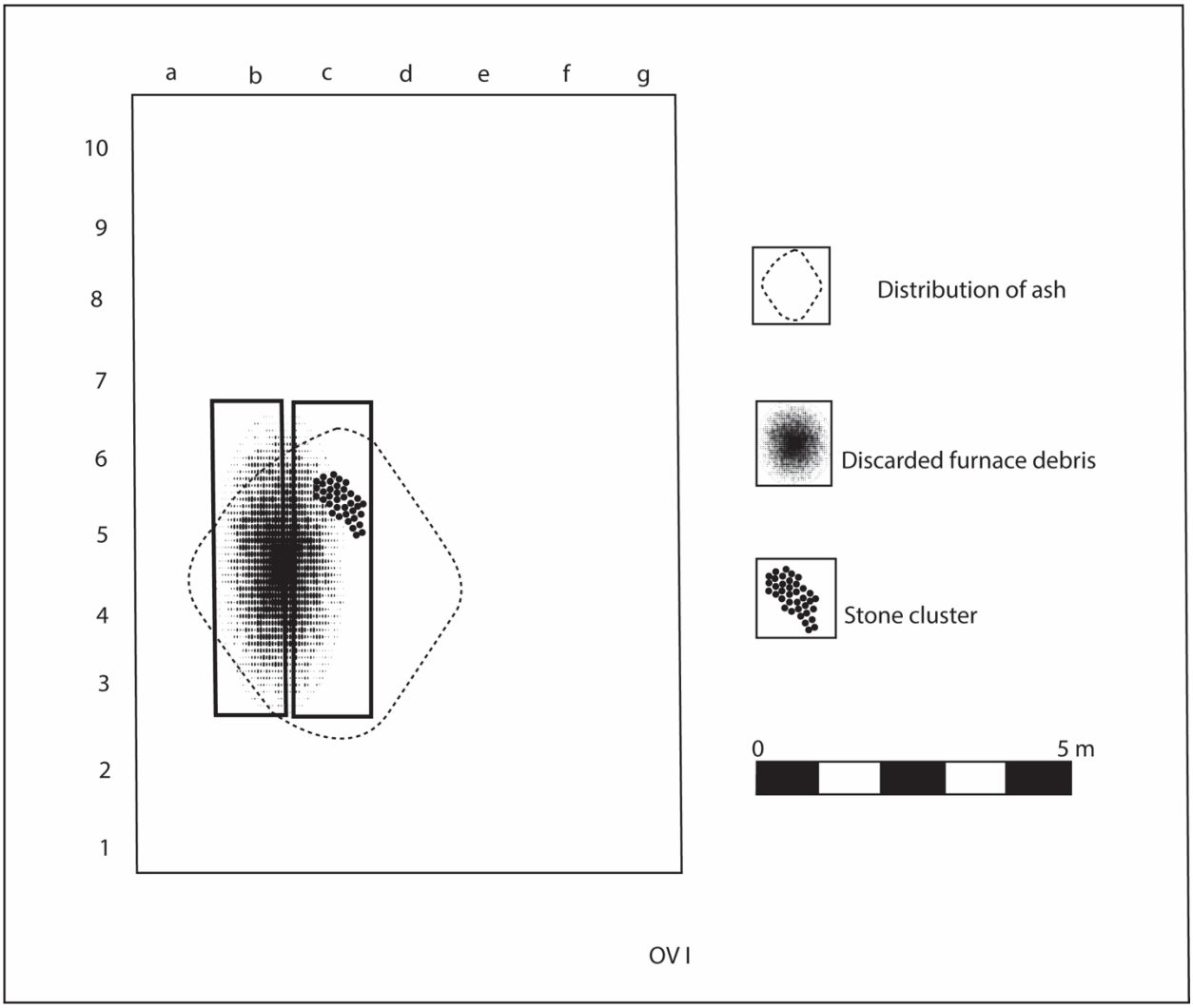


Figure 5.30 The five C^{14} dates from Mamba. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed, were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

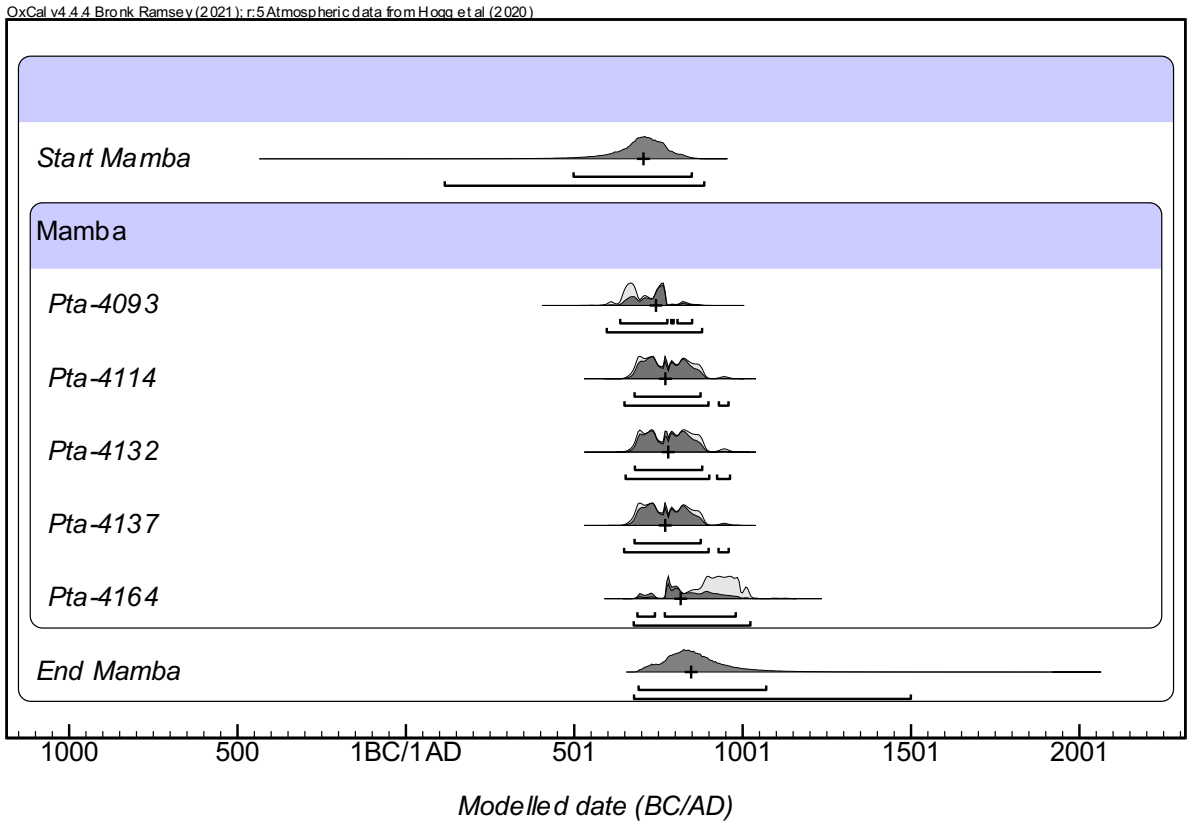


Figure 5.31 Plan of Wosi, highlighting several middens identified at the site and location of the six excavated middens. Adapted from van Schalkwyk, 1994c, Fig.1

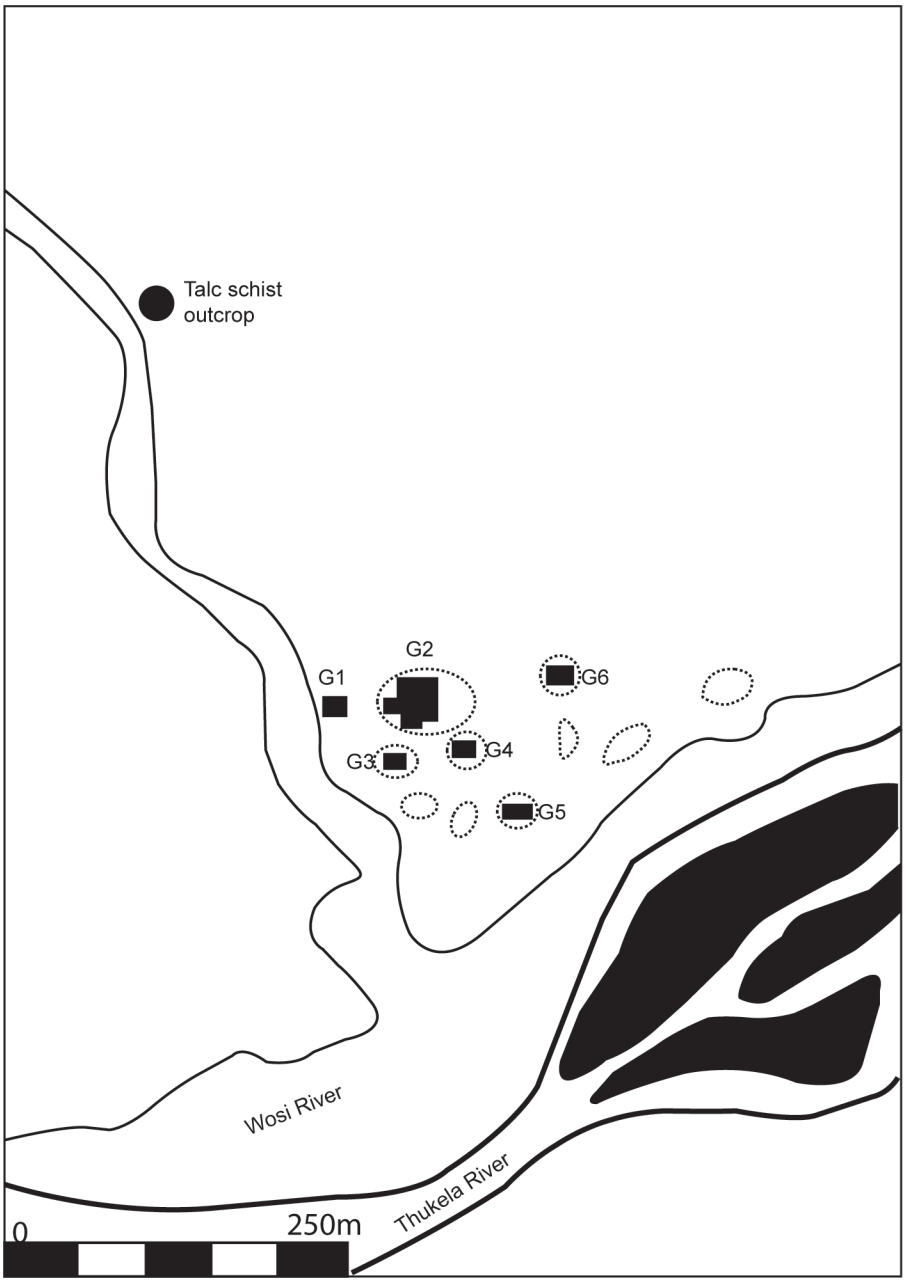


Figure 5.32 Excavation plan (center), stratigraphy (left), and surface topography of Grid 1 at Wosi. Adapted from van Schalkwyk, 1994c, Fig.2 & Fig.4

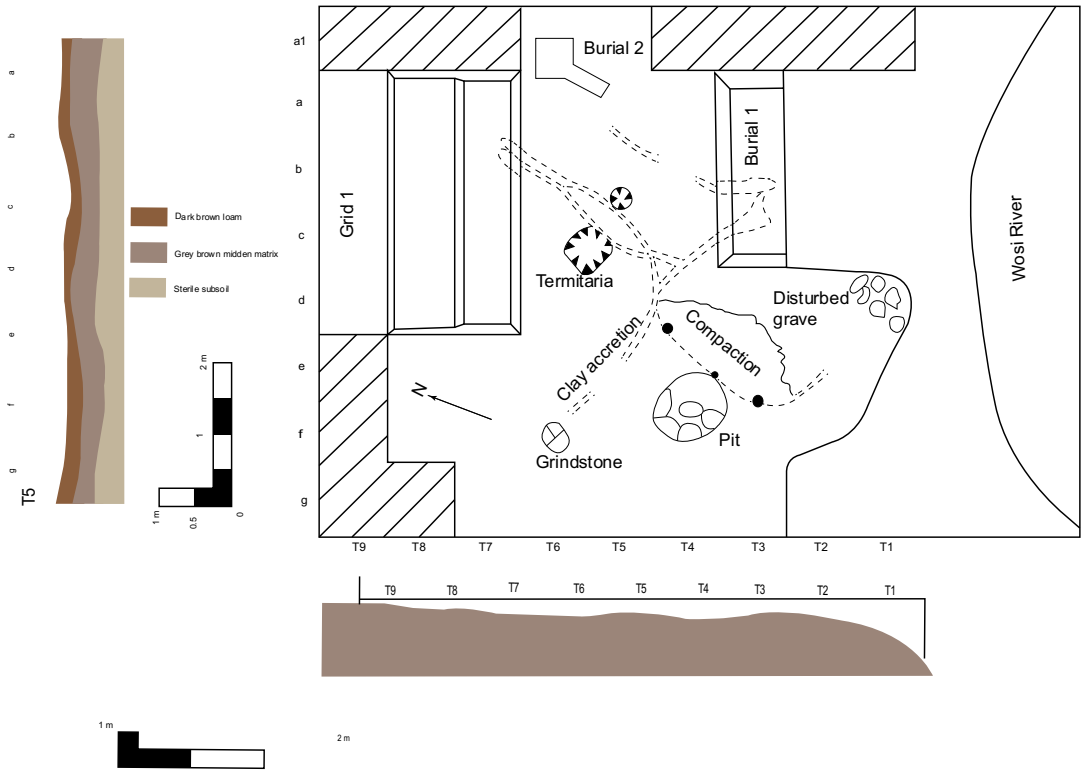


Figure 5.33 Cross-section of pit found at the base midden in Grid I at Wosi. Adapted from van Schalkwyk, 1994c, Fig.5

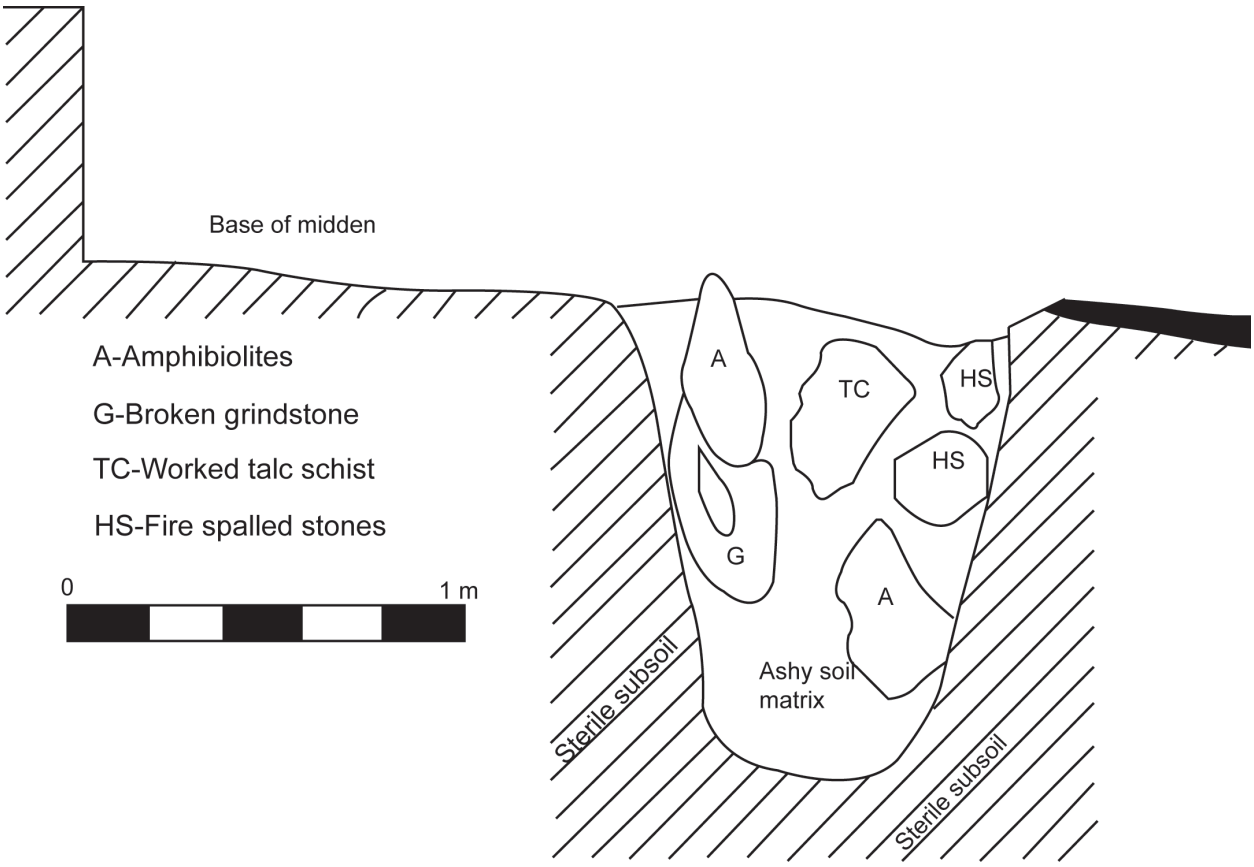


Figure 5.34 The four C^{14} dates from Wosi. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed, were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

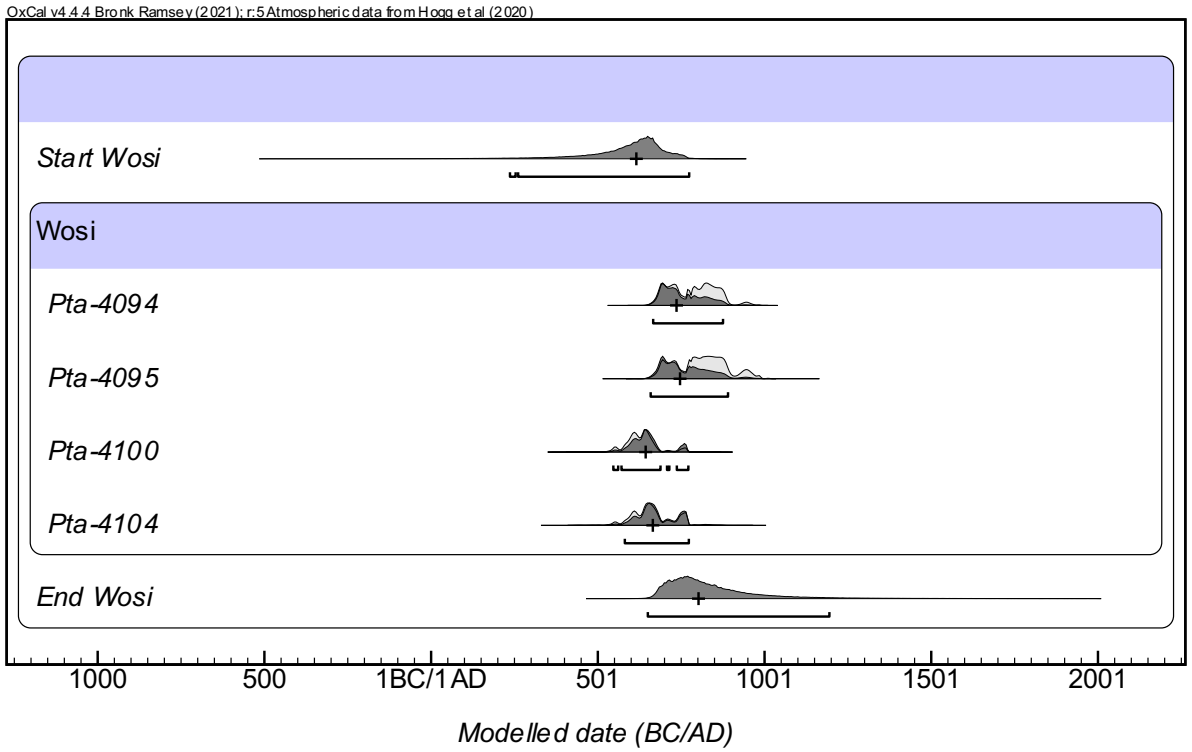


Figure 5.35 Plan of midden in Grid II at Wosi. Adapted from van Schalkwyk, 1994c, Fig.6

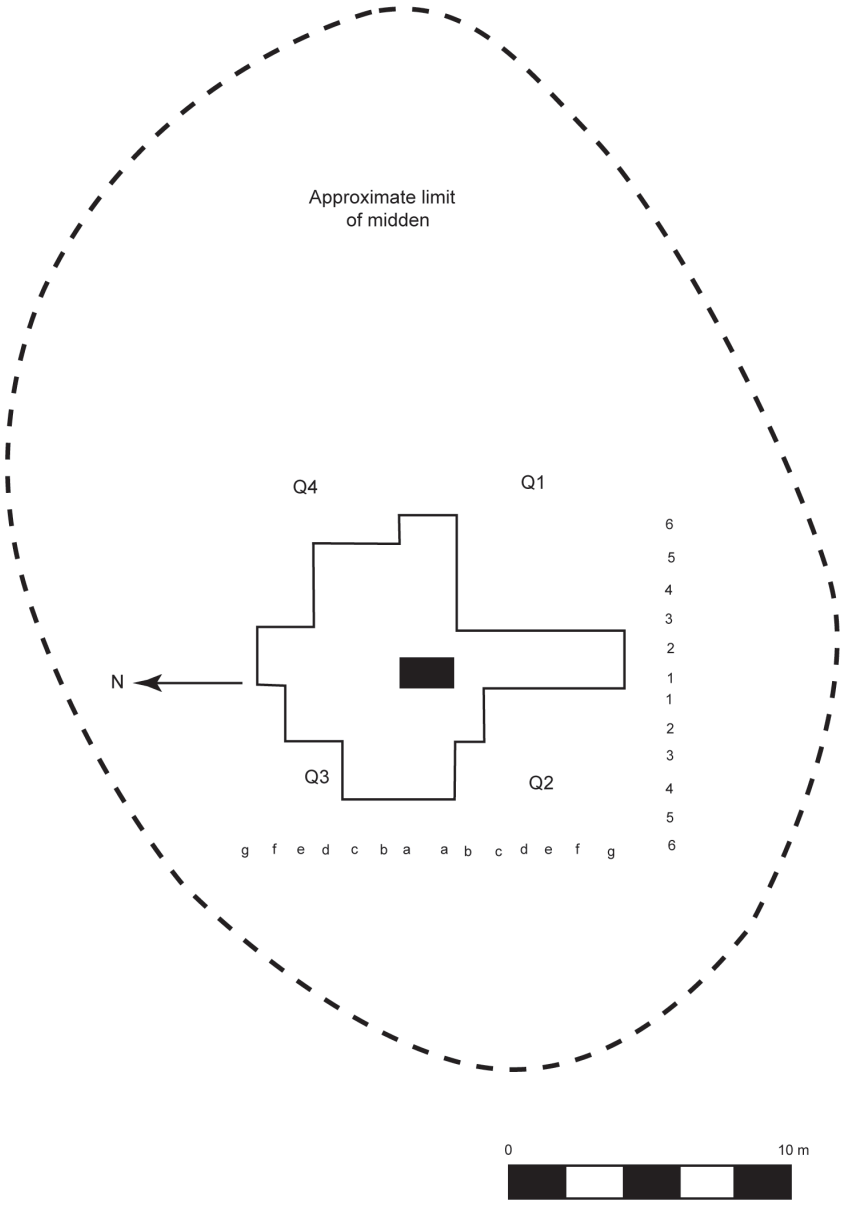


Figure 5.36 The stratigraphy of midden in Grid II at Wosi. Adapted from van Schalkwyk, 1994c, Fig.9

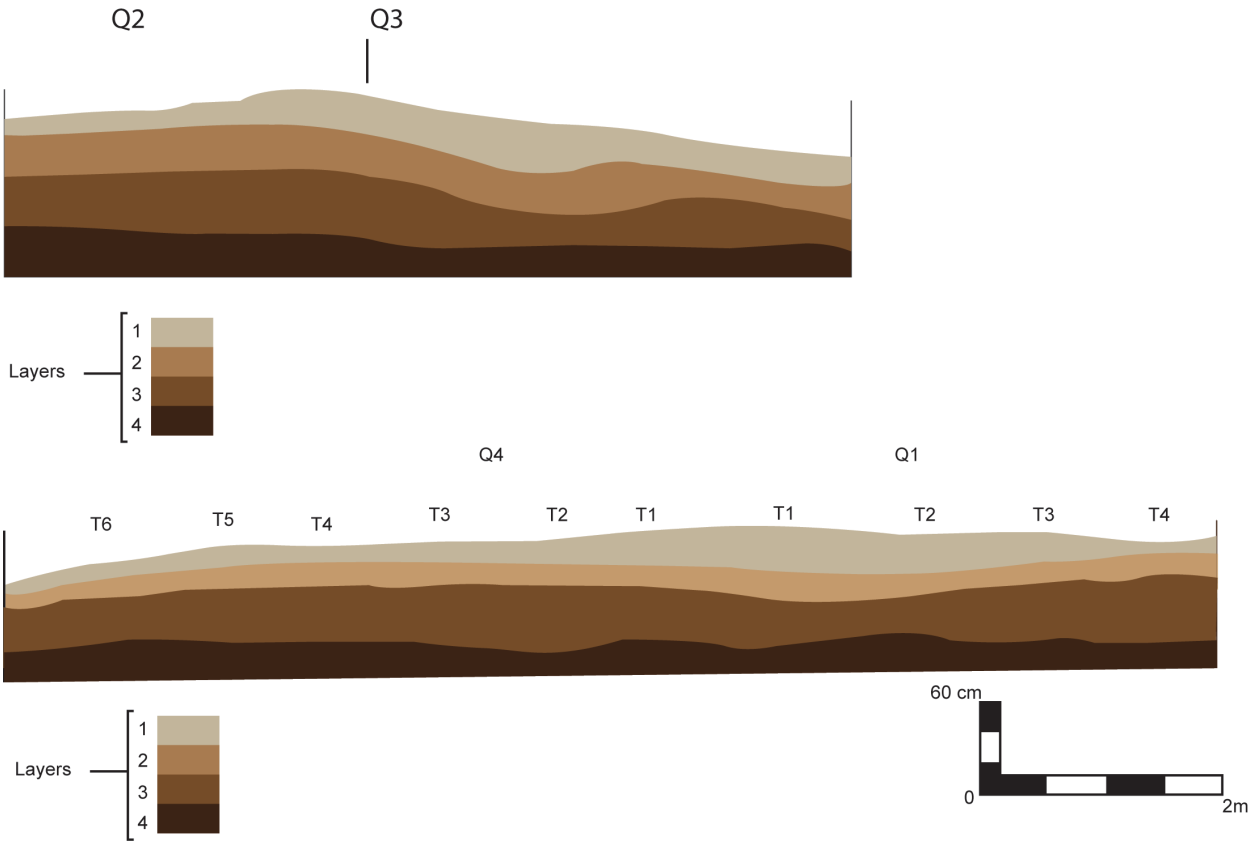


Figure 5.37 Cross-section of pit in Grid II at Wosi. Adapted from van Schalkwyk, 1994c, Fig.7

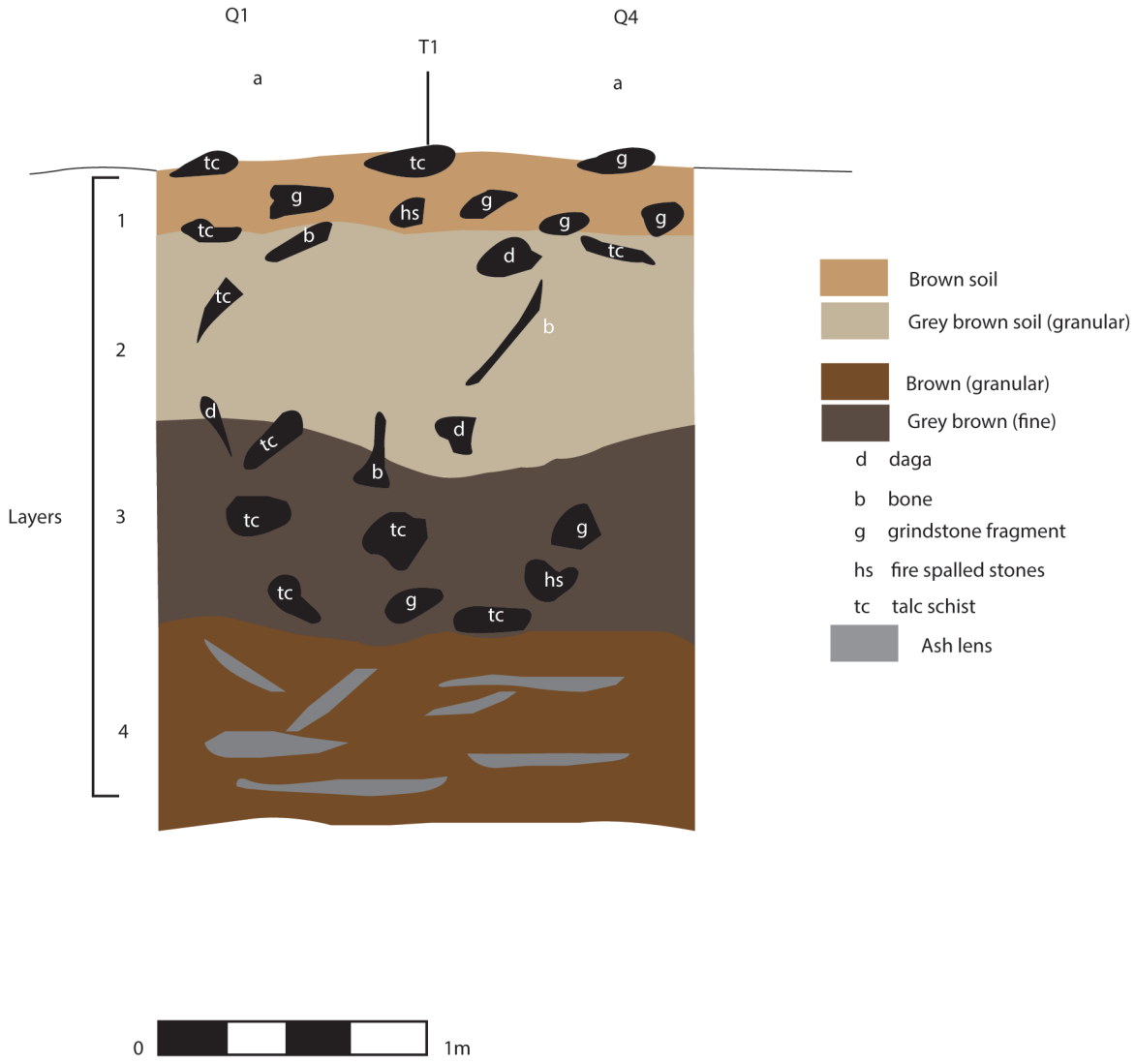


Figure 5.38 The cross-section of the midden and pit excavated in Grid III at Wosi. Adapted from van Schalkwyk, 1994c, Fig.10

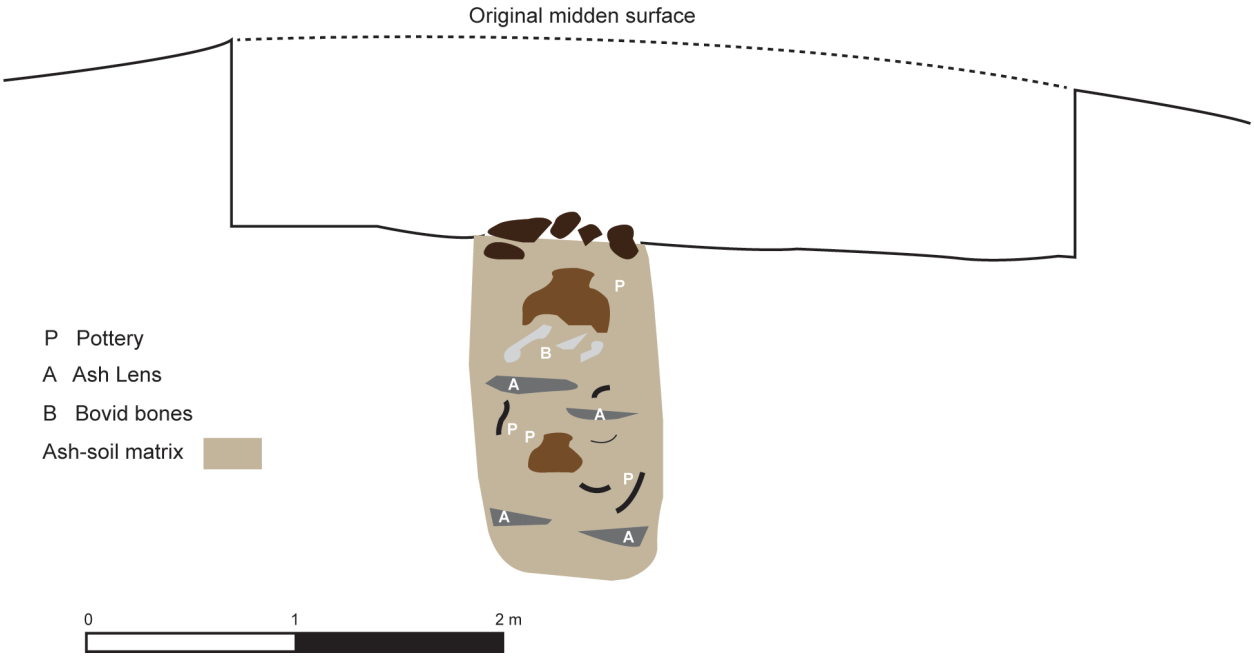


Figure 5.39 Examples of the talc schist pendants beads (left) from van Schalkwyk, 1994c, Fig.22 and bowl (right) from Wosi. Photo credit for bowl: F.G. Jordaan



Figure 5.40 Location of Ndondondwane site along the banks of the Thukela River. Adapted from Maggs, 1984b, Fig.1

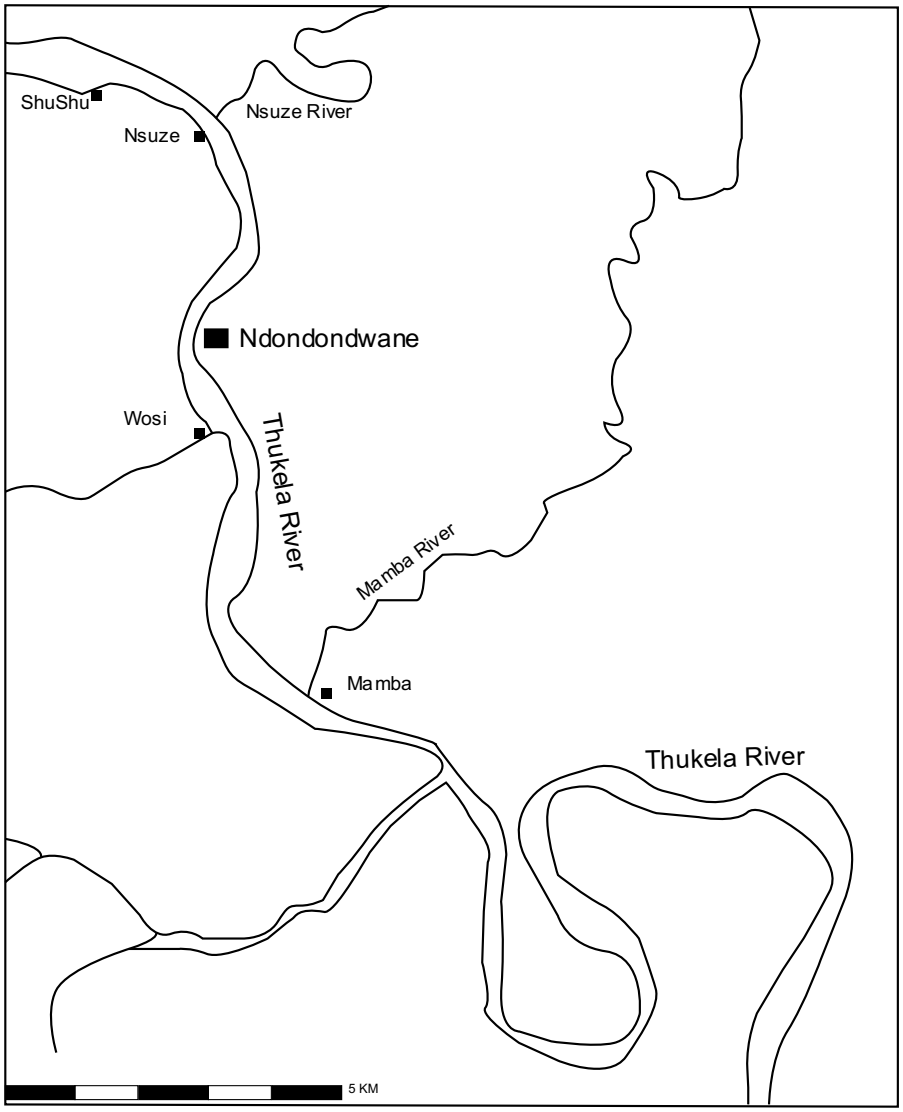


Figure 5.41 Site plan of Ndondondwane. Adapted from Fowler, 2002, Fig.5.6

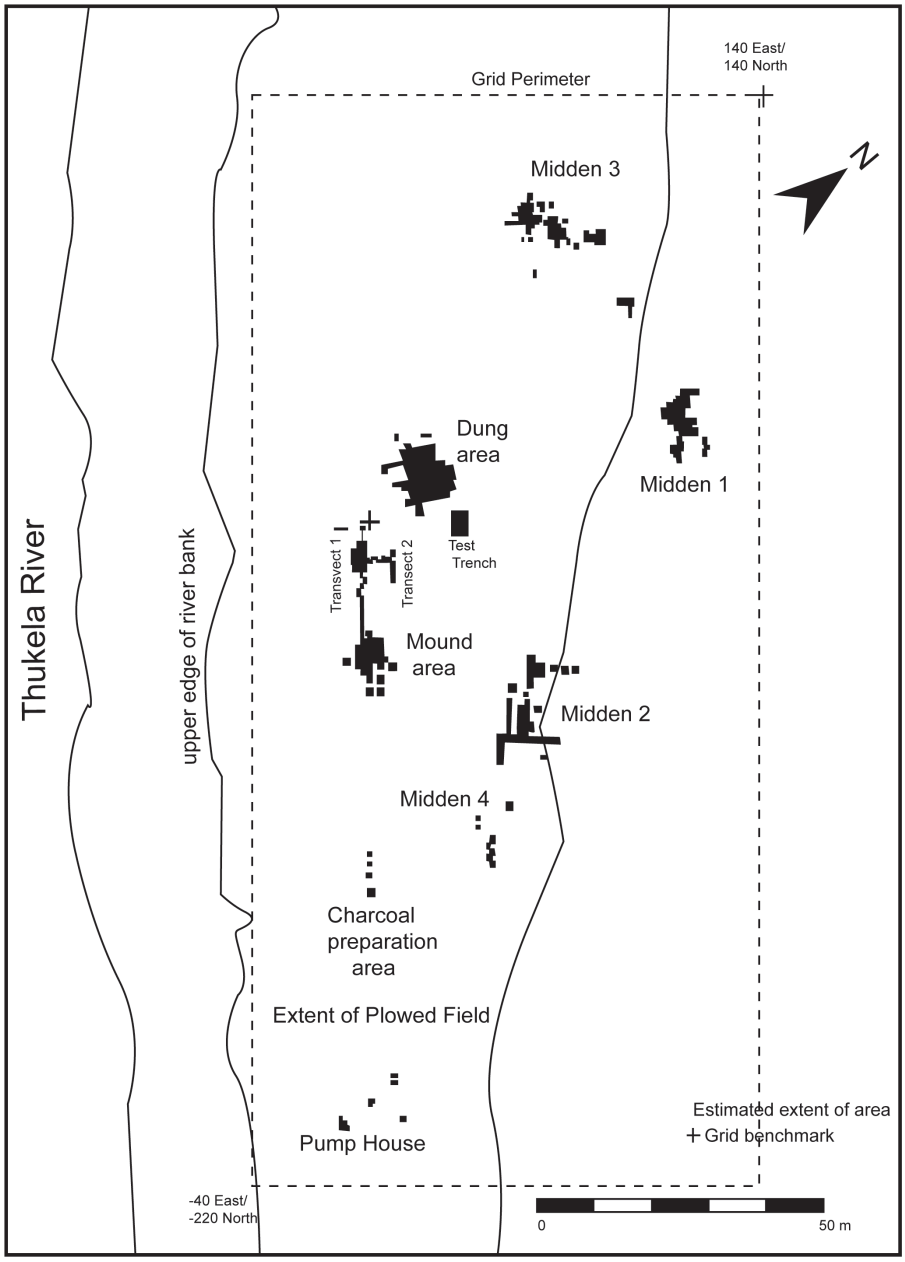


Figure 5.42 The two C^{14} dates from Ndondondwane. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed, were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

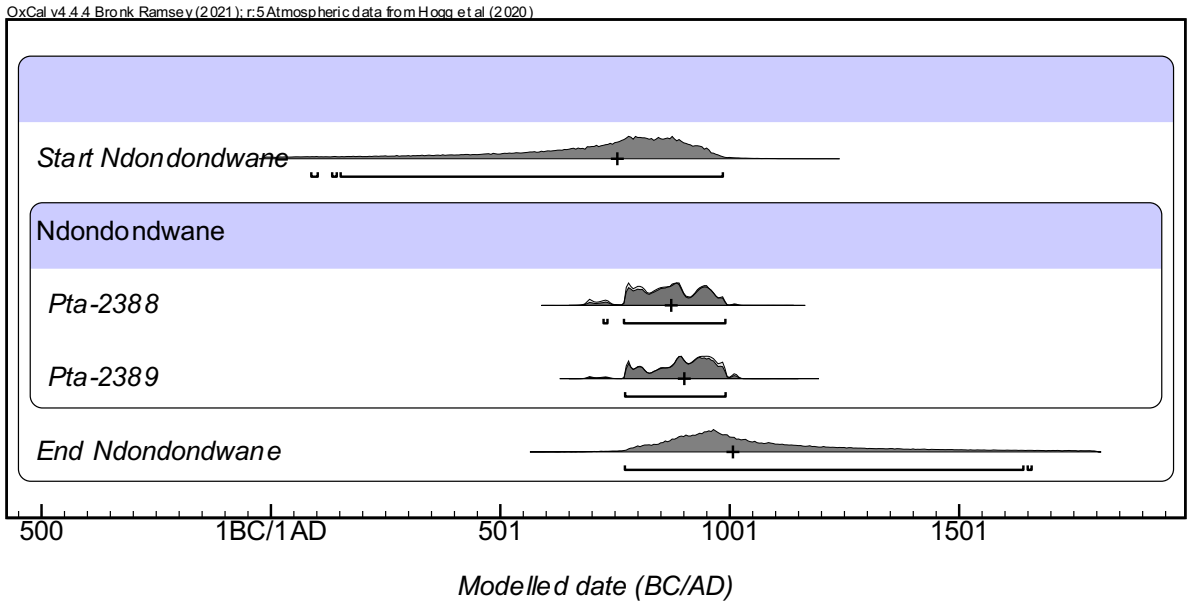


Figure 5.43 Excavation plan of Dung area at Ndondondwane. Adapted from Fowler, 2002, Fig.5.8

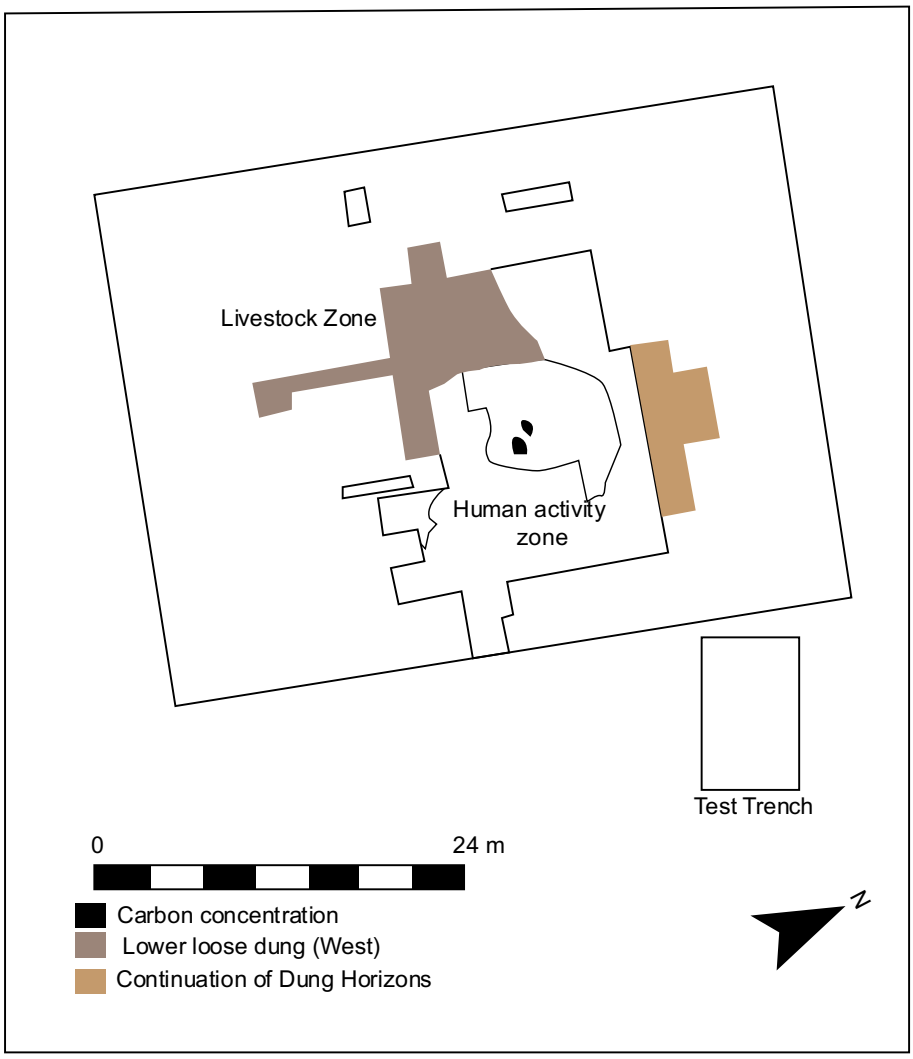
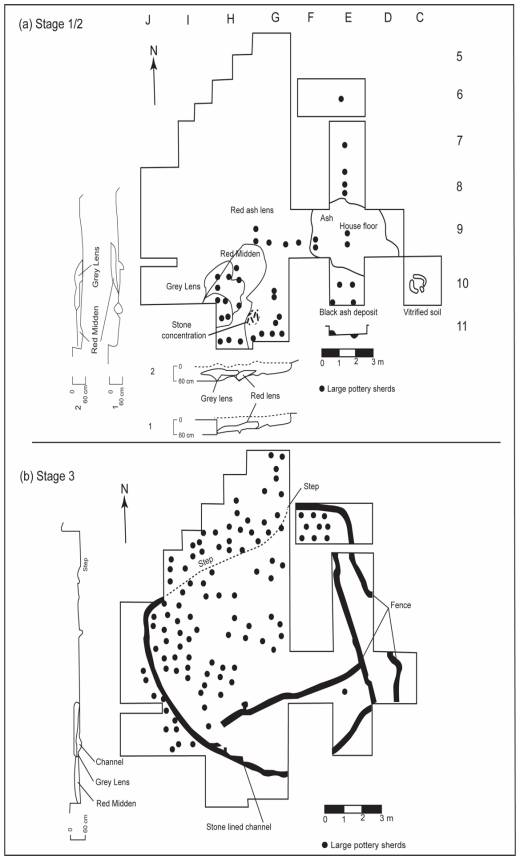


Figure 5.44 Activity areas identified in the Mound Area. Adapted from Fowler, 2002, Fig.5.11

a



b

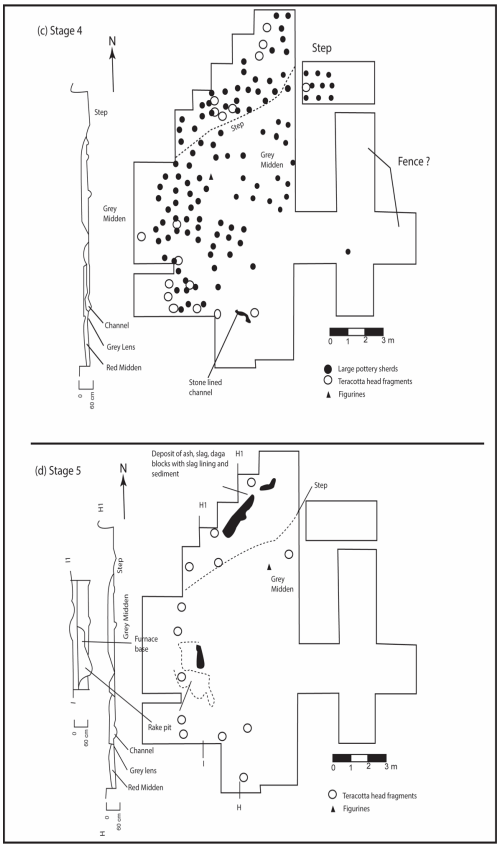


Figure 5.45 Stratigraphy of Dung area at Ndondondwane. Adapted from Fowler, 2002, Fig.5.7

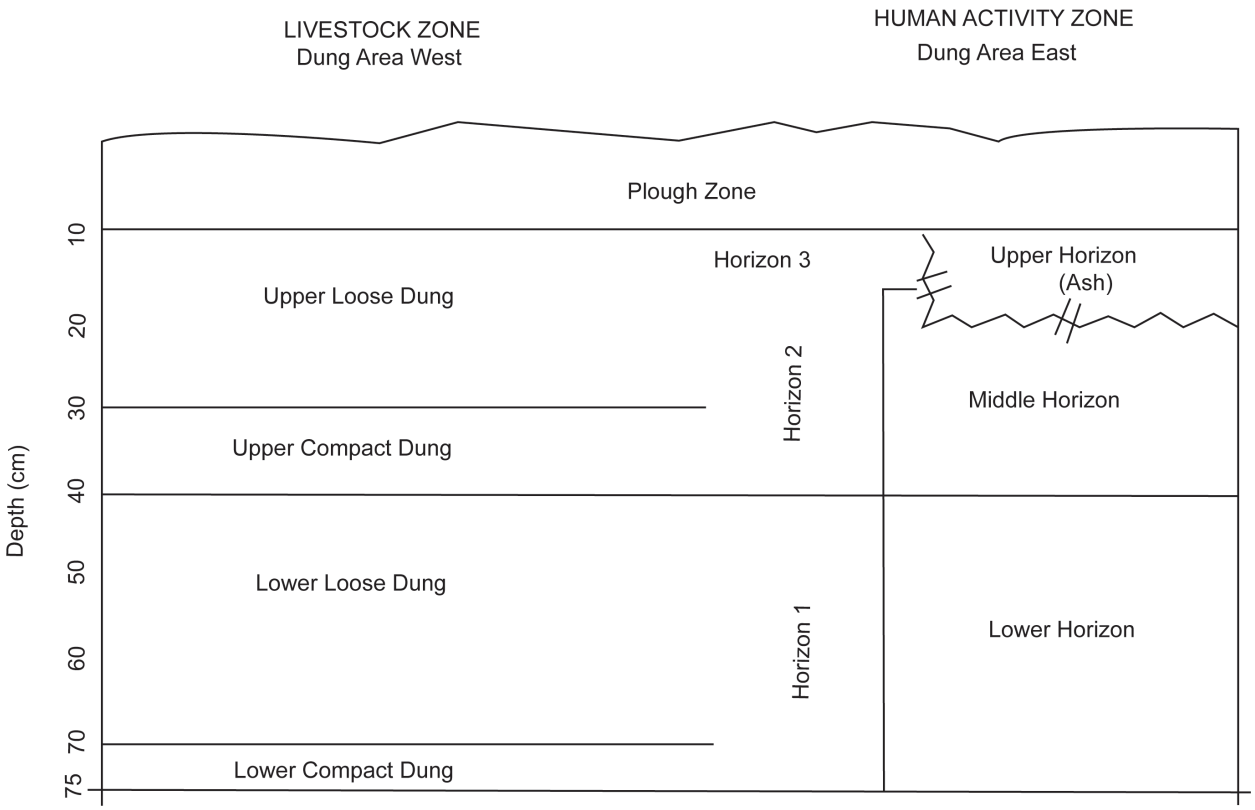


Figure 5.46 Early Iron Age sites from the uMngeni Valley discussed in this chapter. Adapted from Whitelaw, 1994a, Fig. 1

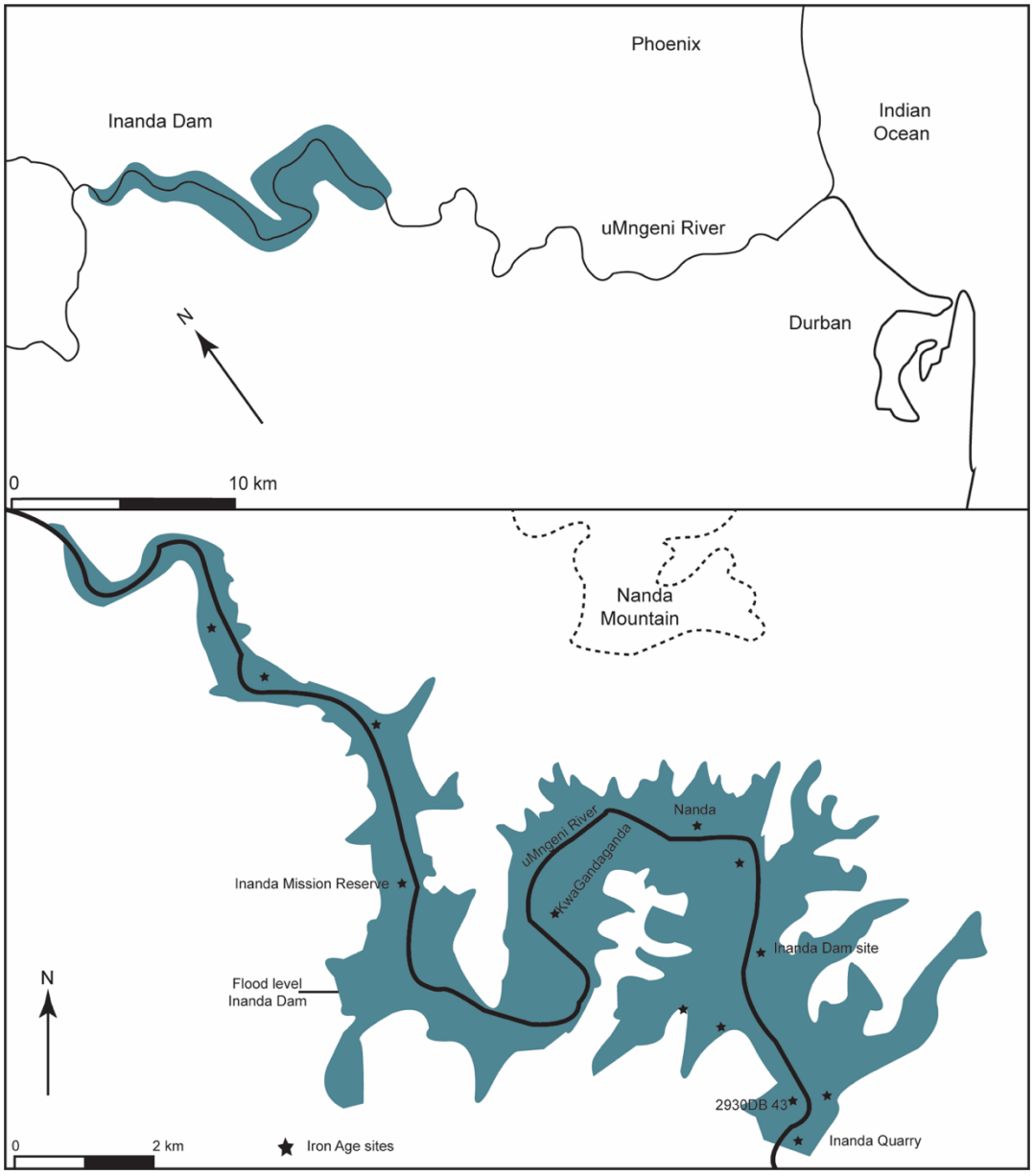


Figure 5.47 Location of KwaGandaganda. Adapted from Whitelaw, 1994a, Fig.2

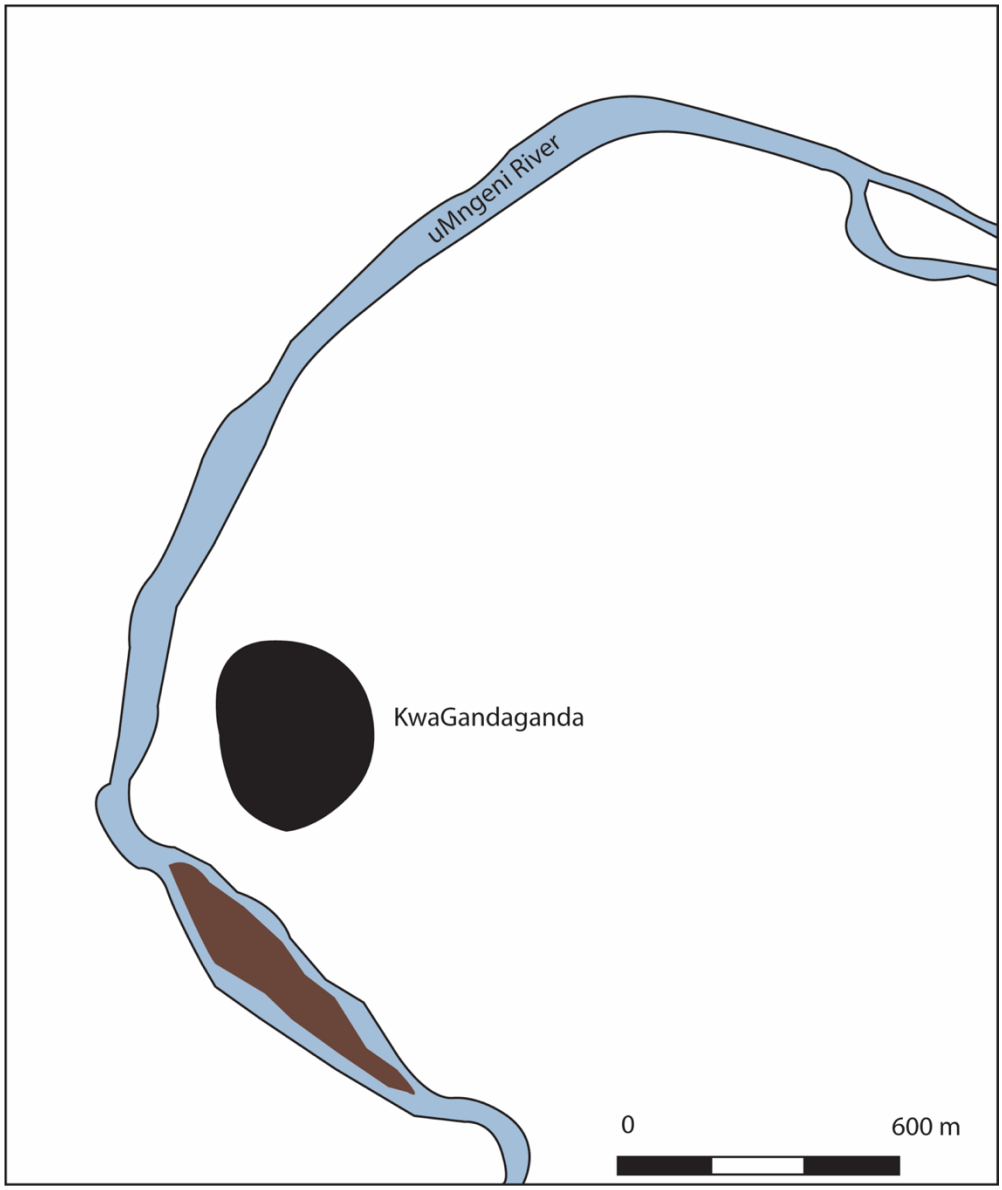


Figure 5.48 Plan of the strips excavated with the bulldozer. Details of excavation areas A and B are shown in Figures 5.49 and 5.50 Adapted from Whitelaw, 1994a, Fig.3a

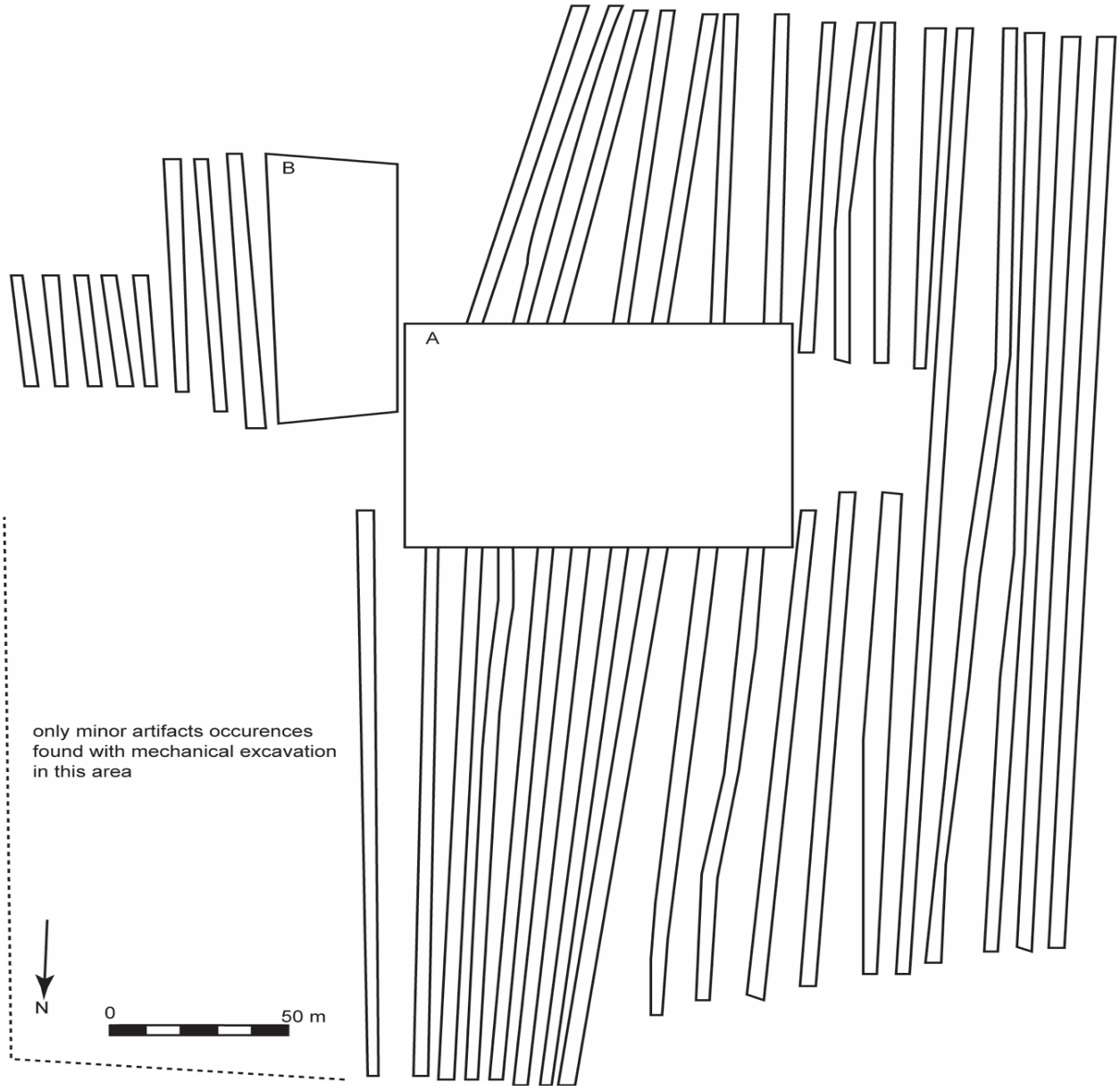


Figure 5.49 Plan of excavation areas A and B and artifact occurrences. G = grid, S = square, TS = test square. Adapted from Whitelaw, 1994a, Fig.3b

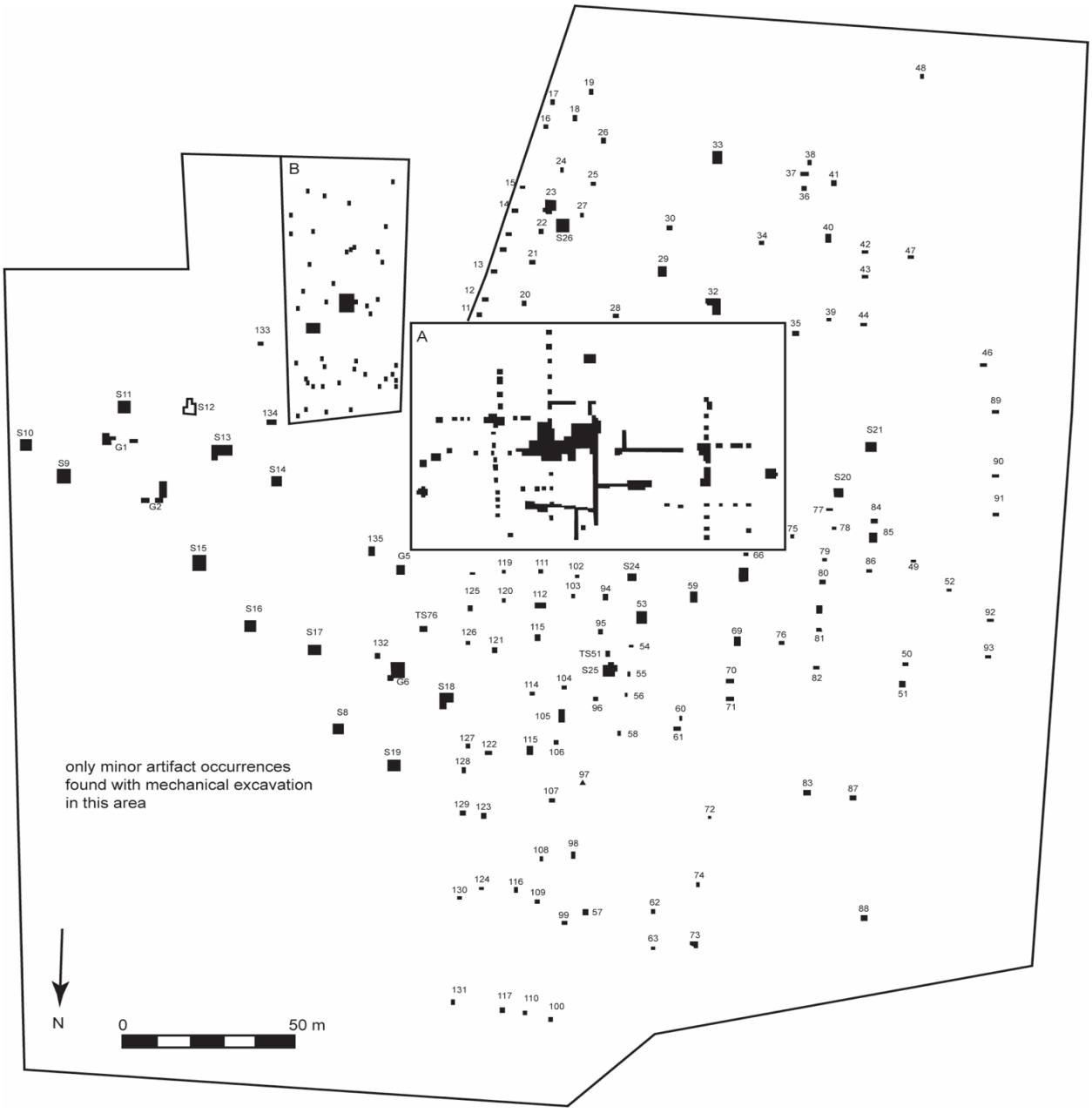


Figure 5.50 Plan of excavation areas A and B and artifact occurrences. G = grid, S = square, TS = test square. Adapted from Whitelaw, 1994a, Fig.3b

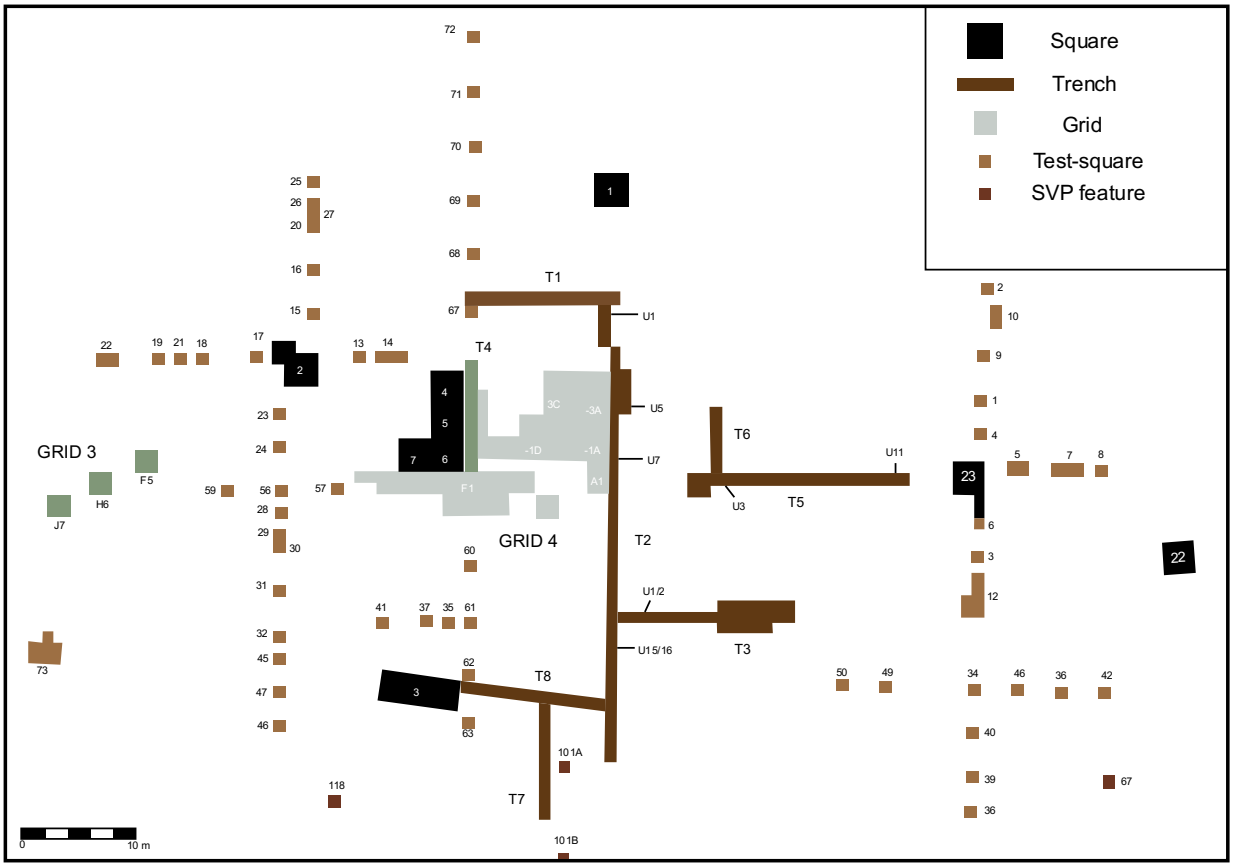


Figure 5.51 Plan of features exposed by the bulldozer. Adapted from Whitelaw, 1994a, Fig.5

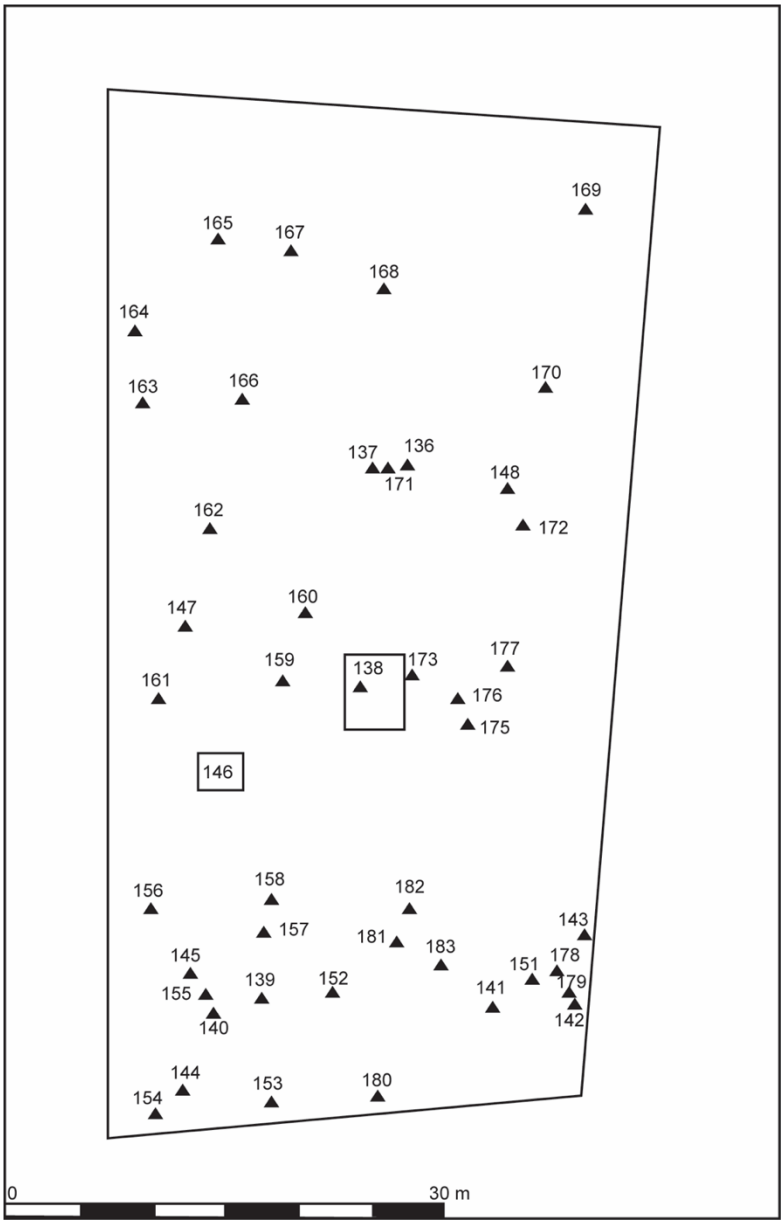


Table 5.3 Charcoal samples from three features at KwaGandaganda were submitted for dating.

Lab ref	Context	Date bp	+/-	Ceramic Phase
Wits-1918	Sq. 25	1395	60	Msuluzi facies
Wits-1919	Sq. 22	1245	60	Ndondondwane facies
Wits-1920	Sq. 14	1080	60	Ntshekane facies
Wits-1937	Sq. 22	1260	60	Ndondondwane facies
Wits-1938	Sq. 25	1315	60	Msuluzi facies

Table 5.4 Daga types and their structural affiliation at the Ntshekane phase of KwaGandaganda

Daga Type	Description	Affiliate feature	Provenience
Granary Floor	Coarse daga pieces. Smooth on one side and grass impressions on the other.	Raised granaries	SVP 138, Square 26. Less well-preserved examples at SVP 32 and 33
Plaster		Plastered hut, or courtyard floor	SVP 69
Hut floor	Thin plaster, sporadically laid out directly on the ground surface 2 to 3cm thick daga pieces, smooth on one side, coarse on the reverse	Broken hut floor	SVP 59, SVP 105
Undiagnostic daga pieces		Not possible to determine	Squares 13 and 15

Figure 5.52 The five C^{14} dates from KwaGandaganda. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

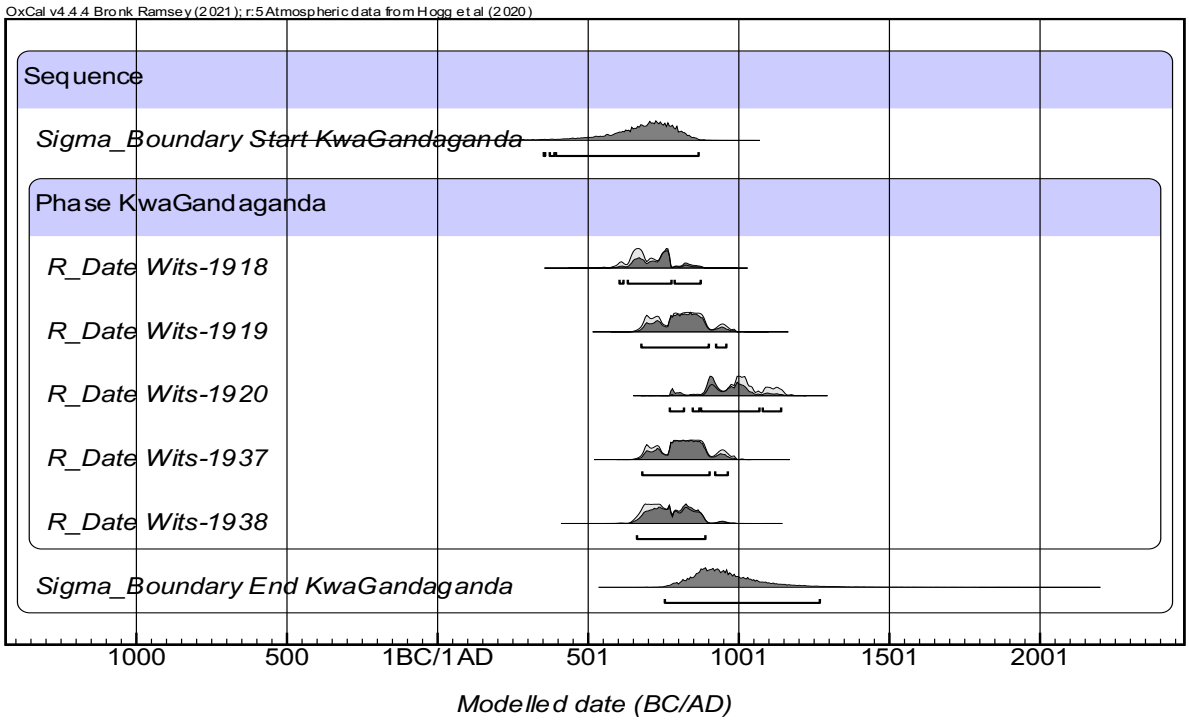


Figure 5.53 Plan of Ntshekane features identified at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 30

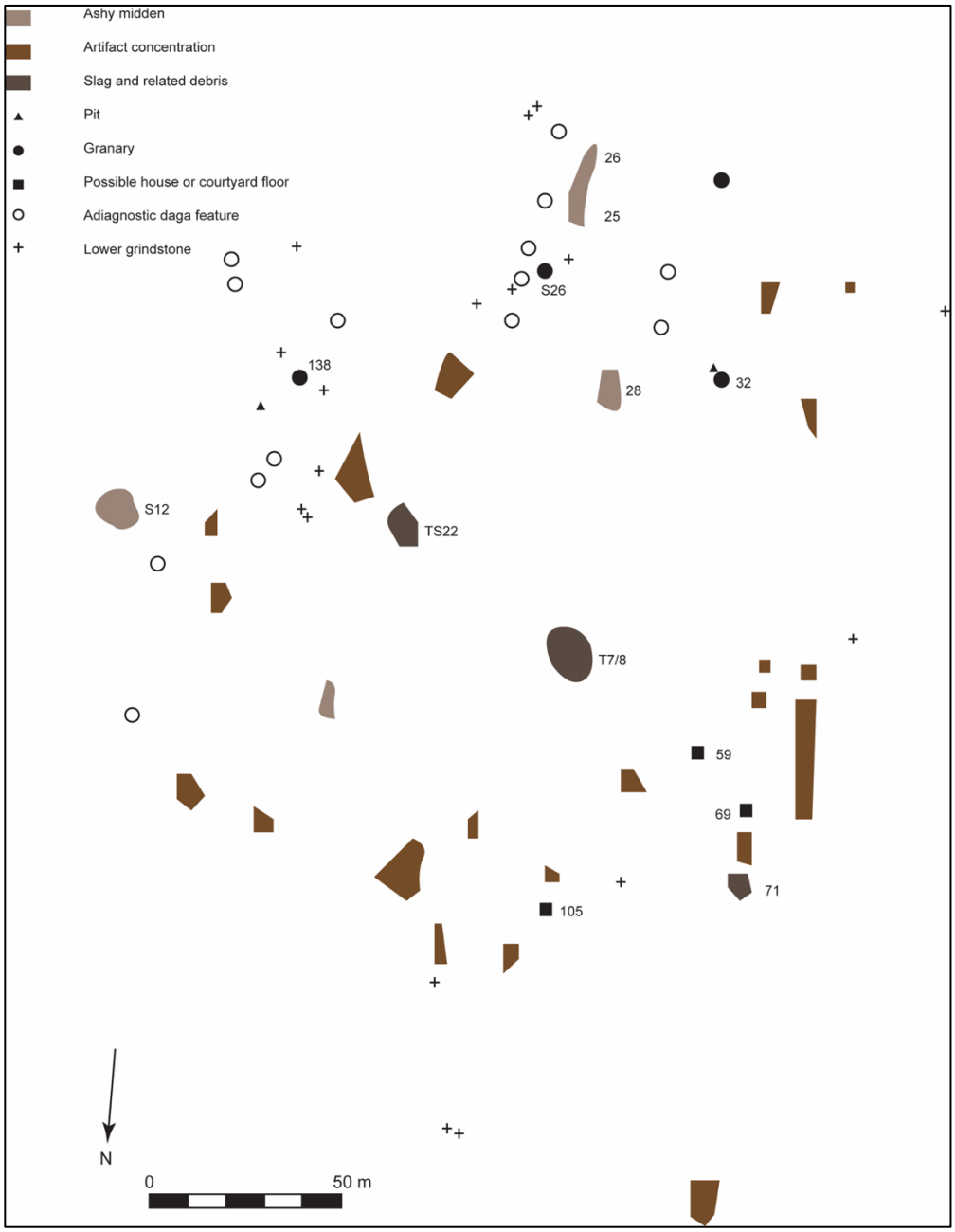


Figure 5.54 Southern sections plans of TS22, TS19, and TS18 at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 16

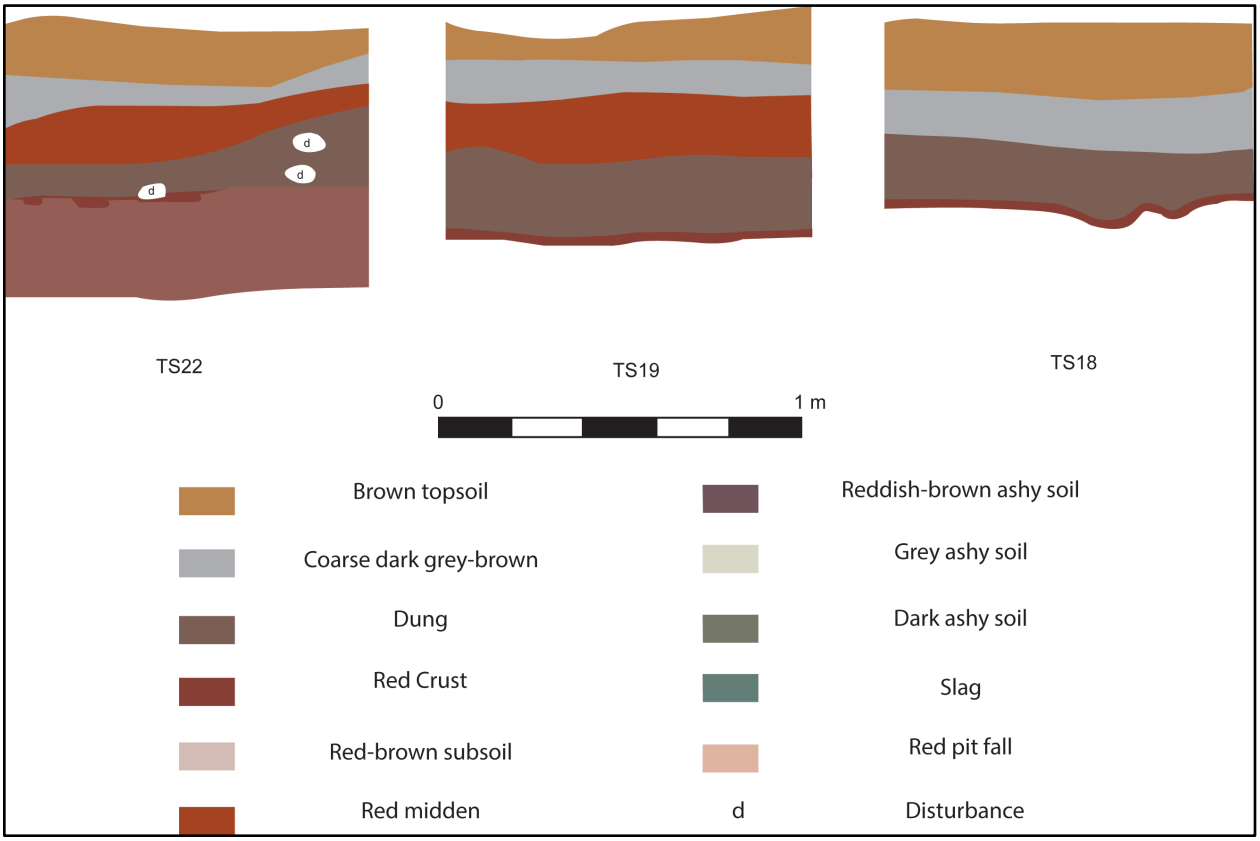


Figure 5.55 Southern section of Grid 4, F1at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 13

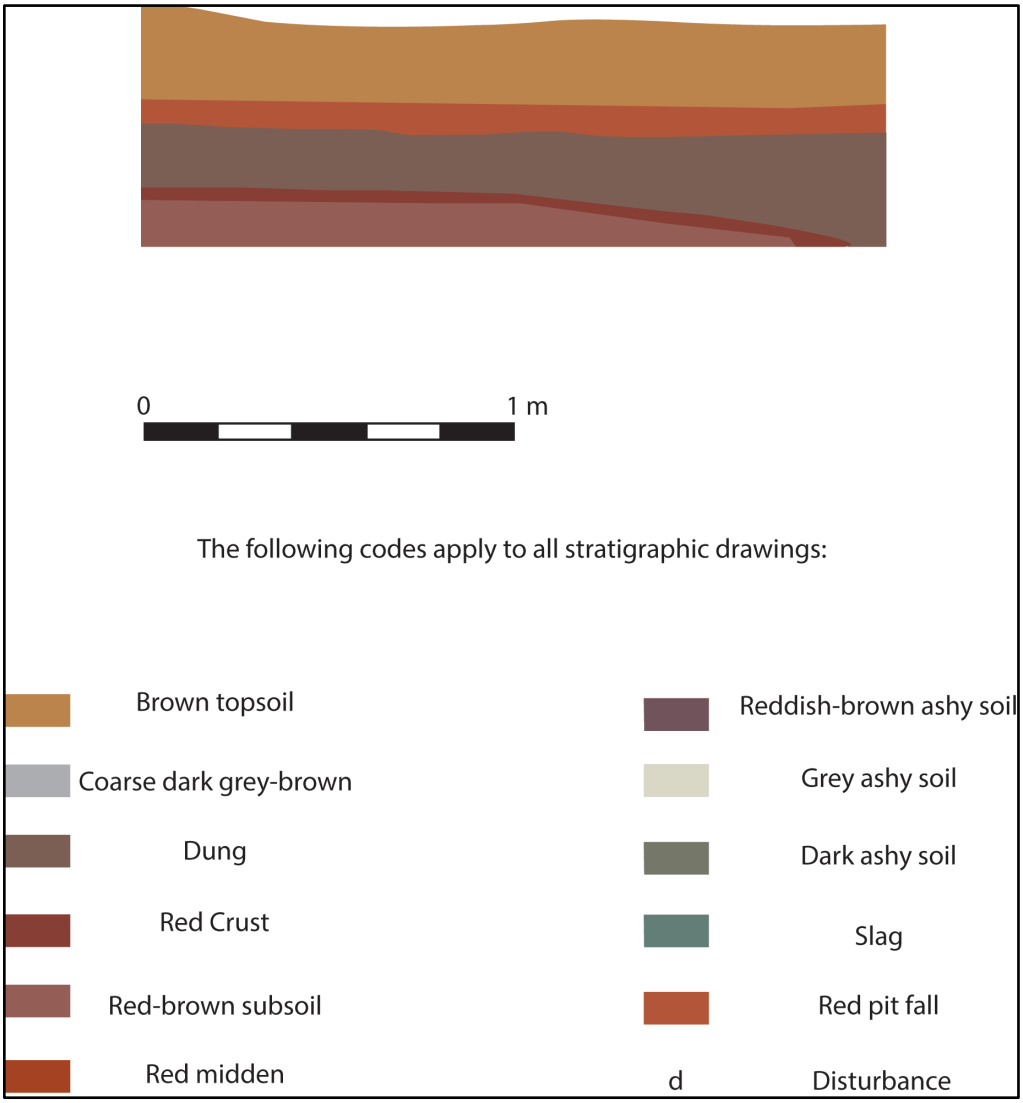


Figure 5.56 Detailed plan of Byre 1 in Grid 4 and surrounding features at KwaGandaganda Grid 4, F1at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 14

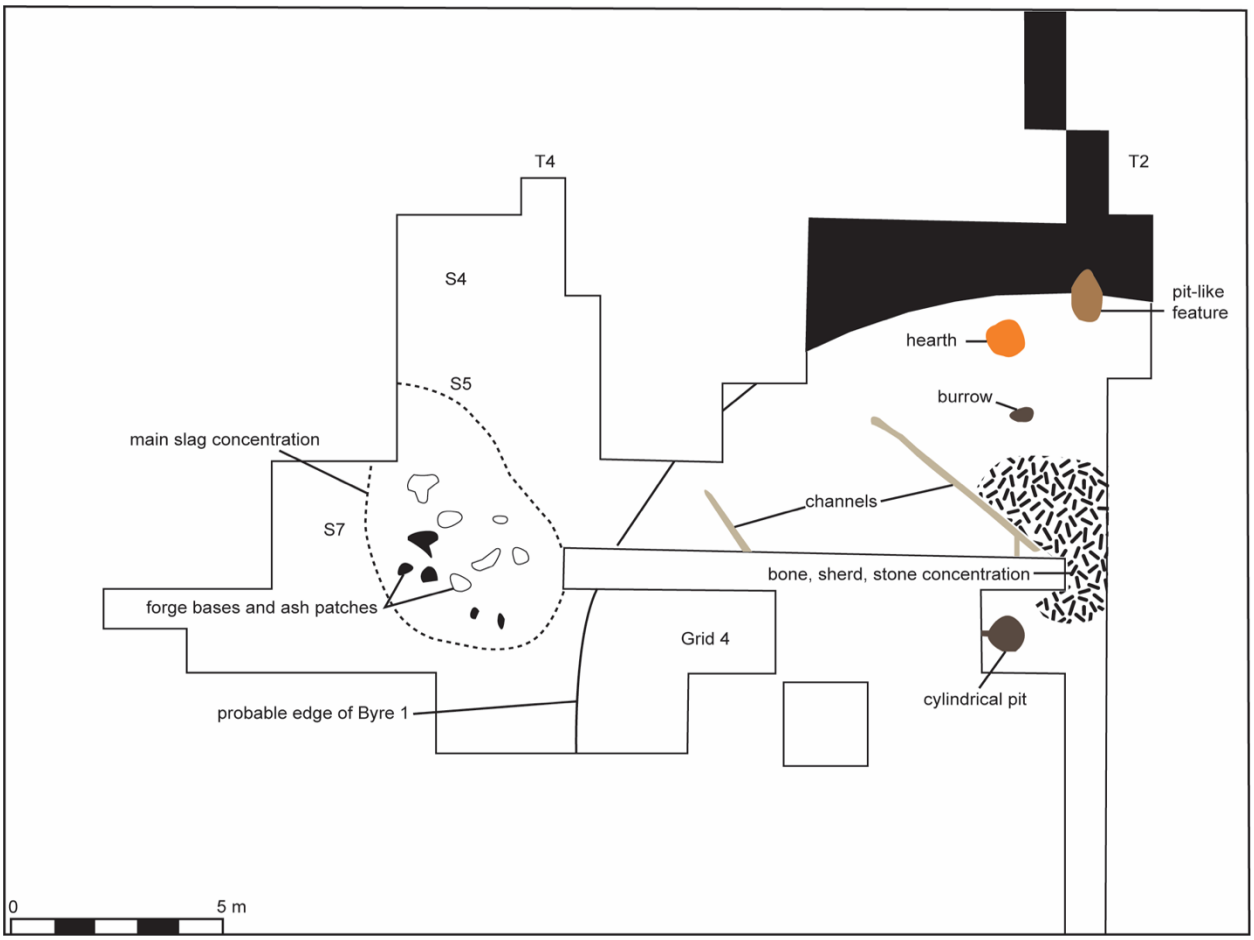


Figure 5.57 Plan of features associated with the Ndondondwane phase at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 31

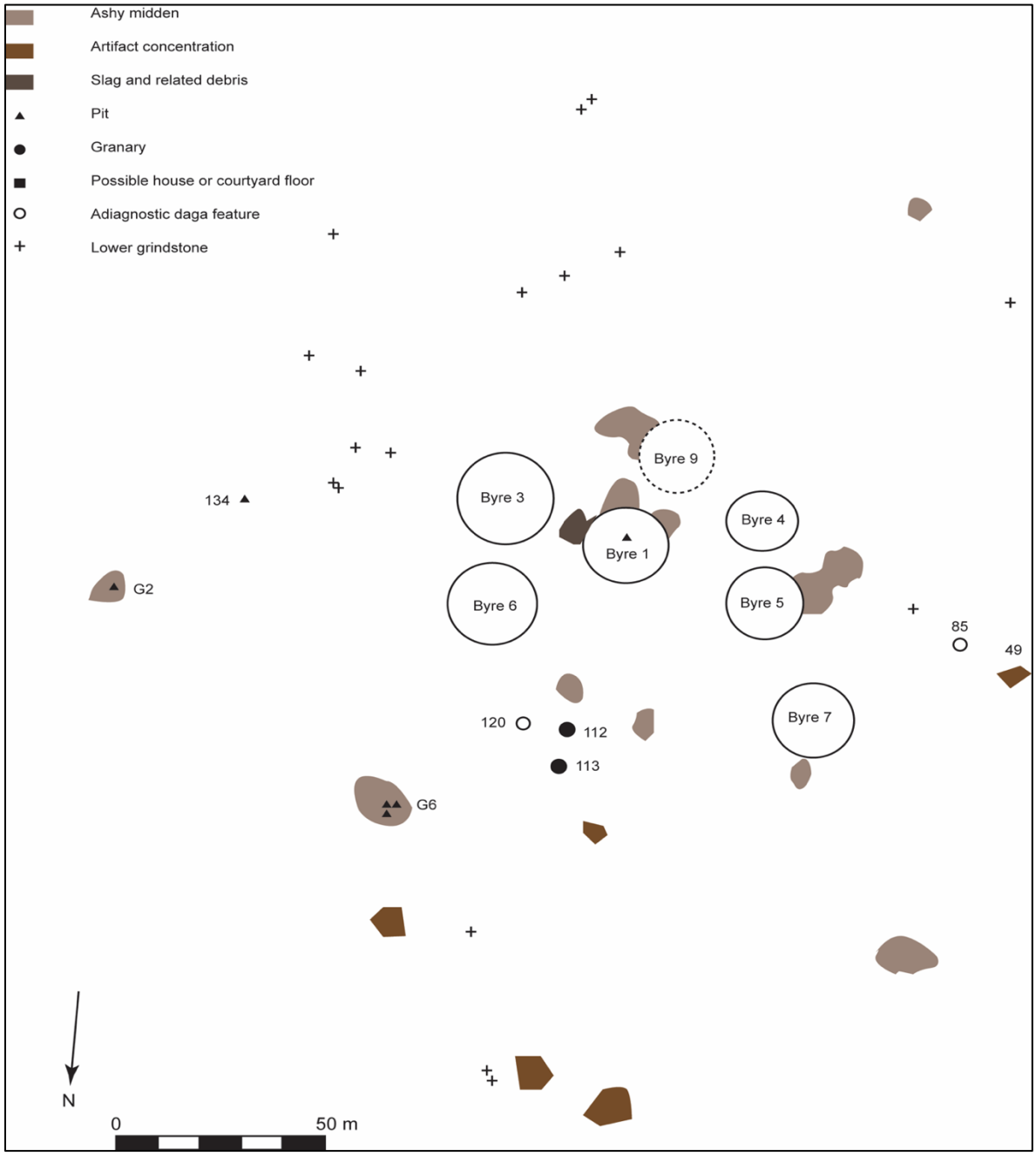


Figure 5.58 Western sections of Squares a) F5, b) H6, and c) J7 in Grid 3 at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 17

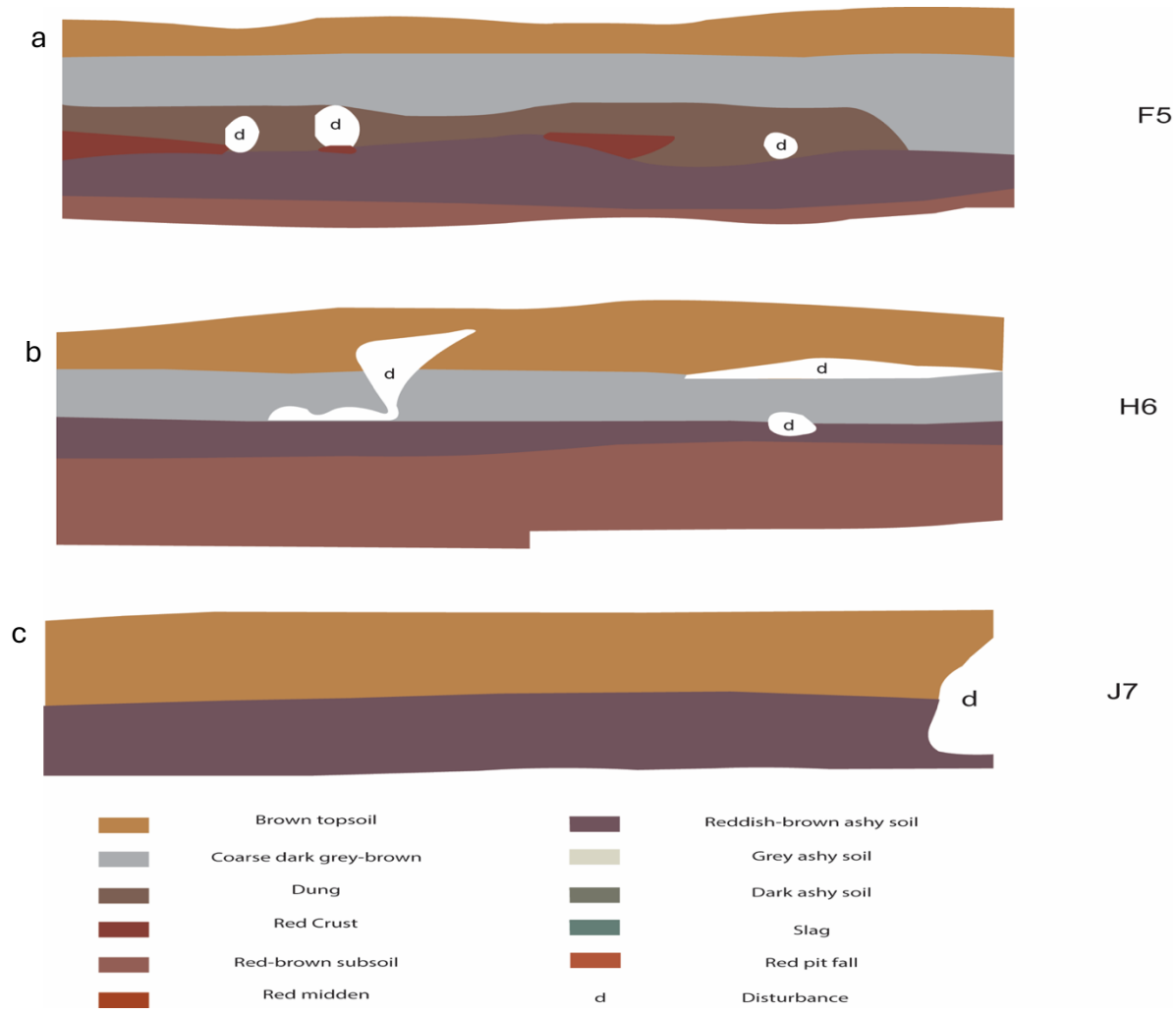


Figure 5.59 Plan and section of Square 23 and TS6 at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 18

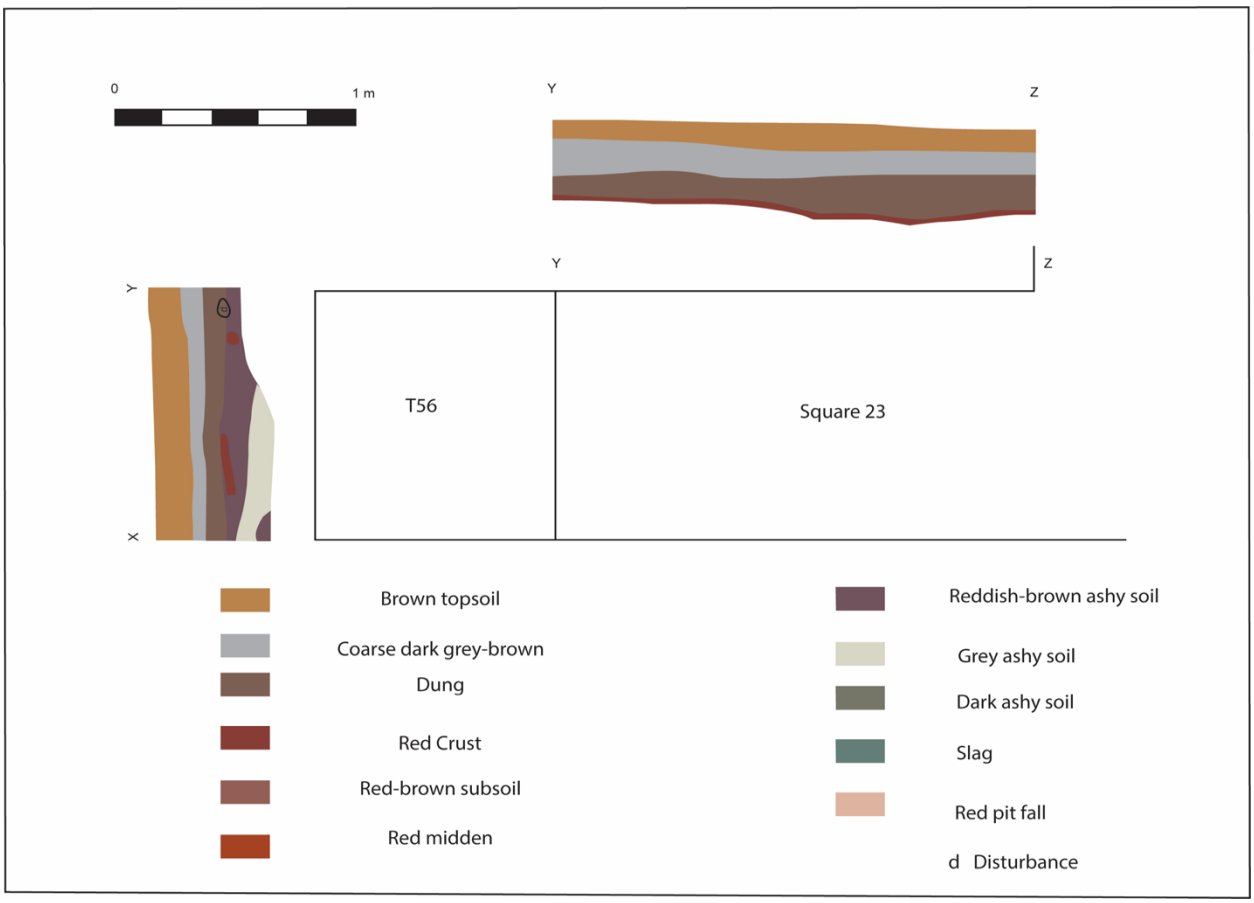


Figure 5.60 Plan and section of Grid 6. The broken lines indicate pits associated with the Msuluzi phase, which were found below the midden at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 21

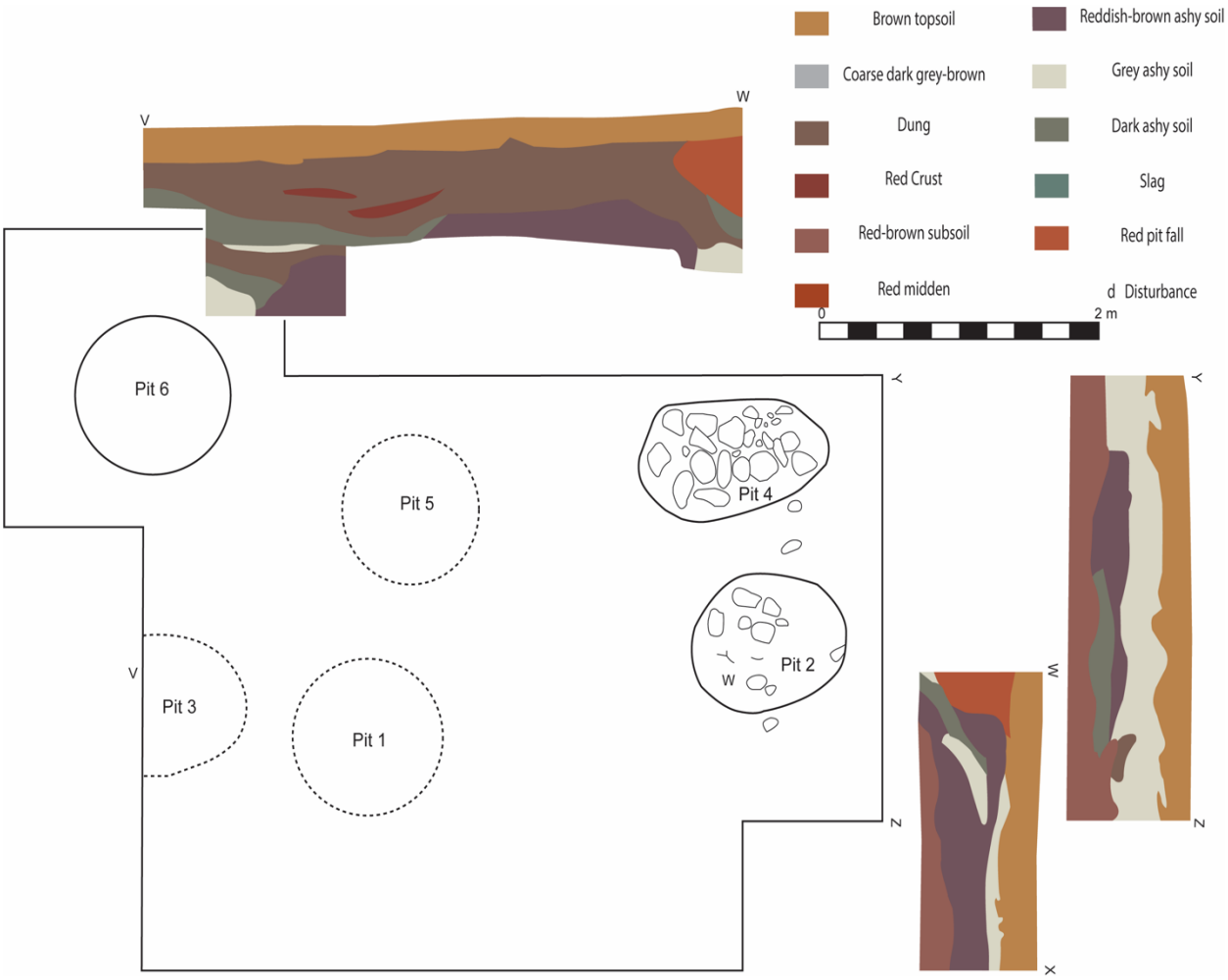


Figure 5.61 Plan and section of Square 25 and TS51 at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 23

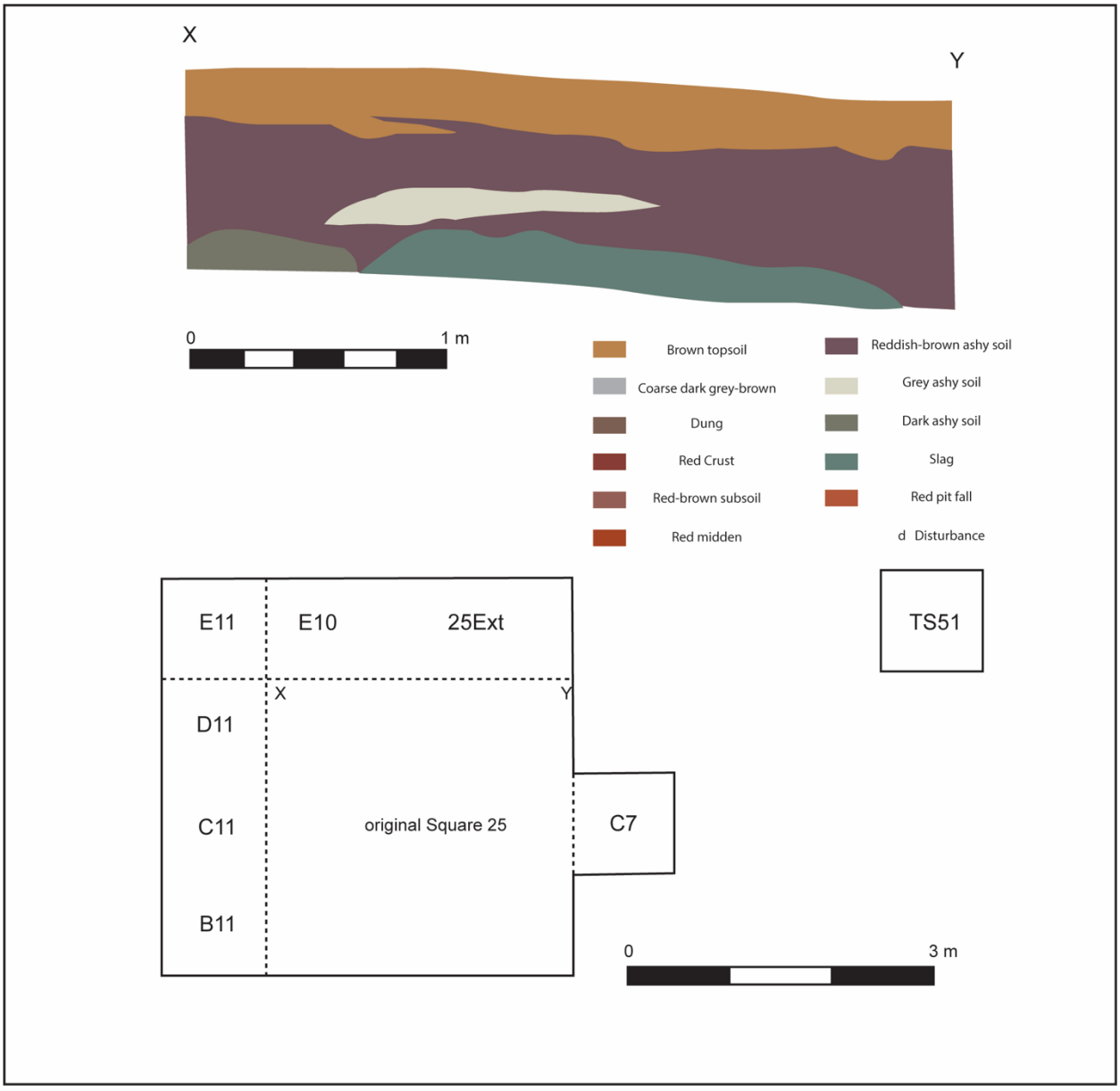


Figure 5.62 Plan of Msuluzi features at KwaGandaganda. Adapted from Whitelaw, 1994a, Fig. 33



Figure 5.63 Plan of Msuluzi features at KwaGandaganda. Adapted from Whitelaw, 1994b, Fig. 5

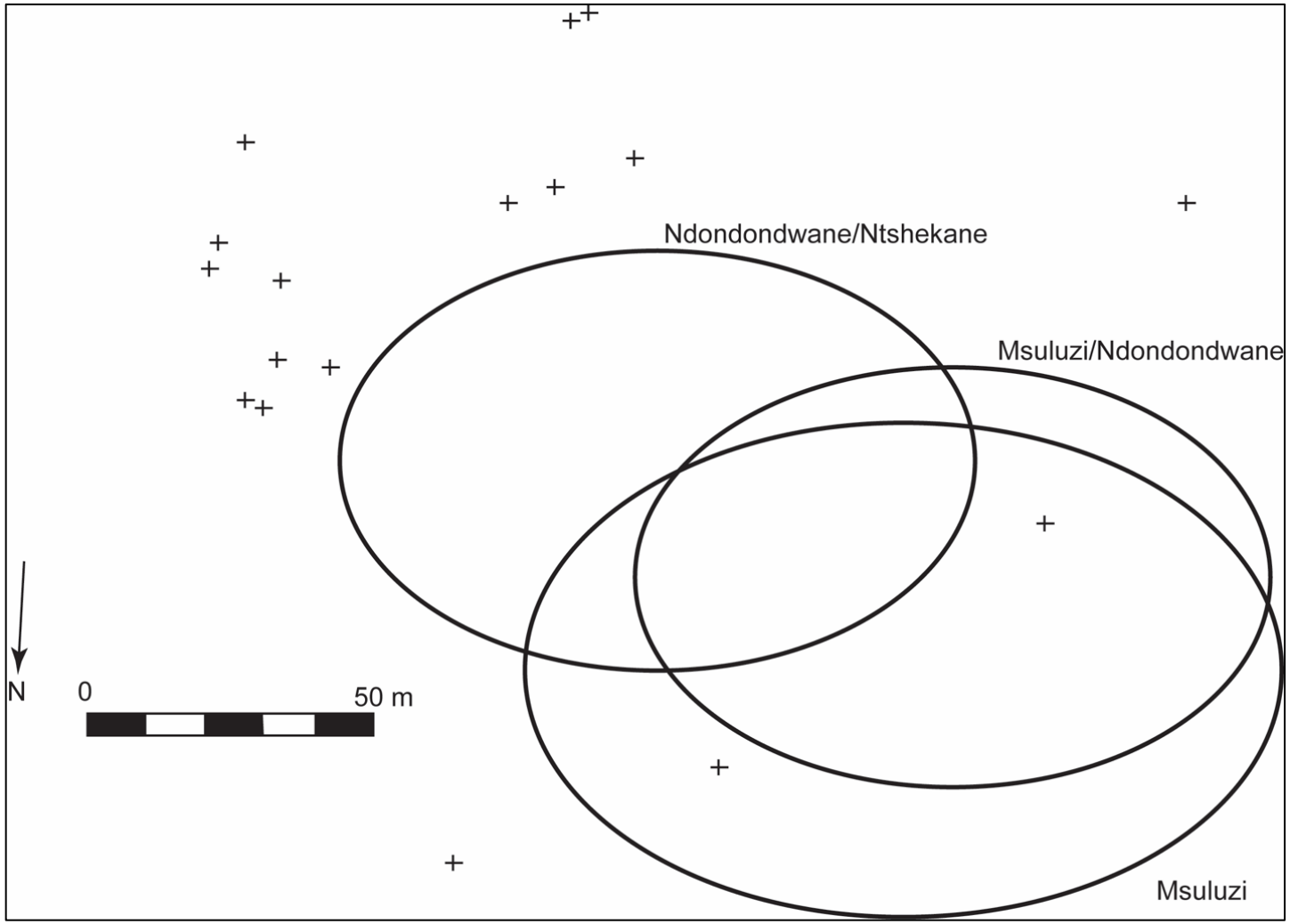


Figure 5.64 Plan of both Ndondondwane and Ntshekane phase features at KwaGandaganda. Adapted from Whitelaw, 1994b, Fig. 3

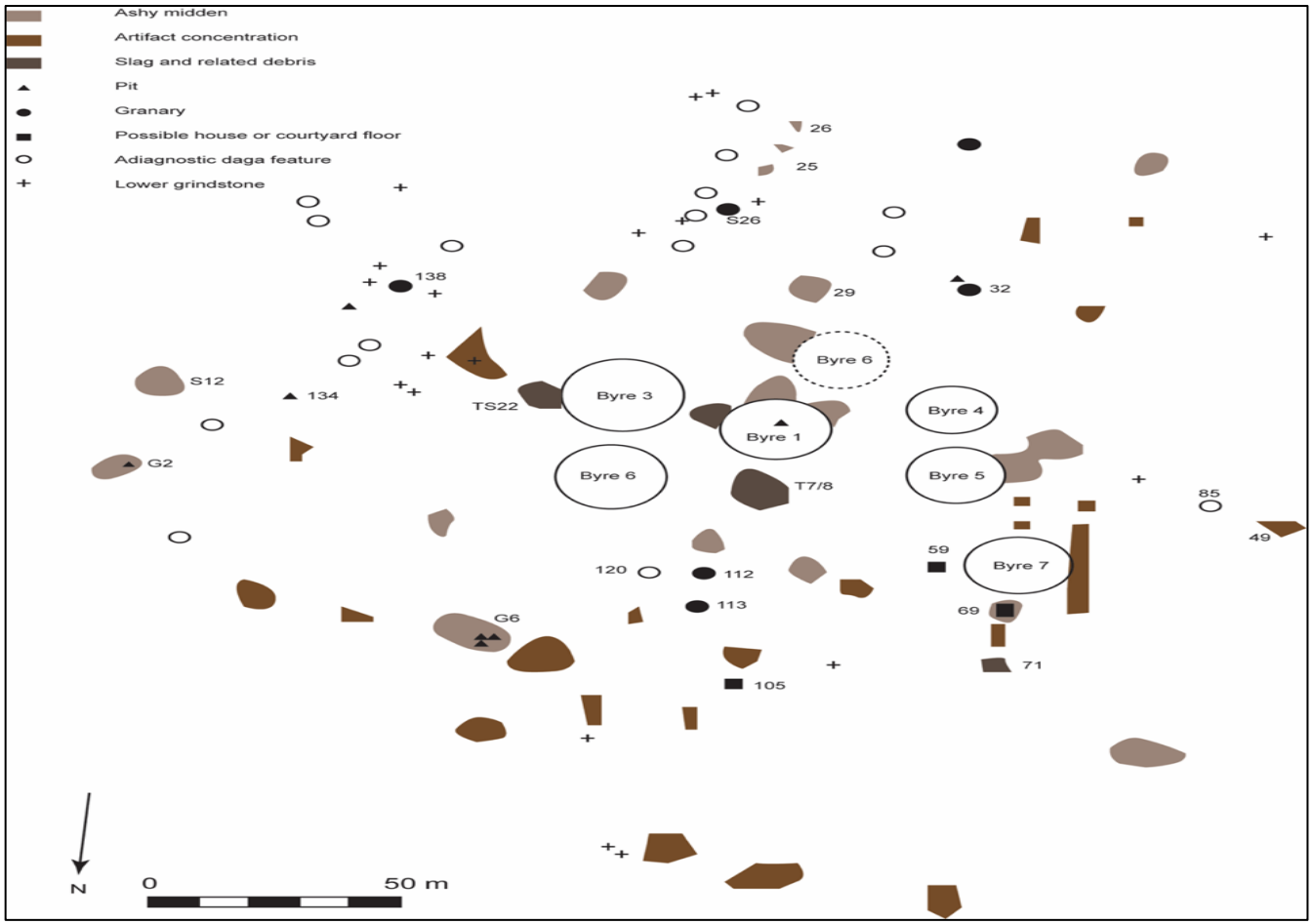


Figure 5.65 Location of Nanda and detail of areas excavated on Nanda. Adapted from Whitelaw, 1993, Fig. 1

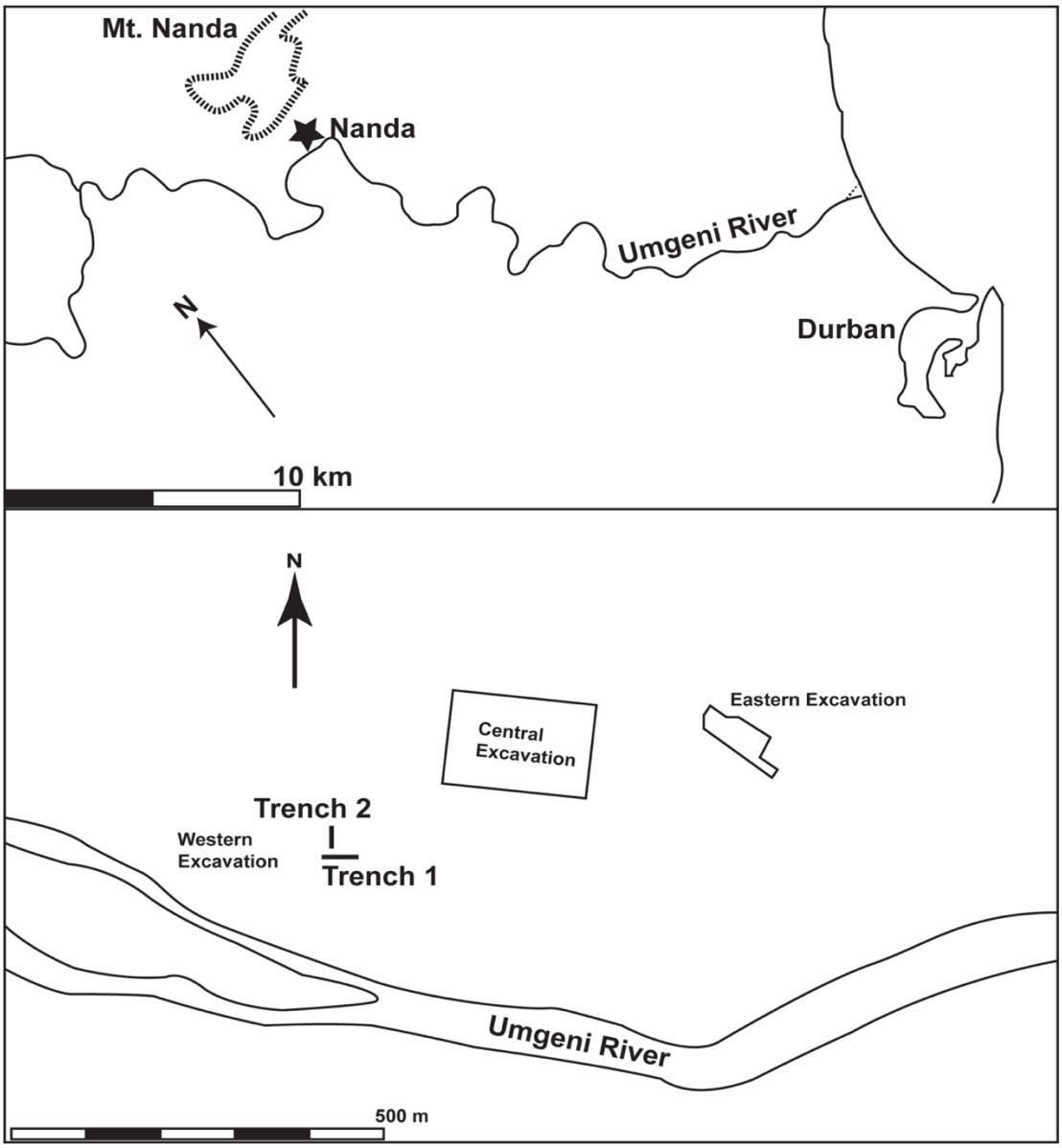


Figure 5.66 Site plan of central excavations at Nanda in increasing detail from A to C. Adapted from Whitelaw, 1993, Fig. 2

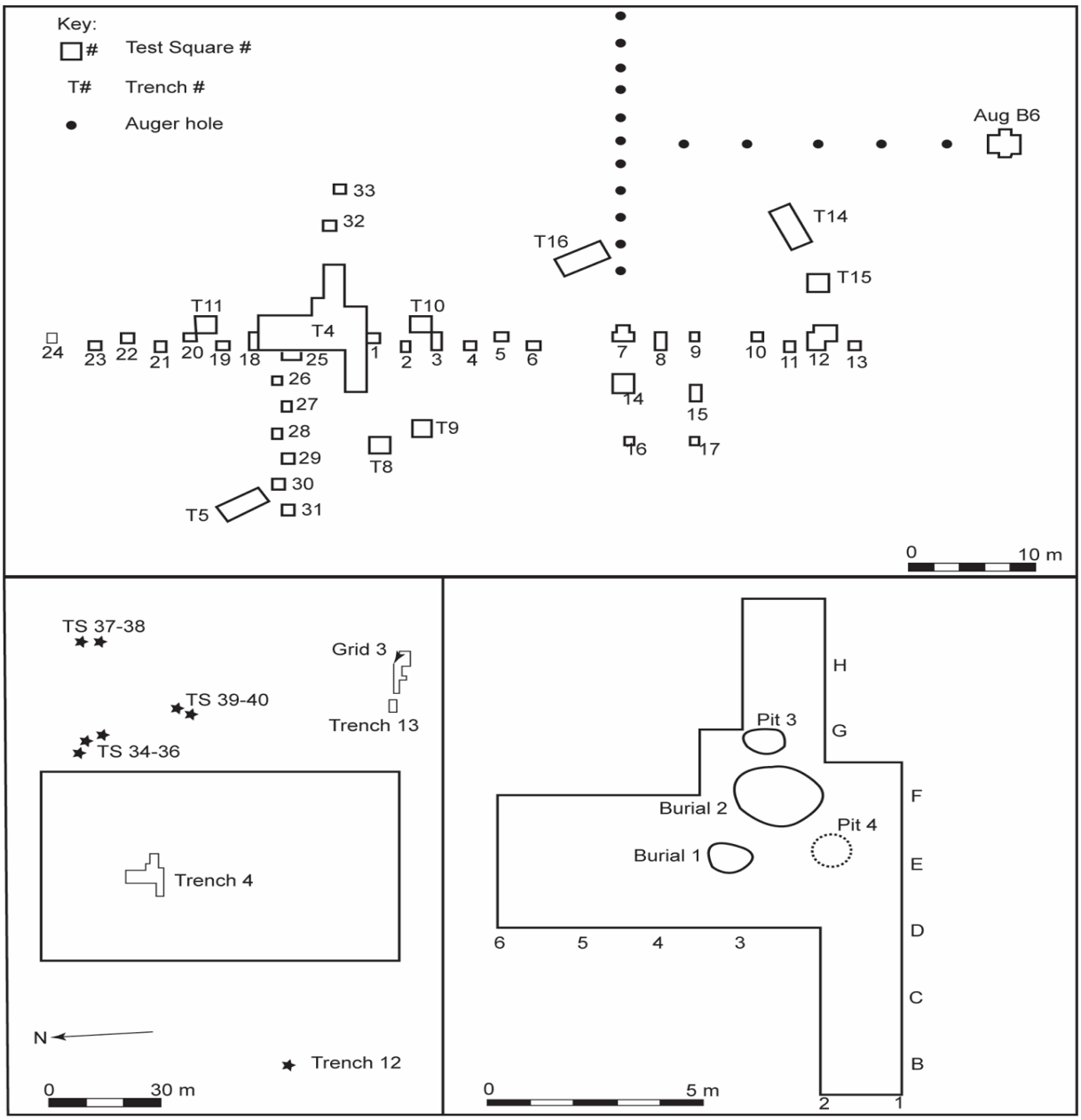


Figure 5.67 Sections and plan of Grid 3 at Nanda. Adapted from Whitelaw, 1993, Fig. 3

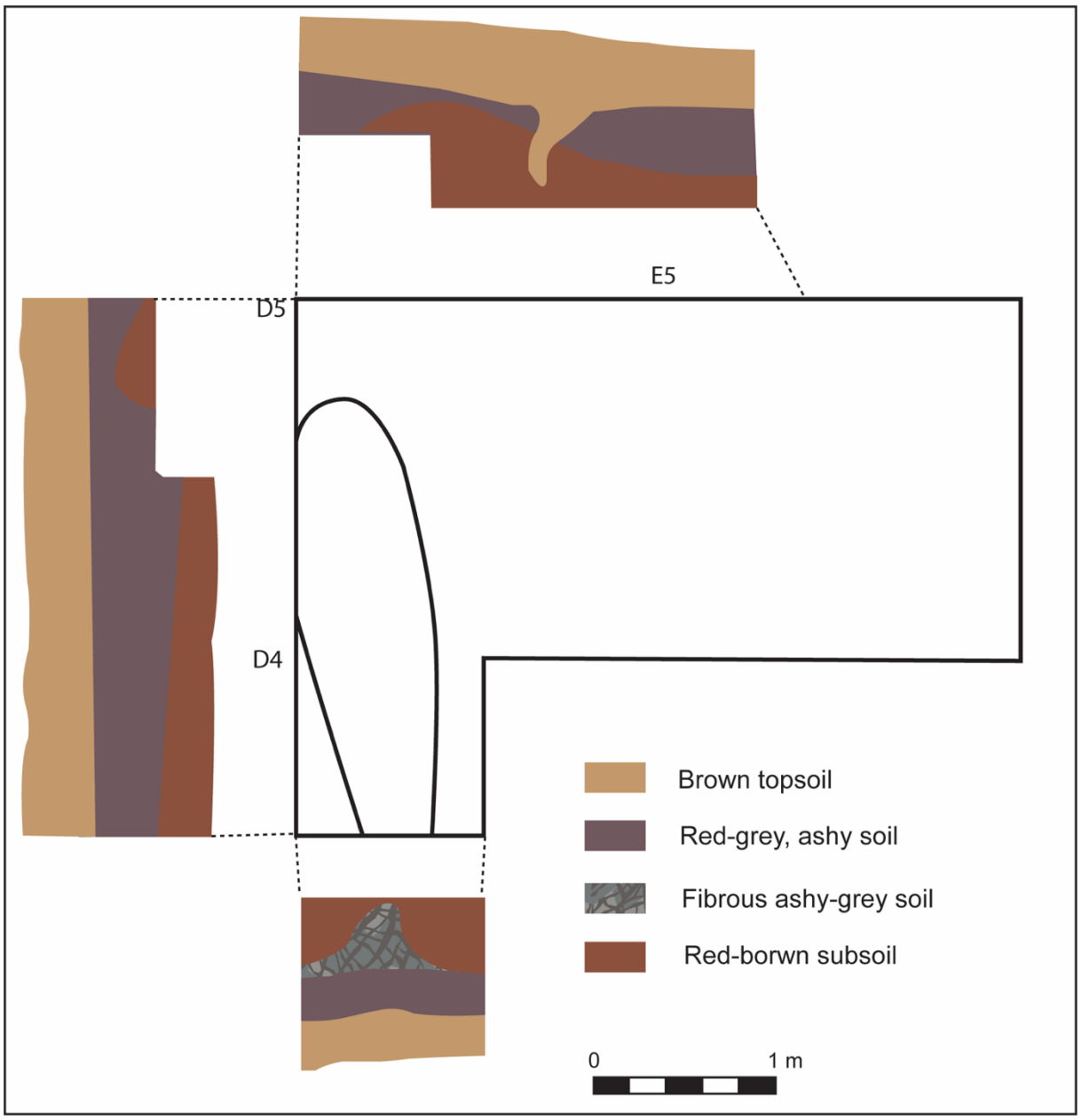


Figure 5.68 The C^{14} date from Nanda. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

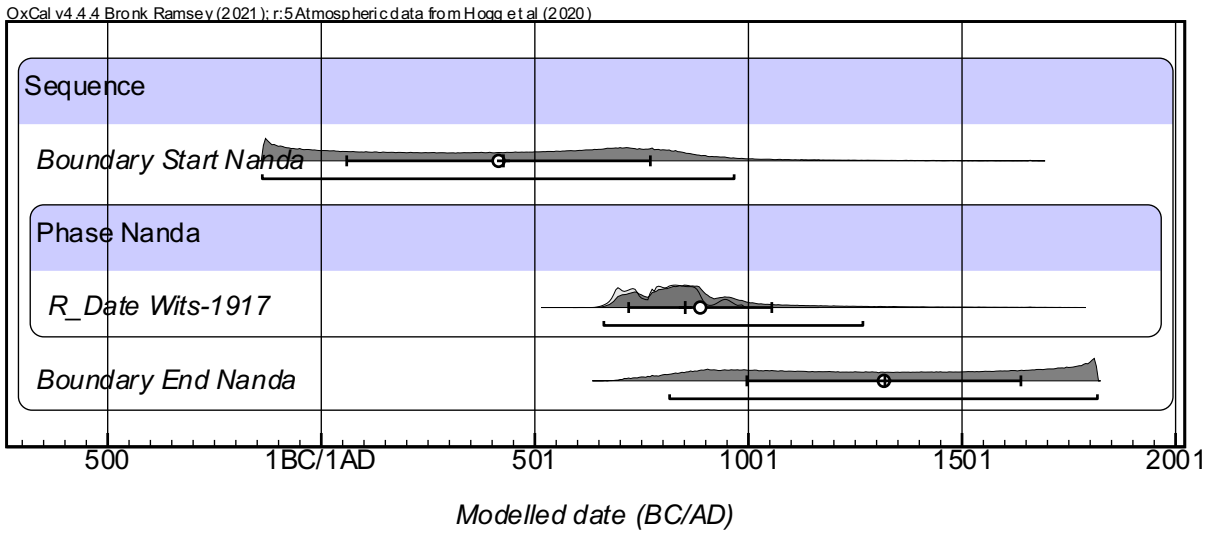


Figure 5.69 Plan of iNanda Dam site. Adapted from Maggs & Ward, 1986, Fig. 1

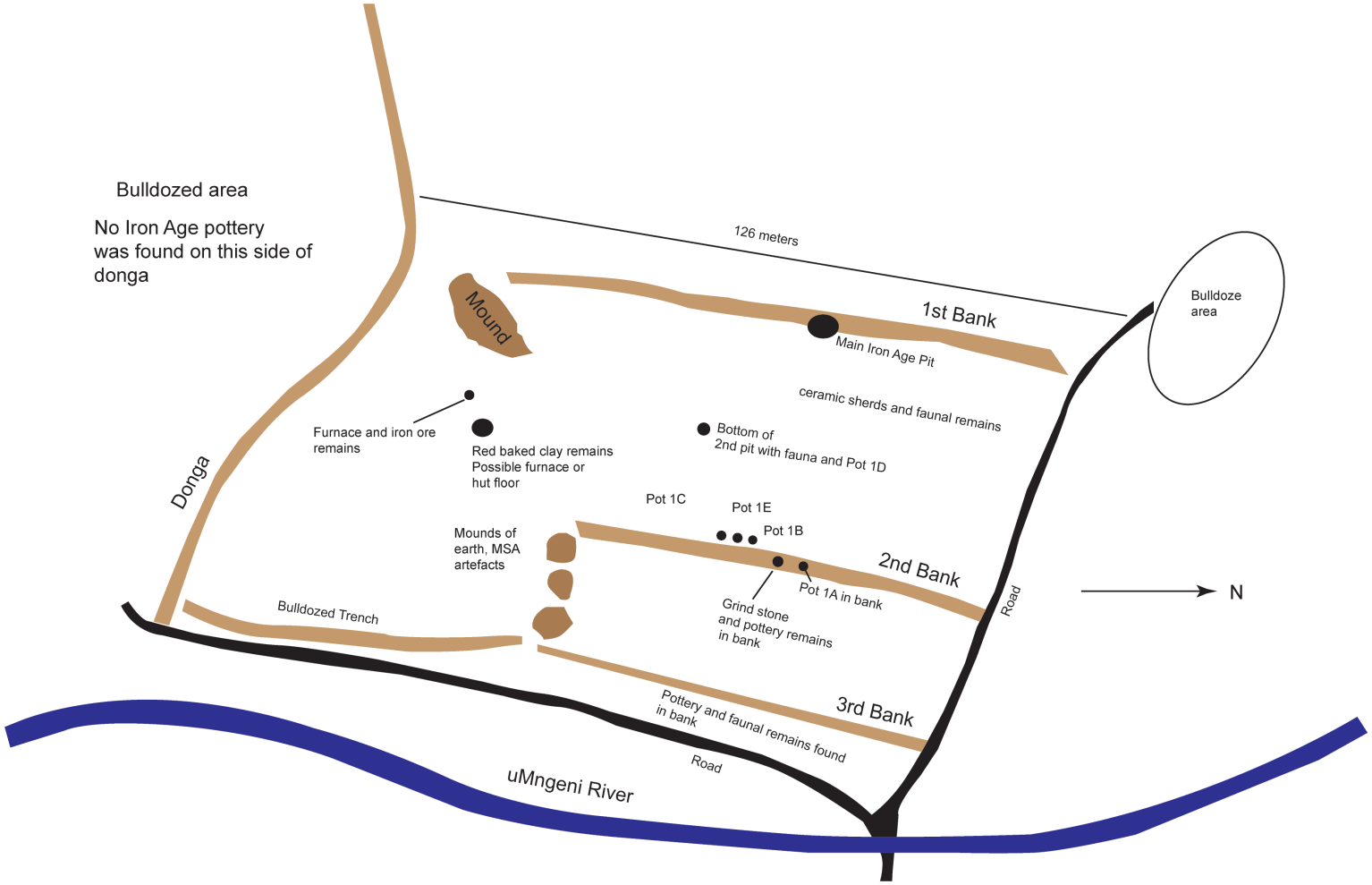


Figure 5.70 The C^{14} date from the iNanda Dam site. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

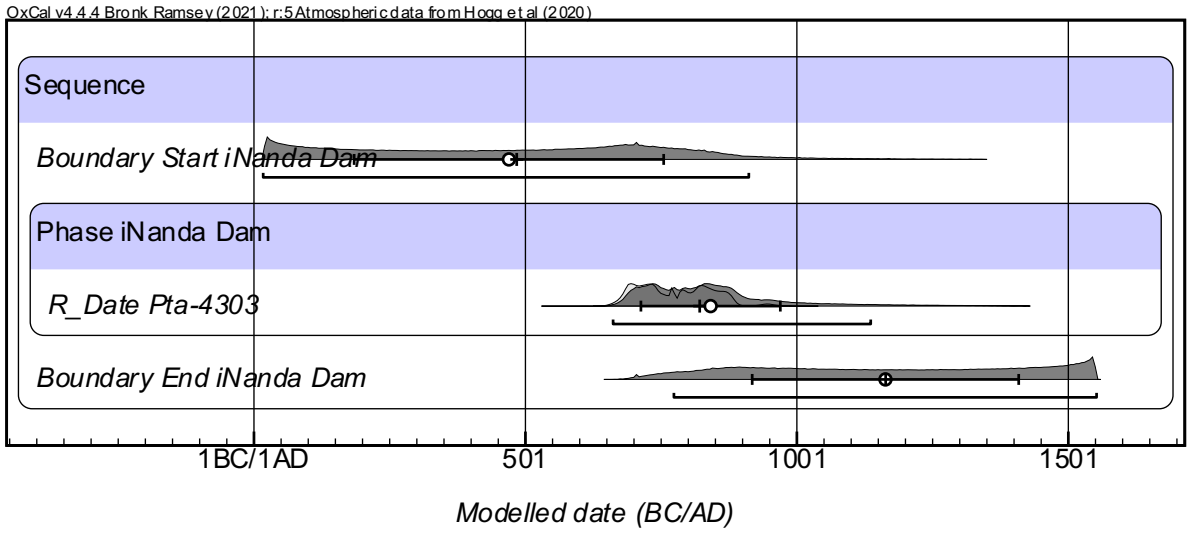


Figure 5.71 Plan of features at iNanda Quarry site. Adapted from Maggs & Ward, 1986, Fig. 1

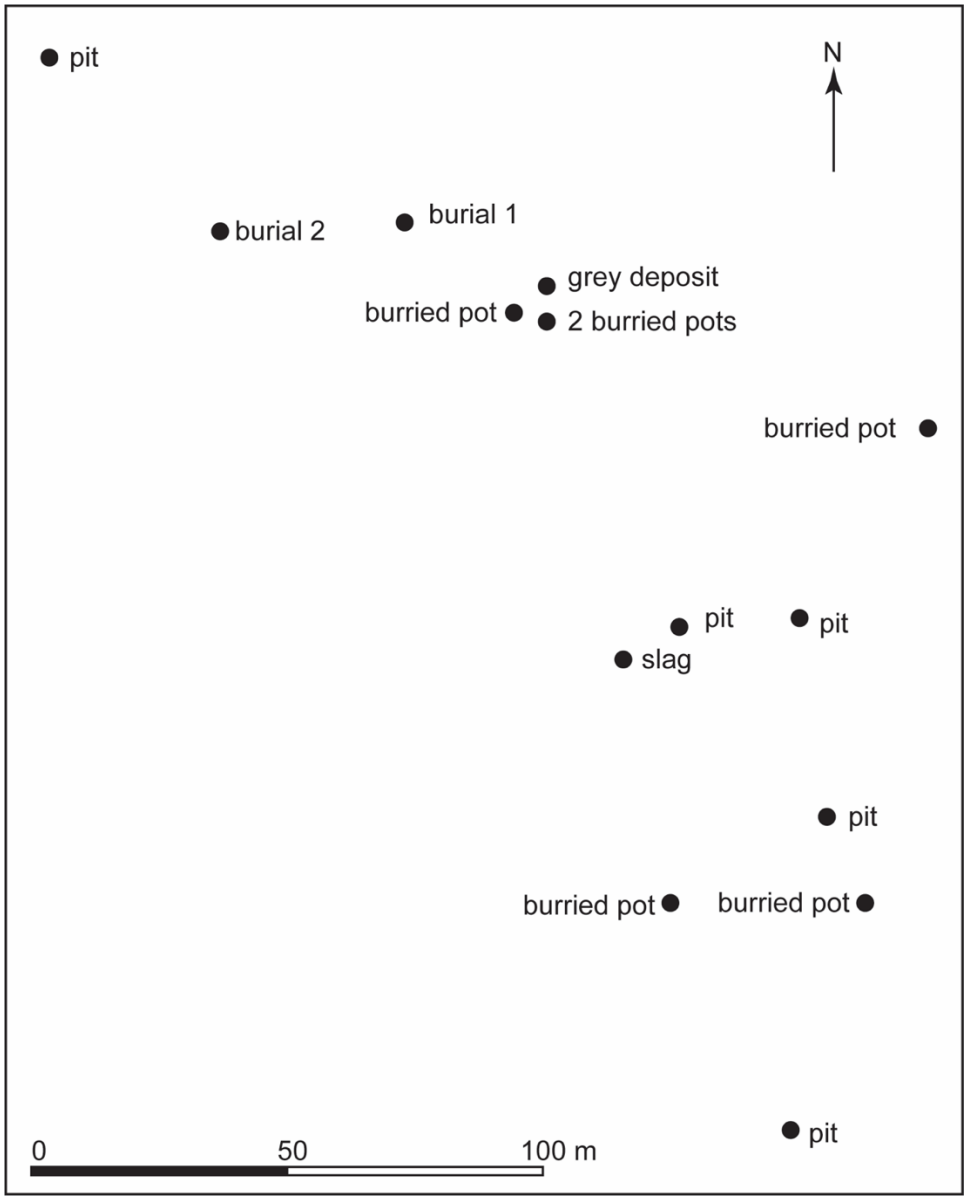


Figure 5.72 The C^{14} date from the iNanda Quarry site. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

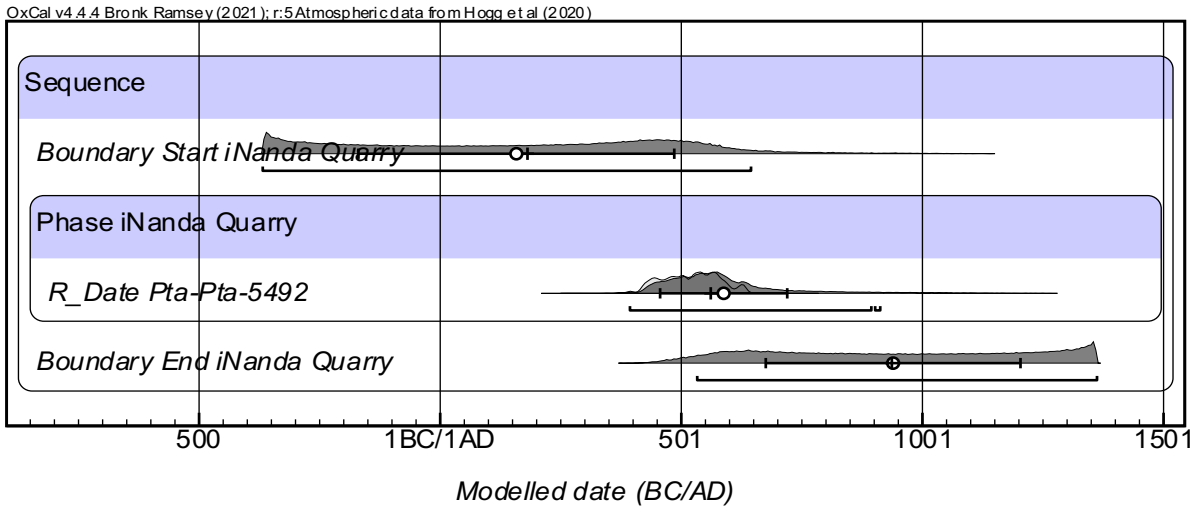


Figure 5.73 Site plan of Emberton Way. Adapted from Horwitz et al. 1991, Fig. 2

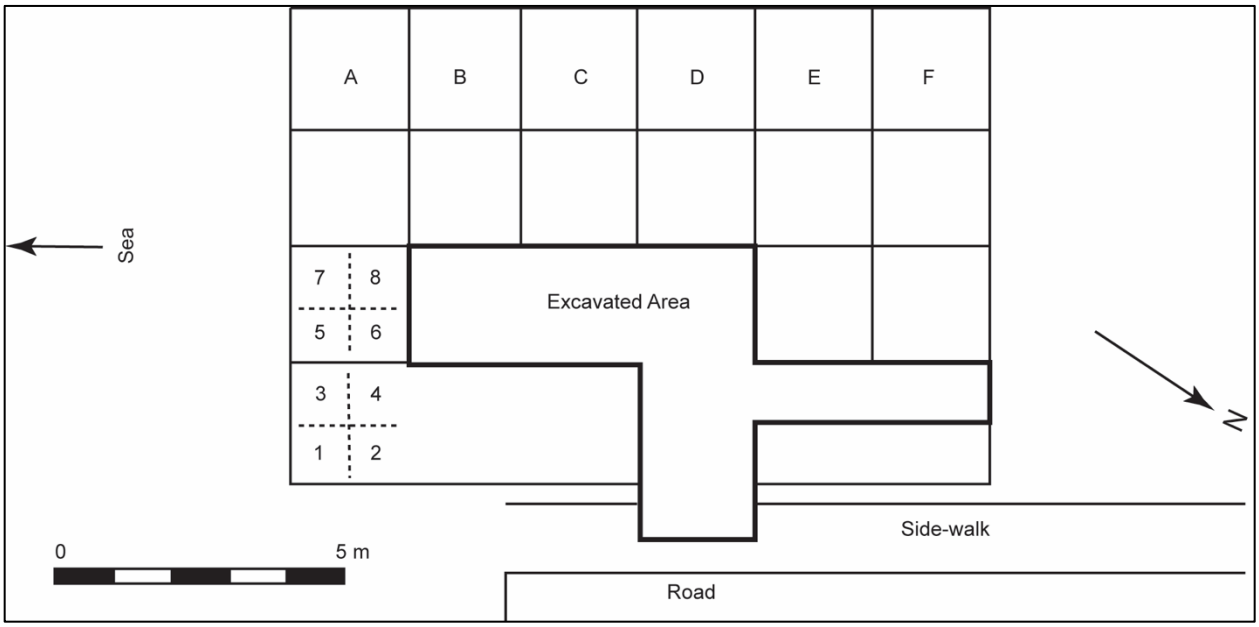


Figure 5.74 Section of Squares D3 and D4 at Emberton Way. Adapted from Horwitz et al. 1991, Fig. 3

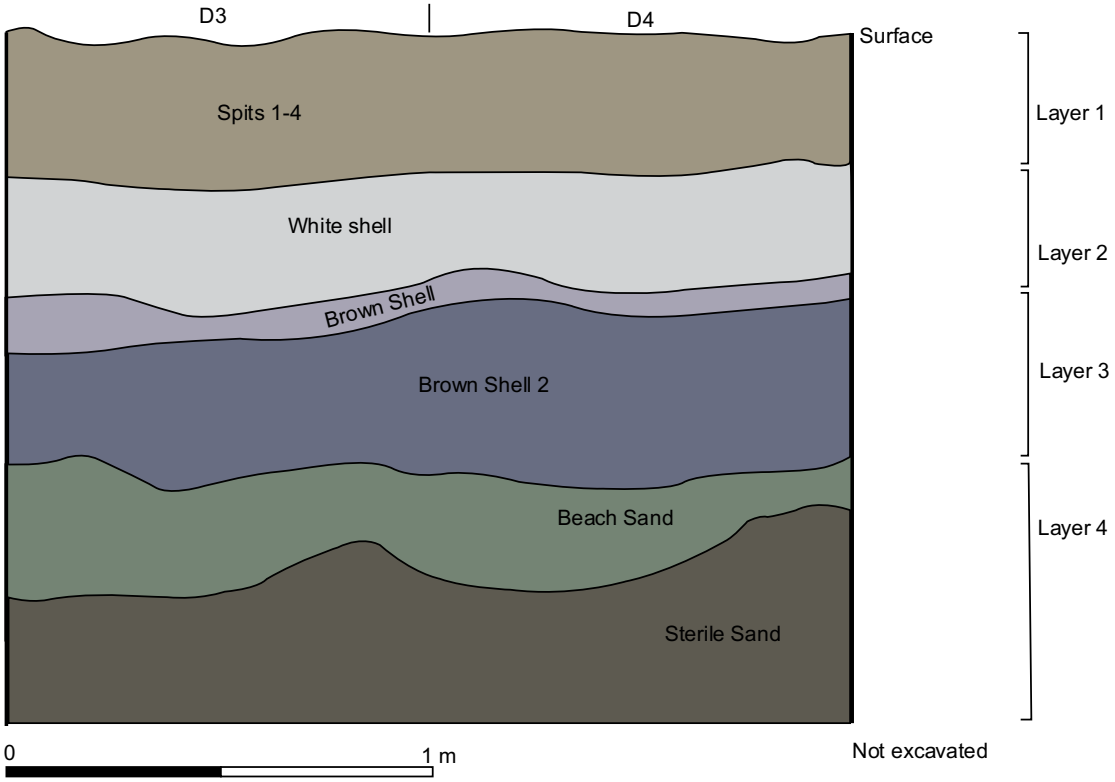


Figure 5.75 The three C^{14} dates from Emberton Way. The C^{14} dates were obtained through Bayesian statistical modelling. The parameters imposed were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%

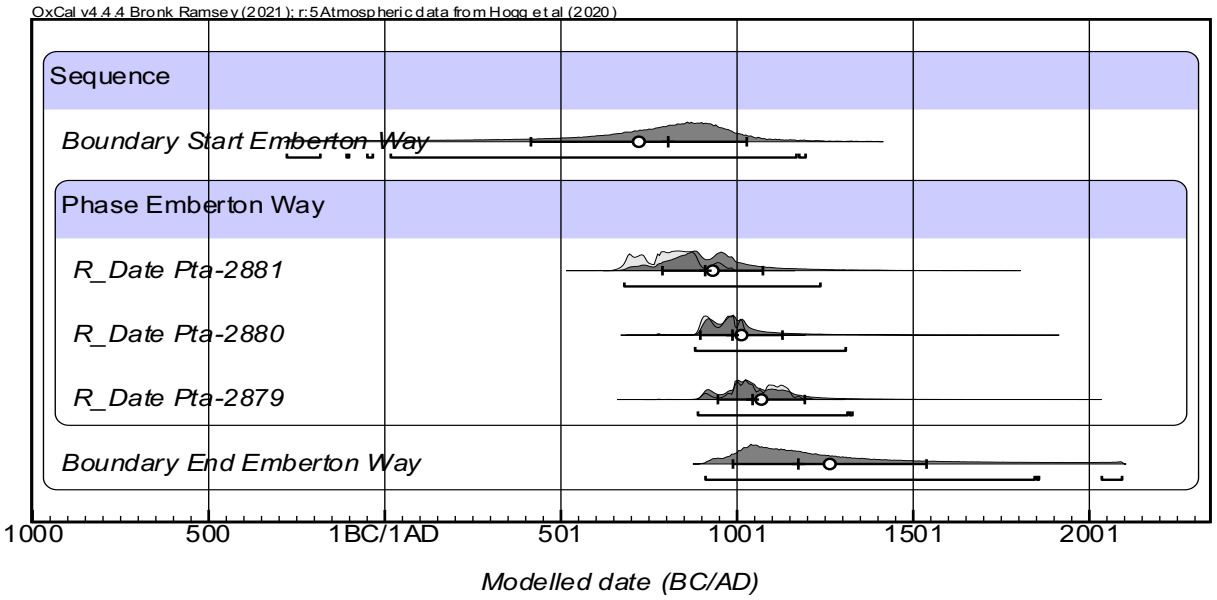
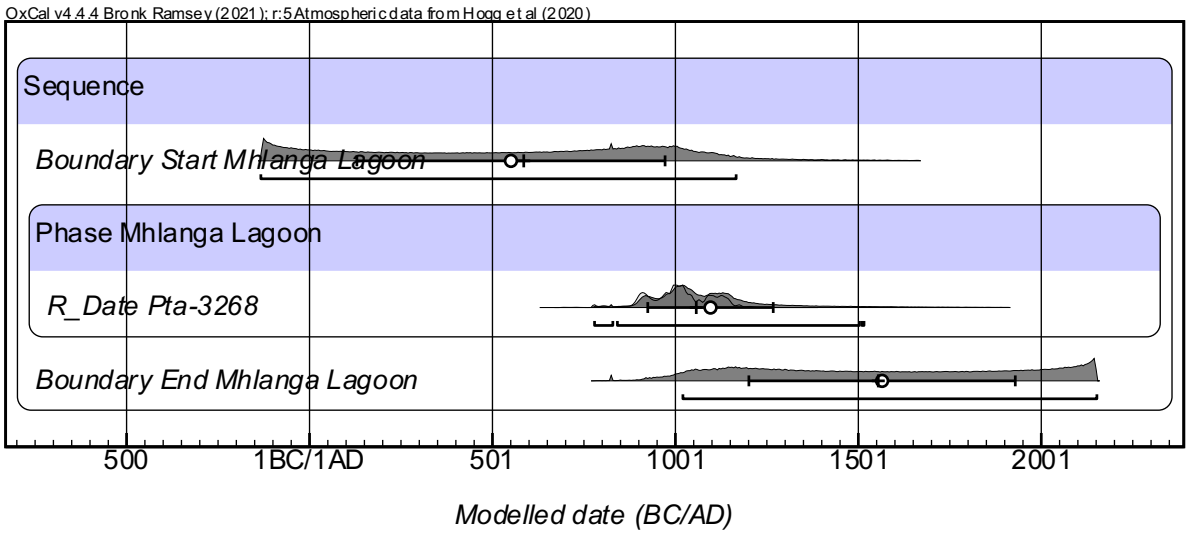


Figure 5.76 The three C1[4] dates from Emberton Way. The C[14] dates were obtained through Bayesian statistical modelling. The parameters imposed were a Phase grouping and Sigma Boundaries. The confidence interval was set at 95.5%



Chapter 6. Results

6.1 Introduction

The preceding chapters have established the rationale for this study, discussed past approaches to ceramic decorative stylistic analysis, situated this research in a theoretical and analytical framework, and introduced the study area and sample.

This chapter presents the analyzed data, and a systematic discussion of the trends identified in the data presented. It identifies some of the noticeable developments in the design symmetry repertoires in the study area. The shifting and static nature of the design repertoires, as well as the symmetry types which make up the various repertoires, are presented here as they shift and move across scales and space, from the proximate (within places) to a release from the proximity, connecting between places, and through time. Thus, the rest of the chapter will discuss the results by examining the design symmetries temporally and spatially. The relationship between design symmetries across space (ceramic facies) and through time (ceramic phases) will be tested. A discussion on design symmetries within the conventional temporal framework for the Early Iron Age (EIA) of southern Africa will follow this. If design symmetries cannot be situated within this framework, it is possible to introduce an alternative framework rooted in Bayesian analysis. The last two sections of this chapter will discuss the design symmetry data and its emerging patterns within each of the four ecozones and between them. This will be done using Social Network Analysis (SNA) to identify relevant patterns. Lastly, the overall variability and similarities across space and time within the study area will also be presented using SNA.

6.2 Relationship between ceramic facies and design symmetries

The first section of this chapter aims to determine the relationship between the ceramic facies concept (see Chapter 2) and design symmetries. Which design symmetries (DS) define or constitute each ceramic facies (e.g. Msuluzi, Ndondondwane, Ntshekane)? Is it possible to identify distinct and discrete design symmetries within each ceramic facies?

The data will be defined using existing facies as boundary markers to test the above hypotheses. Rather than looking at the results from each facies within a specific ecozone (e.g.,

Lower Thukela vs. Upper Thukela Basin), each facies' design symmetry data will be presented in totality (for the entire study region).

Before the results are presented, it is crucial first briefly to redefine what is meant by ceramic facies. Facies can be defined as a unit of ceramic decorative style determined by a set of unique and distinct stylistic properties and attributes. Within the Southeastern Lowlands of southern Africa, four distinct units named after the sites where the style unit was initially defined have been suggested: *Mzonjani, Msuluzi, Ndondondwane, and Ntshekane*. As discussed in greater detail in Chapter 2, Huffman (1980) utilized the attributes of shape, motif, and motif placement to distinguish the properties of a unit across space (facies) and through time (phase) as part (branch) of a broader ceramic tradition, a method commonly referred to as the 'Core Concept Approach.'

The Mzonjani facies defines the Mzonjani Branch of the Urewe Tradition and lends its name to the Mzonjani Sequence. The Msuluzi, Ndondondwane, and Ntshekane facies comprise the Msuluzi Branch of the Kalundu Tradition (see Chapter 2 for a more detailed discussion). These units also represent time segments or phases. The Msuluzi, Ndondondwane, and Ntshekane phases comprise the Msuluzi Sequence. Here, the design symmetry of the Msuluzi Branch facies will be presented to explore whether distinct design symmetries can differentiate them.

6.3 Overall style unit of the Msuluzi Branch

The Msuluzi Branch's ceramic assemblage included 13587 ceramic vessels (Table 6.1), of which half (55%) consisted of undecorated vessels (n=7480). However, most (79%) of the undecorated vessels could be attributed to a single site, Ndondondwane. As discussed in Chapter 5, Ndondondwane was the study area's most intensively excavated and researched site. Thus, the undecorated vessels from Ndondondwane could skew the results. Therefore, it was decided to exclude undecorated vessels in most instances.

When undecorated vessels in the assemblage are excluded, Table 6.1 and Figure 6.1 highlight a preference for glide reflection (Sym4), rotational (Sym3), and translational (Sym1) symmetries throughout the Msuluzi Branch.

Table 6.2 and Figure 6.2 illustrate the distribution of all design symmetries identified in the Msuluzi Branch as they pertain to each of the Branch's ceramic facies (Msuluzi, Ndondondwane, and Ntshekane). These distributions are briefly discussed in the proceeding section.

6.3.1 Msuluzi facies design repertoires

Table 6.2 and Figure 6.2 note the distribution of all design symmetries in the Msuluzi ceramic facies. Throughout the Msuluzi facies, high counts of glide reflection (Sym4), rotation (Sym1), and translation (Sym1) symmetries constitute the facies repertoire. Finite (Sym7) and asymmetrical (Asym) designs, in contrast, contributed poorly to the Msuluzi facies' overall design repertoire.

6.3.2 Ndondondwane facies design repertoires

The design symmetries accounting for the Ndondondwane facies design repertoire were mostly proportioned similarly to Msuluzi, with the only noticeable difference being the presence of slightly higher quantities of vessels with reflection and rotational (Sym5) symmetries and lower amounts of vessels with translation (Sym1) and reflectional (Sym2) symmetries as shown in Table 6.2 and Figure 6.2).

6.3.3 Ntshekane facies design repertoires

The Ntshekane facies design repertoire had notable variations in the proportions of design symmetries. Vessels with reflection and rotational (Sym5) symmetries comprised the highest proportion of symmetry types, followed by translational (Sym1) symmetries. Whereas at Msuluzi and Ndondondwane facies, finite designs were part of the design repertoire, at Ntshekane, no finite designs were discerned (see Table 6.2 and Figure 6.2).

6.4 Discussion and conclusion(s)

An initial comparative review of the design symmetry proportions for each of the three facies suggests a substantial overlap in preferred design symmetries across the three facies, with no clear distinct design repertoires identified for each facies. However, to empirically test these initial patterns, both a Brainerd-Robinson (BR) similarity metric (see Table 6.3 for the scale of comparison used for BR similarities) (Table 6.4) and a Chi-square test of independence (Table 6.5) were conducted. Excluding all undecorated vessels due to sample biases, the BR scores

identified high similarity scores between the design repertoire of the three facies. The highest similarity scores were noted between the design symmetries of Msuluzi and Ndondondwane (92% of 200). In comparison, a slightly lower but still similar score was noted between Ntshekane and Msuluzi (78% of 200) and between Ntshekane and Ndondondwane (76% of 200). Similarly, the Chi-Square test identified a strong interrelation between the three ceramic facies' design symmetries (x^2=23.685, p-value=0.114).

Based on the above discussion of the design symmetries at each facies and the statistical test run, no identifiable distinct design repertoire based on symmetry type proportions was present during each ceramic facies.

6.5 Tracing the changes in design symmetries across phases

The following section will present design symmetries within a spatial (facies) framework. Here, ceramic phases will be examined using conventional phasing determined for the Msuluzi Sequence, followed by a ceramic apportioning method rooted in a Bayesian model of radiocarbon dates. The aim, therefore, is to determine which model provides an appropriate temporal framework; in other words, can the conventional phasing be defined by design symmetries, or does their distribution across time instead suggest a new framework?

6.6 Temporal frameworks

6.6.1 Conventional framework

The conventional framework for the Msuluzi Sequence was based on 39 legacy radiocarbon dates and assigned to three distinct ceramic facies (Msuluzi, Ndondondwane, and Ntshekane). The Msuluzi facies date from AD 650 to AD 750, followed by the Ndondondwane facies from AD 750 to AD 950. Lastly, Ntshekane facies, marking the terminal stages of the EIA, lasted from AD 950 till AD 1050 (Figure 6.3).

6.7 Ceramic apportioning method rooted in a Bayesian model of radiocarbon dates

The 39 legacy radiocarbon dates from 18 sites across the entire Southeastern Lowlands mentioned in the previous section, which included relevant EIA sites from the Eastern Province of South Africa, allowing for the ceramic design symmetries identified in the study area to be situated

in absolute time. Furthermore, the Bayesian interpretive framework formed the basis for the ceramic apportioned models. The C^{14} assays and associated Bayesian models used and discussed in this section are presented in Appendix A,

Table A.1, Table A.2, and Table A.3 and Figure A.1, while Figure 6.3 and Table 6.6 illustrate the unmodelled C^{14} dates followed by the modelled Bayesian dates (Figure 6.4) used in this study for the ceramic apportioned framework.

6.7.1 Bayesian Model-parameters

The various parameters of the primary Bayesian model used for this study were discussed in detail in Chapter 5. However, here, crucial considerations will be reviewed. The first parameter imposed on the radiocarbon assays was their inclusion in a Phase, which allows for the organic grouping of specific events. Therefore, any events in the particular Phase have an equal likelihood to occur anywhere between the start and end boundaries of the Phase.

Couching the radiocarbon determinations into various phases allows an unbiased understanding of the dates. However, for any relevant information to be extrapolated from the events, a start and end Boundary needs to be assigned to the Phase. The type of Boundaries imposed determines how events in a Phase are distributed. Using a Simple Boundary assumes that the assays in the Phase are distributed uniformly. However, Sigma Boundaries were used in this study, distributing the events in the phase following a normal distribution curve (Bronk Ramsey, 2009a, p. 346). Thus, Sigma Boundaries highlights no fixed start or end events in the Phase (Lulewicz, 2018, pp. 158-159) and, therefore, is appropriate for evaluating the change in design repertoires, which also follow a normal distribution pattern.

Furthermore, the ceramic apportioning model used in this study (see Chapter 5) shadows a start and end date for each of the ceramic facies lifespans, following a normal truncated distribution pattern (see Roberts et al., 2012). Another critical reason why Sigma Boundaries are used is that they do not impose static and invariable distributions. Instead, similar to the ceramic apportioning model, Sigma Boundaries consider the popularity of events in a Phase, allowing events to overlap with preceding or succeeding phases (Lulewicz, 2018). As used in this study, models can be built on multiple Phases where the relationships between the various Phases are determined, as shown in Figure 6.3. The primary Models in this study incorporated the three ceramic facies in the Msuluzi Sequence within an Overlapping Model. Overlapping Models, similar to Sigma

Boundaries, set no specifications on how the Phases in the Model are ordered and allow for the start and end boundaries of each phase to overlap with adjacent Phases (Lulewicz, 2018, p. 160).

The last parameters set for the Bayesian Models used in this study are the Outliers and Outlier Models. The Outlier Model applied in this study is charcoal outliers, as most radiocarbon assays in southern Africa are derived from wood or wood charcoal. Only four of the 39 C^{14} determinations in this study were from faunal remains. However, assays obtained from wood or wooded charcoal are fraught with limitations and discrepancies. Archaeologists' most common problem with establishing an accurate temporal and chronological understanding of occupations is the 'old wood' effect (Kim et al., 2019; Schiffer, 1986; Shott, 1992). The 'old wood' effect, when C^{14} determinations from a wood charcoal date much older than the archaeological context from which it came, can occur due to many different reasons, including the tree or branch used for charcoal having been dead for a substantial period before the wood was used for charcoal (Kim et al., 2019; Olsen et al., 2013). Rather than excluding all charcoal samples, which would make the Bayesian analysis impossible, they were treated as outliers in association with an outlier model. When dates are treated as outliers without any outlier models being specified, the sample is removed entirely from all frameworks. Therefore, an outlier model can be added to the framework to overcome this while being cognizant of the 'old wood effect' on charcoal samples (Lulewicz, 2018).

Therefore, aimed at testing the validity of the extant cultural history of the Msuluzi Sequence as pertaining to design symmetry, the Bayesian model (Figure 6.3 and Figure 6.4) identified substantial temporal overlap between the three ceramic facies.

6.8 Regional Results: Apportioned sequence design repertoires

The design symmetries that defined the ceramic facies (see the previous section) also defined the symmetries for each phase. The conventional temporal framework sets rigid restrictions that see a phase's boundaries collapsing over considerable time, forcing the design symmetries into one or the other phase.

The apportioned sequence, on the other hand, provides an alternative temporal framework to examine changes in the prevalence of design symmetries within a phase. The results of the apportioned sequence will be discussed below.

6.9 Msuluzi sub-section

The Msuluzi phase was chronologically apportioned into four fifty-year sub-sections from AD 625-AD 775 (Table 6.7). Throughout the four apportioned slices, some small-scale variability was noted in several of the design symmetries. Reflection with rotational symmetries (Sym5), for instance, was slightly more prevalent during the AD 725 and AD 775 periods, while glide reflection (Sym4) slightly increased in popularity over time (Figure 6.5). Notably, undecorated vessels decreased in popularity.

The frequency of the design symmetry proportions across the four apportioned slices suggested a substantial overlap in preferred design symmetries. A Brainerd-Robinson (BR) similarity metric test shown in Table 6.8 identified very similar scores between the design repertoire across the four slices. The highest similarity scores were noted between the AD 675 and AD 725 periods' design symmetries (95% of 200), while the lowest scores occurred between AD 625 and AD 775 (81% of 200). The lower score between these two periods also occurred over the first and last periods in the Msuluzi phase.

6.9.1 Ndondondwane sub-section

The Ndondondwane phase was apportioned into five fifty-year chronological temporal slices from AD 725 to AD 925 (Table 6.9). Some small-scale variability in several design symmetries across the five periods was noted (Figure 6.6). Finite designs (Sym7) were present in two apportioned periods (AD 775 and AD 875), while reflection (Sym2) and reflection with rotational (Sym5) symmetries were less prevalent during the AD 725 and AD 825 periods. The BR similarity matrix in Table 6.10 identified high similarity scores in the design repertoires across the apportioned phases. The highest score occurred amongst AD 875 and AD 775 (97% of 200), while the lowest score, similar to Msuluzi, occurred amongst the first phase (AD 725) and the last phase (AD 925) (83% of 200).

6.9.2 Ntshekane Phase

The Ntshekane phase was divided into hundred-year periods rather than fifty-year periods, as the sample was not extensive enough to allow for apportioning on a smaller scale. seven fifty-year apportioned periods from AD 775 to AD 1075 (Table 6.11). More variability was identified

between the Ntshekane phases than with the previous two phases discussed above. Interestingly, undecorated vessels show an increase through time, while the proportions of design symmetries were distinct between the different apportioned phases (Figure 6.7). The BR similarity matrix shown in Table 6.12 confirms these patterns, with the highest score occurring between the AD 875 and AD 925 phases (92% of 200), while the lowest score was noted between AD 775 and AD 825 (16 % of 200). A great deal of variability was identified across the different Ntshekane phases.

6.10 Site-Level Results

In the preceding section, the design symmetries constituting the design repertoires of the Msuluzi Sequence in the southeastern Lowlands of South Africa have been presented across space (facies) and through time (phases). An alternative approach to dealing with the design symmetries has also been introduced for the phase data. The following section will discuss the intra-site variability as conventional facies and apportioned frameworks of all sites in the study area. The apportioning at the site level occurred at a hundred years rather than fifty years, as sites had a scarcity of ceramic data.

6.10.1 Upper Thukela Basin sites

6.10.1.1 Msuluzi Confluence site

Msuluzi Confluence's ceramic assemblage was assigned to the Msuluzi facies and apportioned into the seventh and eighth centuries (Figure 6.8).

The overall assemblage was dominated by undecorated vessels followed by rotational (Sym3) and vessels with reflection and rotational (Sym5) symmetry designs (Figure 6.8).

There was a slight shift in the preferred design repertoire shown in Figure 6.8, between the seventh and eighth centuries, with rotational symmetry more prevalent during the seventh century. The eight-century period of Msuluzi saw an increase in undecorated vessels. Similarly, finite and asymmetrical designs though low, were only present during this period of the site's occupation.

The Brainerd-Robinson (BR) Coefficient of the Similarity matrix between the seventh and eighth centuries (Table 6.13) indicates a relatively strong similarity score (71% of 200).

6.10.1.2 Magogo

Magogo was occupied during both the Msuluzi and Ndondondwane ceramic facies. At the same time, Maggs and Ward (1986, p. 116) also identified a transitional ceramic facies which characterized both stylistic elements of Msuluzi and Ndondondwane.

Magogo has many undecorated vessels, and relatively equal distributions of translational, reflectional, rotational, or combinations of these symmetries (Sym1-Sym5), but no vessels with finite (Sym7) or asymmetrical designs (Asym) were identified (Figure 6.9). Consistent frequencies of symmetry types across the ceramic facies were apparent, with two notable shifts: rotational symmetry (Sym3) was more prevalent during the Msuluzi and Ndondondwane facies, and undecorated (None) vessels were prevalent during the Msuluzi and transitional Msuluzi/Ndondondwane facies.

When the overall design repertoires during each ceramic facies were considered through BR Coefficient Similarity scores (Table 6.14), more variation in the design repertoires is evident between the Msuluzi and Ndondondwane facies (72% of 200) than the Msuluzi and the transitional Msuluzi/Ndondondwane facies (86% of 200). Interestingly, as shown in Table 6.14, the design repertoire between Ndondondwane and the transitional facies highlighted the opposite, as there is greater dissimilarity between the design repertoires of these two facies (70% of 200). There seems to be a resurgence in symmetries more prominent during the Msuluzi facies.

Magogo was chronologically apportioned into the seventh, eighth, and ninth centuries AD (Figure 6.10). Similar to what was noted for the symmetry types and design repertoires during the ceramic facies, there is strong consistency across the three apportioned periods. The BR Similarity scores shown in Table 6.15 highlight that the most notable variation in the design repertoires occurred between the seventh and eighth centuries AD (84% of 200). In comparison, an extremely high similarity score (93% of 200) between the seventh and ninth century AD was noted.

6.10.1.3 Mhlopeni

Mhlopeni was inhabited over a single occupational period during the Msuluzi facies (Figure 6.11) and could be chronologically apportioned into the seventh and eighth centuries.

Overall, the design repertoire includes all but asymmetrical (Asym) and finite (21) symmetry types. Translation symmetry (Sym1) is the most common and glide reflection (Sym4) was the least common, with the other symmetry types being similarly represented. The apportioned

symmetry types show significant change between the two slices (Figure 6.12). Only translation (Sym1), reflection (Sym2), rotation (Sym3), and glide reflection (Sym4) symmetries were part of the design repertoire during the seventh century, and the design repertoire is dominated by translation (Sym1) symmetry. The eight-century period saw the addition of reflection with rotational (Sym5) symmetry, a great reduction in the proportion of translation symmetry (Sym1), and a relatively even frequency of the other symmetry types. As a result, the overall design repertoires of the two apportioned periods at Mhlopeni are dissimilar (61% of 200) (Table 6.16).

6.10.1.4 Ntshekane

Ntshekane consists of an occupational period stretching the Msuluzi, Ndondondwane, and Ntshekane ceramic phases, and most likely also into the Late Iron Age with the presence of Blackburn ceramics identified at Ntshekane. Figure 6.13 shows that all symmetry types, except finite designs, were part of the overall design repertoire at Ntshekane. Throughout all occupational periods at Ntshekane, more than half of the assemblage comprised undecorated vessels, followed by translation (Sym1) and glide reflection (Sym4).

Furthermore, as seen in Figure 6.14, a slight shift in the popularity of symmetry types across the three ceramic facies was noted. Rotational (Sym3) symmetry, popular in the design repertoire during the Msuluzi facies, decreased significantly during the other two ceramic facies. Interestingly, translation (Sym1), reflection (Sym2) symmetries, and undecorated vessels remained relatively consistent across all three facies. The BR Coefficient of Similarity (Table 6.17) scores for the design repertoires across the facies had overall high similarity scores, with the highest dissimilarity scores being between the overall design repertoires of Msuluzi and Ntshekane facies (77% of 200) and Msuluzi and Ndondondwane (79% of 200). In contrast, between the Ndondondwane and Ntshekane facies, the highest similarity score was found (93% of 200).

Ntshekane was the only site in this study that could be apportioned to chronological periods stretching from the seventh to the twelfth century AD (Figure 6.15). A shift in symmetry types across the apportioned periods was identified. At the same time, a temporal increase in the popularity of undecorated vessels was noticed, while glide reflection (Sym4) and reflection and rotational symmetries became less popular over time. The BR scores for the apportioned design symmetries (Table 6.18) highlight the trend of more discontinuity in design symmetry over time at Ntshekane. For instance, the similarity score between AD 600 and AD 700 is 70% of 200, while the score decreases when AD 600 and AD 1100 are compared (56% of 200).

6.10.2 Lower Thukela Sites

6.10.2.1 Mamba I

Mamba I's ceramic assemblage formed part of only the Ndondondwane facies and was apportioned into three periods, the eighth, ninth, and tenth centuries. The distribution of symmetry types, which accounts for Mamba I's design repertoire, is shown in Figure 6.16. The design repertoire is comprised of all symmetry types except for rotational (Sym3) symmetry, finite (Sym7) and asymmetrical (Asym). Glide reflection (Sym4), undecorated vessels (None), and reflection with rotational (Sym5) symmetries account for the majority of symmetry types at Mamba I during the Ndondondwane facies.

The symmetry type distribution across the three apportioned periods is illustrated in Figure 6.17. On initial assessment, slight variation in symmetry types during each apportioned period was noted. Temporally, reflection (Sym2) and glide reflection (Sym4) symmetries persisted in Mamba I's design repertoire. At the same time, translation (Sym1) was only constant during the eighth and ninth centuries, after which translation was excluded from Mamba I's repertoire. However, a similar pattern was noted regarding reflection with rotational (Sym5) symmetries, still used during the tenth-century AD period. On the other hand, undecorated vessels shifted in popularity across all three periods.

The BR similarity scores, shown in Table 6.19, identify relatively high similarity scores (76% of 200) between the design repertoires of the eighth and ninth-century periods. A slight decrease is apparent (73% of 200) between the eighth and tenth-century periods. The lowest similarity score (56% of 200) occurred between Mamba I's design repertoires during the ninth and tenth centuries.

6.10.2.2 Mamba II

Mamba II had an occupation that spanned only the Msuluzi facies and was apportioned into the seventh and eighth centuries. The design repertoires defining the facies also defined the apportioned data. The design was comprised of a relatively high proportion of glide reflection (Sym4), undecorated vessels (none) and reflection with rotational (Sym5) symmetries (see Figure 6.18) similar to what was identified at Mamba I' Ndondondwane facies. However, a pivotal difference is the addition of finite with rotational (Sym7) symmetries at Mamba II relative to

Mamba I. In Figure 6.18, the symmetry type distribution across the seventh and eighth-century periods at Mamba II is illustrated, which on initial interpretations, shows some variability between the two periods' symmetry type preferences. Translation (Sym1), reflection (Sym2) symmetries, and finite (Sym7) design only accounted for the design repertoire during the eighth-century period, while rotational (Sym3) symmetry only occurred in the design repertoire of the seventh-century period. Reflection with rotational (Sym5) symmetry persisted throughout both periods, while glide reflection (Sym4) slightly decreased in popularity during the eighth-century AD period.

The BR similarity scores (Table 6.20) show dissimilarity between the two periods' design repertoires (65% of 200).

6.10.2.3 Ndondondwane

Ndondondwane has an occupation which stretches across the Ndondondwane ceramic facies. Due to Ndondondwane's strict stratigraphic control, the ceramic assemblage was apportioned into three fifty-year chronological periods, AD 700, AD 750, and AD 800.

The bar graph in Figure 6.19 shows that all symmetry types for the Msuluzi Sequence accounted for the design repertoire at Ndondondwane, with undecorated vessels constituting the majority of vessels in the assemblage. However, when undecorated vessels were omitted (Figure 6.19) from the results, it was possible to see that glide reflection (Sym4) and rotation (Sym3) were among the more prevalent symmetry types accounting for Ndondondwane's design repertoire. A key trend was the consistency of each symmetry type across the three apportioned periods, as shown in Figure 6.20. This continuity in symmetry types at Ndondondwane was further corroborated when the BR similarity index, shown in Table 6.21. An extremely high overall similarity score was noted, with the highest score (98% of 200) occurring between the eighth and tenth centuries. In comparison, the lowest score (94% of 200) was between the ninth and tenth centuries.

6.10.2.4 Wosi

Wosi had an occupational span stretching across both Msuluzi and Ndondondwane ceramic facies (see Figure 6.21). The ceramic assemblage at Wosi was further apportioned into the seventh, eighth, and ninth centuries. The overall symmetry types which account for the design repertoires at Wosi are illustrated in Figure 6.22. All possible symmetry types formed part of Wosi's overall design repertoire, while translation (Sym1) and rotational (Sym3) symmetries were more prevalent

choices in design types at Wosi. The Msuluzi facies design repertoire at Wosi had higher translational (Sym1) and glide reflection (Sym4) symmetries (see Figure 6.22). It did not include any finite or asymmetrical designs, whereas, during the Ndondondwane facies (Figure 6.22), rotational (Sym3) symmetry and undecorated vessels were more prevalent. Small temporal shifts in certain symmetry types were evident. Translation (Sym1) became slightly less prevalent in the Wosi design repertoire during the Ndondondwane ceramic facies, while rotational (Sym3) shifted in the opposite direction, being more prevalent during the Ndondondwane facies. The BR similarity index scores in Table 6.22 identified a relatively strong (76% of 200) similarity score between the two ceramic facies. The temporal distribution of symmetry types during the three apportioned periods is illustrated in Figure 6.23 and shows slight variability in the prevalence of symmetry types during each apportioned period.

Interestingly, finite and asymmetrical designs were only part of the design repertoire during the seventh and eighth centuries. Relative consistency in translational (Sym1) symmetry throughout all three periods was noted, while rotational (Sym3) symmetry was more prevalent during the ninth century. Glide reflection (Sym4) symmetry, however, shifted slightly downwards in its prevalence over time. BR similarity index scores in Table 6.23 show no drastic variability. The lowest similarity score (81% of 200) occurred between the eighth and ninth century AD, while the most robust similarity score (88% of 200) was identified between the seventh and eighth centuries.

6.10.2.5 Nsuze

Nsuze comprised ceramics from the Msuluzi, Ndondondwane, and Ntshekane facies All symmetry types, except finite designs, made up the design repertoire at Nsuze, with reflection with rotational (Sym 5) symmetry the most prevalent. The substantial variability in design repertoires across the three ceramic facies is shown in Figure 6.24 Such variability was also noticed when the BR similarity scores were calculated for each ceramic facies design repertoire (Table 6.23). The highest similarity score (60% of 200) occurred between the design repertoires of Msuluzi and Ndondondwane facies. A meagre (29% of 200) similarity score was calculated for the Ndondondwane and Ntshekane facies, while the repertoires between Ntshekane and Msuluzi (43% of 200) were not much stronger.

Four chronological apportioned periods for the ceramic assemblage at Nsuze were identified, stretching from the eighth to the eleventh century (Figure 6.25). Notably, the apportioned data mirror what was seen within the facies data but on a more nuanced scale. However, when design repertoires between the four periods are compared through BR similarity index scores (Table 6.23), a somewhat different pattern emerged than what was noticed for Nsuze's ceramic facies similarity scores. Even though some low scores were identified, for instance, between the design repertoires during the ninth and eleventh century AD (23% of 200), there seemed to be more substantial similarities between the design repertoires than what was noticed for ceramic facies.

6.10.2.6 ShuShu Hotsprings

ShuShu Hotsprings is the most northern site in the Lower Thukela Basin, with a ceramic assemblage that stretches across only the Ndondondwane facies but is apportioned into three chronological periods from the ninth to the eleventh century.

In Figure 6.26, the symmetry type distribution at ShuShu shows the prevalence of translation (Sym1), glide reflection (Sym4) and reflection with rotational (Sym5) symmetries in the design repertoire, while no finite (Sym7) or asymmetrical (Asym) designs were accounted for. Like Nsuze, substantial variability between the design repertoires of the ceramic facies and during the three apportioned periods was noted. Notably, several symmetry types were constant over two periods, after which they were excluded entirely from the design repertoire. The BR similarity scores of the design repertoire during each period show very dissimilar scores across all three periods (see Table 6.24). The lowest score (28% of 200) was noted between AD 900 and AD 1000, while the highest score (38% of 200) was identified for AD 800 and AD 900. ShuShu Hotsprings and Nsuze had the lowest similarity scores in the Lower Thukela Basin.

6.10.3 uMngeni Valley

6.10.3.1 KwaGandaganda

All three ceramic facies from the Msuluzi Sequence were present at KwaGandaganda, while the assemblage could be chronologically apportioned from the seventh to the eleventh century. The overall design symmetry repertoire for the site, within the three ceramic facies and as chronologically apportioned periods, is presented in Figure 6.27 and Figure 6.28—a relatively equal distribution of undecorated and Sym 1 to 6 symmetries. Temporal shifts in the facies design

repertoires could be seen in the absence of finite designs in the Ndondondwane facies but present in the Msuluzi facies. In contrast, the Ntshekane facies had neither finite nor asymmetrical designs as part of their repertoire. Msuluzi facies, furthermore, had slightly higher amounts of glide reflection (Sym 4) than the other facies. The Ndondondwane facies, in contrast, had slightly higher amounts of rotational (Sym 3) and reflection with rotational (Sym 5) symmetries. The Ntshekane facies repertoire consisted of higher reflection and rotational (Sym 5) symmetries.

Table 6.25 shows high BR similarity scores across the facies design repertoires from each comparison. The lowest was 81% of 200, and the highest was 90% of 200. However, higher similarities are present between the Msuluzi and Ndondondwane facies, while lower similarities are present between Ndondondwane and Ntshekane facies. More homogeneity between the design repertoires from Msuluzi and Ndondondwane facies and a more heterogeneous Ntshekane facies was identified.

Several interesting patterns were noticed in the chronologically apportioned ceramic assemblage at KwaGandaganda (Figure 6.28). A temporal shift was noted in the popularity of specific symmetry types, while other symmetry types remain constant through time. Glide reflection (Sym 4) and reflection and rotational (Sym 5) symmetries are good examples of the shifting nature. Glide reflection became less integral over time, while reflection and rotational symmetries (Sym 5) became more popular.

Another interesting trend was the strong similarity scores, as shown in Table 6.25. However, the BR Similarity Matrix also indicates a more substantial similarity between design repertoires of the seventh, eighth, and ninth centuries. In comparison, less similarity was noted between the seventh, tenth and eleventh centuries (the lowest score being 70% of 200). A trend of specific design symmetries being more prevalent with specific periods was noted. The results suggest that the design repertoire at KwaGandaganda saw a decisive shift after the ninth century, transcending both the Ndondondwane and Ntshekane ceramic facies.

6.10.3.2 iNanda Quarry

Nanda Quarry's ceramic assemblage encompassed both the Msuluzi and Ndondondwane ceramic facies (Figure 6.29). It was apportioned into the seventh and eighth centuries. iNanda Quarry's symmetry types, as shown in Figure 6.30, illustrate the presence of all but finite design. At the same time, a clear difference between the design repertoire for the Msuluzi and

Ndondondwane facies is noted. The design symmetry variability during the Ndondondwane facies was less pronounced as Sym 3, 5, and 6 were absent from the repertoire (Figure 6.29). However, no asymmetrical vessels were identified for the Msuluzi facies. BR similarity scores indicate relatively strong homogeneity (70% of 200) between the two facies' design repertoires (Table 6.26). Because the design symmetries for the two ceramic facies discussed above were the same for the apportioned data, the apportioned results will not be discussed here.

6.10.3.3 Nanda

The ceramic assemblage at Nanda formed part of the Msuluzi ceramic facies and apportioned to the seventh, eighth, and ninth centuries. All possible Msuluzi Sequence design symmetries were identified at Nanda. The Msuluzi facies comprised high counts of undecorated, translational (Sym1), rotational (Sym3) and glide reflection (Sym4) designs.

The design symmetries across the three apportioned periods reveal the presence of finite and asymmetrical designs only during the ninth century and low counts of undecorated vessels compared to the other two periods (Figure 6.31). The BR similarity scores reveal a temporal shift in preferred symmetry types as similarity scores decrease over time. The similarity score shifted from 85% of 200 between AD 600 and AD 700 to 69% of 200 between AD 600 and AD 800. Overall, the design symmetry data at Nanda reveals connectivity over time, but the variation between the three periods' choices in design symmetry types makes each period's design repertoire distinct (Table 6.27).

6.10.3.4 Nanda Dam Site

Nanda Dam site's ceramic assemblage included the Msuluzi and Ndondondwane facies and apportioned into the seventh, eighth, and ninth centuries. Nanda Dam site's overall design repertoire included all but asymmetrical Msuluzi Sequence symmetry types (Figure 6.32). A prevalence for glide reflection (Sym 4), followed by relatively equal counts of translation (Sym1), reflection (Sym2), and rotational (Sym3) symmetries, comprised the overall design repertoire during the Msuluzi facies. At Ndondondwane, no undecorated or vessels with reflection (Sym 2), mirror and glide reflection (Sym 6), or finite designs (Sym 7) formed part of the design repertoire (see Figure 6.32). A BR similarity score of 125 (62% of 200) identifies relative continuity in

preferred design symmetries across the two facies while at the same time pointing to distinct design repertoires during each facies (Table 6.28).

The above patterns were noted in the apportioned data but on a more nuanced scale (see Figure 6.33). Interestingly, the BR Similarity scores (Table 6.28) show lower similarity scores across the three periods than seen for the facies data. Similar to what was noted amongst data from many other occupations in the uMngeni Valley discussed above, BR similarity scores decrease over time at Nanda Dam.

The similarity score between the seventh and ninth centuries is 75 (38% of 200), while during the eighth and ninth centuries, it is somewhat higher at 118 (59% of 200). The data suggest more substantial similarities between the seventh and eighth-century repertoires. In contrast, the repertoire for the ninth century had strong correlations with glide reflection (Sym 4) and reflection with rotational (Sym 5) symmetries.

6.10.3.5 2930DB 48 & Mission Reserve

Site 2930DB 48, also known as Nanda Mission Reserve, had a ceramic assemblage attributed to the Msuluzi and Ndondondwane facies and apportionable between the seventh, eighth, and ninth centuries. A substantial preference in symmetry types between the design repertoires of the two ceramic facies was noted. The Msuluzi facies comprised all possible symmetry types except for undecorated vessels and asymmetrical designs, while at Ndondondwane, only translation (Sym1), rotation (Sym3), and glide reflection (Sym4) were part of the repertoire (Figure 6.34). The disparity of preferred symmetry across the two facies is further highlighted by the BR similarity score 107 (54% of 200) (Table 6.29) between the two facies. As with other sites in the uMngeni Valley, more nuanced patterns were identified in the apportioned data. Significant shifts in symmetry preferences were identified across the three periods (Figure 6.35). Translation (Sym1), for instance, was popular during the seventh century but decreased during the eighth century, followed by a slight increase during the ninth century. Interestingly, the BR similarity scores (Table 6.29) for the apportioned repertoires are higher than those identified for the ceramic facies.

6.10.4 Coastal Belt intra-site design symmetry repertoires

6.10.4.1 Emberton Way

Emberton Way's ceramic assemblage was attributed to all three ceramic facies in the Msuluzi Sequence and apportioned to the ninth, tenth, and eleventh centuries. All Msuluzi Sequence symmetry types, except for finite designs, were identified, with translation (Sym1), glide reflection (Sym4), and reflection with rotation (Sym5), all relatively common.

The design repertoire across the three ceramic facies identified at Emberton Way, as shown in Figure 6.36, shifted and varied significantly. Translational (Sym1) symmetry remained consistent across all three facies, while reflection (Sym2) was only part of the design repertoire during the Msuluzi facies. Reflection (Sym2), rotation (Sym3), and glide reflection (Sym4) were only present at Msuluzi and Ndondondwane. In contrast, reflection with rotational (Sym5) symmetry was the most prevalent at Ntshekane, while mirror with glide reflection (Sym6) only being part of the Ntshekane design repertoire. The BR Similarity Matrix in Table 6.30 highlights more substantial similarity scores between the Msuluzi and Ndondondwane facies (63% of 200). In contrast, highly decreased similarity scores identify the relationship between Msuluzi and Ntshekane facies (25% of 200) design repertoires, with the relationship between Ndondondwane and Ntshekane being stronger (55% of 200) but still less than Msuluzi and Ndondondwane relationship.

The nuanced trends identified between the ninth and eleventh centuries of symmetry data revealed notable temporal shifts in the preferred symmetry types.

The design repertoires during the three chronologically apportioned periods are shown in Figure 6.37. The most complex design repertoire was identified in the ninth century, while a significant shift was noted between the tenth and eleventh-century apportioned repertoires. The BR similarity scores in Table 6.30 showed no consistency in symmetry types across the three apportioned periods, with extremely low similarity scores (11% of 200) between the ninth and tenth centuries. In contrast, a relatively strong similarity score (75% of 200) occurred between the tenth and eleventh centuries.

6.10.4.2 Mhlanga Lagoon

Like Emberton Way, Mhlanga Lagoon had a ceramic assemblage that stretched across all three ceramic facies. However, the assemblage was apportioned into four chronological periods between the eighth and eleventh century AD. The symmetry types which made up the design repertoire at Mhlanga Lagoon were comprised of all but finite and asymmetrical designs (see

Figure 6.38), with the most complex design repertoire found during the Msuluzi facies. At Ndondondwane, the design repertoire had no mirror with glide reflection (Sym6), while at Ntshekane, no mirror with glide reflection (Sym6) nor reflection with rotational (Sym5) formed part of the design repertoire. The BR Similarity Matrix score reveals very low similarity scores between the design repertoires during the Msuluzi and Ndondondwane facies and between the Msuluzi and Ntshekane facies. However, a higher similarity score was noted between the repertoires from the Ndondondwane and Ntshekane facies.

The patterns noted in the design repertoires of the apportioned data were similar to those noted for the ceramic facies data (see Figure 6.39). However, a slight shifting trend in symmetry types across all four apportioned periods was noted, with few symmetry types consistent across all four periods. This trend of substantial variability between the four periods' design repertoires was also noted in the BR Similarity Matrix scores (Table 6.31), which show low similarity scores between the repertoires of the four periods. The most substantial similarity scores were seen between the eighth and ninth centuries.

6.10.4.3 Sinkwazi

The ceramic assemblage from Sinkwazi was not extensive; therefore, not much could be extrapolated from the data. However, two ceramic facies, Msuluzi and Ndondondwane, were identified across the assemblage (Figure 6.40), and two apportioned periods were determined in the ninth and tenth century AD. Overall, the design repertoire at Sinkwazi comprised Sym1 to Sym4 (Figure 6.41). During the Msuluzi facies, translation (Sym1), rotation (Sym3), and glide reflection (Sym4) made up the repertoire, while at the Ndondondwane facies, only reflection (Sym2) symmetry was found. The same patterns were identified in the apportioned data and will not be discussed in more detail here.

6.10.4.4 Shrimp Lane

The ceramic assemblage of Shrimp Lane, similar to Emberton Way and Mhlanga Lagoon, stretched across all three ceramic facies of the Msuluzi Sequence. The assemblage was apportioned between the eighth and ninth centuries. The overall design repertoire at Shrimp Lane consisted of translation (Sym1), reflection (Sym2), rotation (Sym3), glide reflection (Sym4), and undecorated vessels (Figure 6.42). Translation (Sym1), reflection (Sym2) and glide reflection (Sym4) made up the Msuluzi repertoire, while at Ndondondwane, translation (Sym1), reflection (Sym2), rotation (Sym3), glide reflection (Sym4), and undecorated vessels were found. Ntshekane, on the other

hand, comprises only translational (Sym1) symmetry. Relatively high similarity scores were noted between the design repertoires of the Msuluzi and Ndondondwane periods (70% of 200) (Table 6.32). In contrast, a low score was noted between the repertoires at the Ndondondwane and Ntshekane facies (22% of 200). The design repertoires from the two apportioned periods show a more complex design repertoire during the ninth-century period, while no rotational symmetries were found during the eighth-century period (Figure 6.43).

More consistency and similarity were found between the design repertoires from the eighth and ninth centuries than between the facies repertoires (73% of 200) (Table 6.32).

6.10.4.5 Conclusions: does the conventional or apportioned framework work better?

This section presented the design symmetries constituting the design repertoires of the Msuluzi Sequence in the southeastern Lowlands of South Africa across space (facies) and through time (phases). An alternative approach to dealing with the design symmetries was introduced for the phase data. This was followed by discussing how to design symmetries plot out following the conventional facies and apportioned frameworks at an intra-site level. The apportioned frameworks allowed for a better understanding of changes in the prevalence of design symmetries within a phase and a site. The apportioned framework identified stability in some sites' design repertoires through time (e.g. Wosi, Ndondondwane). While in others, it was possible to note the shifting nature of design symmetries. Therefore, only the apportioned model will be used in the next section.

6.11 Design Symmetry over time within each Ecozone.

6.11.1 Introduction

This section presents the results of the frequency seriation and the network analysis for all four ecozones, Upper Thukela Basin, Lower Thukela Basin, uMngeni Valley, and the Coastal Belt, in the study area. The design symmetries for each ecozone's occupations and occupational periods are presented as a single frequency seriation plot in Figure 6.44a-d. As an occupation's design repertoire comprises design symmetry frequencies, Simpson's $E^{1/D}$ (Birch & Hart, 2018; Hart et al., 2016; D. Wilson, 1994) was used to determine the evenness of each occupation's design

repertoire. The occupation and design symmetry distributions for each ecozone are shown in Figures 6.45a-d. The evenness data are presented in association with the frequency seriation plots. The BR similarity matrixes used and discussed in this section are presented in Appendix A, Table. A.4 to A.18. The network data and visualizations were determined using weighted data (see Chapter 5). The weighted network data is presented in Table 6.33, while the visualization representations of the sequential apportioned period network are presented in Figures 6.46 to 6.49. In what follows, summaries of the seriation and network results are presented, starting with the Upper Thukela Basin.

6.11.1.1 Upper Thukela Basin

The Upper Thukela Basin social network for the seventh to eleventh centuries was constructed from n=1391 ceramic vessels across four occupations, Msuluzi, Magogo, Mhlopeni, and Ntshekane (Figure 6.44).

Figure 6.43 illustrates the frequency seriation plot and highlights some interesting trends in the temporal shifts of various symmetry types. While symmetry types such as translation (Sym1) mostly remain constant, except in higher amounts at Mhlopeni during the seventh century, others, such as reflection (Sym2), rotation (Sym3), reflection with rotation (Sym5), mirror with glide reflection (Sym6), and undecorated (None) vessels, all shift diachronically.

The design repertoire evenness mean scores are primarily high, indicating relative temporal evenness and the presence of more complex design repertoires across the various occupations (Figure 6.43). However, slight decreases in average design symmetries comprised each site's design repertoire evenness were noted at Mhlopeni during the seventh century. Another noticeable trend is the drastic decrease in repertoire evenness at all of Ntshekane's occupations (see Figure 6.43).

The social network visualizations were determined as weighted Brainerd-Robertson (BR) matrices (see Appendix A, Table A.***6*** and Table A.***7***) with specific threshold points. The threshold points are in place to assure the structural integrity of the network while also making the visual aspect easier to interpret. For the Upper Thukela Basin, the threshold point was set to 55% (see Table A.***7***)

The visual representation of the sequential period network for the Upper Thukela Basin stretches from the seventh to the eleventh century (Figure 6.45). The BR scores in Table. A.7 shows lower mean similarity scores between occupations during the seventh century, reflected in

the network presented in Figure 6.45. Occupations from the seventh century are connected by weak ties, with Ntshekane and Mhlopeni connected through a single edge. The only cut point, a node in this instance the seventh-century occupation at Ntshekane, which, if removed, allows for the network's structure to become disconnected; therefore, a cut point bridges a structure hole in the network (Birch & Hart, 2018, p. 23) of the network is formed by Ntshekane (see Table 6.33).

Highly connected clusters amongst the three periods of the Magogo occupation form the centre of the network, while the eighth-century Magogo and Msuluzi formed strong ties. By contrast, all four periods at Ntshekane form only strong ties amongst themselves, with weak ties noticeable between Ntshekane and other occupations. Thus, in the Upper Thukela Basin, initial settlements of relatively disconnected communities became more integrated through time, while Ntshekane by the tenth century had become completely distinct from the other communities in the region.

6.11.2 Lower Thukela Valley

Six sites within the Lower Thukela Basin, Mamba I, Mamba II, Wosi, Ndondondwane, Shushu Hotsprings, and Nsuze West, made up 54% (n=8179) of the entire ceramic sample for this study (see Figure 6.46), with the majority of the Lower Thukela's sample belonged to Ndondondwane (87%, n=7112). The results are presented in a similar structure as done for the Upper Thukela Basin, shifting between scales of intra-site to inter-site.

The design symmetries across the occupational periods in the Lower Thukela Basin are characterized by relative consistency in symmetry types across all occupational periods. However, several variations were noted in some of the occupations. For instance, during the eight-century periods of Wosi and Mamba II, the design repertoire comprised higher amounts of finite designs, while during the ninth-century periods of Mamba I and Ndondondwane yielded higher counts of asymmetrical designs (Figure 6.46).

Similarly, the design repertoire evenness was consistently high across most occupational periods; however, the seventh-century period at Mamba II and the tenth-century occupation of Nsuze presented relatively lower evenness scores (Figure 6.46). Similar to what was noted for the Upper Thukela Basin, evenness scores during the eleventh century in the Lower Thukela Basin were also considerably lower than what was presented for the rest of the occupational periods.

The network visualization presented in Figure 6.46 (see Table A.4 and Table A.5) consists of central well-connected clusters, with many occupations forming strong ties, especially between

individual sites' occupations. Ndondonwane, for instance, comprises strong ties between their three occupations. However, Ndondonwane also shares a strong tie with the ninth-century occupation at Nsuze. Two bridges are edges which, if removed, will cause the network to separate into distinct higher components (Brughmans & Peeples, 2023). Both bridges were from different occupations at Nsuze. The ninth and eleventh-century occupations at ShuShu are connected to the main network clusters through weak ties. At the same time, a similar though more connected pattern was noted amongst the seventh and tenth-century occupations at Mamba II and Mamba I, respectively (see Table 6.33).

6.11.3 uMngeni Valley

Five sites within the uMngeni Valley, 2930DB48, KwaGandaganda, Inanda Dam site, Nanda, and Inanda Quarry, made up 35% (n=5268) of the entire ceramic sample for this study (see Figure 6.47).

The apportioned periods, similar to those seen during the three ceramic facies, showed substantial continuity through time. However, the frequency seriation plot in Figure 6.43 allows for more nuanced variability in the shifts of the popularity of symmetry types to be identified across all the temporal occupational periods (see Table A***.8*** for the BR scores). A few notable trends are the high amount of asymmetrical designs at Inanda Quarry's eighth-century occupation, while finite designs were more prominent in 2930DB48's seventh and ninth-century occupations. The design repertoire evenness was overall relatively high, with only a few noticeable variations from 2930DB48 and Inanda Quarry, which consisted of much lower evenness counts (Figure 6.43).

The network visualization for all occupational periods in the uMngeni Valley is presented in Figure 6.47. A trend similar to that noted for the Lower Thukela Basin was seen in the uMngeni Valley, with a centralized, well-connected cluster with solid ties amongst most occupations, especially between the eighth and tenth centuries. Two further noticeable trends are apparent. Firstly, as seen in Table 6.33 (also see Appendix A Table A.12 shows the complete network centrality scores for each node (site); KwaGandaganda and Nanda had high eigenvector centrality across all their occupational periods. In contrast, during the seventh century, Inanda Dam had high betweenness centrality scores, while interestingly, during the seventh century, Inanda Dam had the highest betweenness centrality score and could be seen as a type of 'gatekeeper' controlling the flow through the network (see Borgatti et al., 2013, p. 185). Similarly, during the ninth century,

Nanda took this role (Table A.***13***). No other occupations during any period had high betweenness centralities. Secondly, similar to what was noted in the Lower Thukela Basin, two edges constituted bridges during the seventh-century occupations, Inanda Quarry and Inanda Dam.

6.11.4 Coastal

Four Early Iron Age sites, Mhlanga Lagoon, Emberton Way, Shrimp Lane, and Sinkwazi, from the Coastal Belt, were included in the ceramic sample and comprised n=261 vessels, which accounted for only 1.73% of the entire sample (see Figure 6.44).

The frequency seriation plot for all occupational periods in the Coastal Belt (Figure 6.43) reveals more discontinuity between occupational periods and more dissimilarity in design symmetries at the sites identified in this ecozone. The design repertoire evenness scores reveal similar patterns, with few occupations (i.e. Mhlanga AD 700, Emberton Way AD 800) comprised of high evenness scores. The design repertoire evenness scores drastically decrease after the ninth century (Figure 6.43)

The Coastal Belt network shows a distinct central grouping linked by one or a few edges (Figure 6.48). The Coastal network typology is vastly different than what was noted for the other three ecozones' networks. It is, therefore, not surprising that three cutpoint edges form part of the network (Shrimp Lane AD 800, Mhlanga Lagoon AD 900, and Emberton Way AD 900). Even with the BR threshold set to 50%, the eighth century at Sinkwazi was isolated from the main network structure. It was, however, possible to note the central role of two occupations, eighth-century Emberton Way and ninth-century Mhlanga Lagoon, both of which yielded high betweenness scores (see Table 6.33 and Table A.***12***).

6.11.5 Summary of design repertoire variability across space

The above discussion highlighted stronger links within sites from each occupation, with similar design repertoires extending through time within each site. The alternative apportioned framework allows for variability in design repertoires between sites within each ecozone to become apparent. However, this pattern only applies to the Coastal Belt, which saw a more heterogeneous design repertoire within and between occupations. An analysis of the ecozones network typologies and associated network data (Table 6.33, Table A.***12***) reveals some interesting trends.

The k-cores of the networks from each ecozone show that the highest order of *k*-cores, *k*=10, comes from the Lower Thukela Basin. The proportion of occupations connected to at least

four other occupations is 0.78. Similarly, the uMngeni Valley shows a similar pattern, with the maximum order of *k*-cores at *k*=9 and connected to four or more other occupations at 0.88. No cutpoints were present at either of these networks. Therefore, the lack of cutpoints and the high order of *k*=cores shows that the occupations from these two ecozones formed strong bonding ties.

In comparison, a noticeable shift occurred in the network structures for the Upper Thukela Basin and the Coastal Belt. The maximum order of *k*-cores decreased to *k*=6 and *k*=3, respectively. An increase in cutpoints was also noted, suggesting these two networks comprised more bridging than bonding ties. The following chapter will discuss the relevance of these and other trends.

6.12 Networks

The preceding section presented the similarity and shifting nature of the design repertoires within each ecozone through network analysis. This final section will examine the design repertoires for the entire study area on a temporal scale. The aim is to observe what, if any, the relationships of design repertoires are across ecozones through time. To do this, network data and visualizations, including Walktrap community detection modularity, are presented in Figures 6.49-6.53 and Table 6.34. The complete network centrality scores for each node (site) are shown in Appendix A, Table A.***13***, while all BR similarity scores for the apportioned periods are presented in Tables A.14-18. In the sections that follow, the main patterns will be summarized.

The network typologies between the seventh and eleventh centuries have discrete variables (see Table 6.34). The maximum k=cores of each period assist in identifying the design symmetry connectivity across the study area and how these patterns shift through time. During the seventh century, the maximum k-core was k=4, with 0.91 of the k-cores being equal to or greater than four. The low number of k-cores shows less bounded networks, with design symmetries able to spread across the region. The eigenvector scores show that most occupations during the seventh century seem equally central in the network, except for Ntshekane and Mamba II. However, the betweenness centrality score of Wosi and KwaGandaganda (6.27 and 7.86 respectively) in accordance with its eigenvector score (Wosi=1.00, KwaGandaganda=0.87) shows that even though design symmetries during this period freely moved between occupations across the region, these two occupations played a more central role in the network (see Figure 6.49 and Table 6.34). A Walktrap community detection modularity identifies three clusters during the seventh-century period (Figure 6.49). The main clusters include KwaGandaganda and Wosi, a second smaller

cluster is comprised of two uMngeni Valley (Inanda Quarry and Inanda Dam site) and one Upper Thukela Basin (Mhlopeni) occupations. The third and smallest cluster comprises only Mamba II, which is connected to the central cluster by Kwagandaganda and Magogo.

A notable shift in the network typology characterizes the eighth century (Figure 6.50 and Table 6.34). The maximum k-cores went up to k=10, with a much more bounded central cluster of occupations. Based on the eigenvector scores, most occupations had equally central positions in the network. However, a high betweenness centrality was identified at Wosi, suggesting that potters at Wosi were integral in disseminating and spreading design symmetries between communities. The walk trap community detection identified two clusters, with Wosi being the primary connection to the smaller clusters (see Figure 6.50).

During the ninth century, the network typology shifted from bounded to more bridging. The main cluster is less compact, and one isolate was noted (Sinkwazi) (see Figure 6.51). Interestingly, the central role of Wosi, noted during the eighth century, was absent during this period (Figure 6.51). The overall centrality of occupations was still relatively high, with some occupations (KwaGandaganda, Nanda, Mamba I, and ShuShu Hotsprings) being somewhat more central. Interestingly, Emberton Way, a Coastal occupation, had the network's highest eigenvector and betweenness centrality scores (see Table A***.13***). These trends were further noticed in the Walktrap community clusters, where four clusters were noted (Figure 6.51).

The network typology noted a drastic change during the tenth century (Figure 6.52, Table 6.34). The maximum k-core decreased significantly to k=2. The overall eigenvector scores stayed similar to those seen in the ninth century. Four cutpoints formed part of the network during the tenth century, suggesting more bridging nodes were present. The overall structure of the network also drastically shifted, with no central cluster and occupations being connected by one or a few edges. Ndondondwane, Ntshekane, and Mamba I formed an appendage with a strong tie between Ndondondwane and Ntshekane being present. The Southeastern Lowlands were less densely populated during the tenth century based on the number of settlements identified in the region with only eight nodes forming part of the network.

The network typology noted during the tenth century shifted again during the eleventh century, with connectivity between occupations becoming more disconnected (Figure 6.53, Table 6.34). Similar to the tenth-century network, an appendage between three occupations, ShuShu Hotsprings, Mhlanga Lagoon, and KwaGandaganda, was noted, while a separate connection

between Emberton Way and Nsuze was noted. The maximum k-cores (k=2) suggest a bridging and free-flowing design symmetry between the dwindling occupations during the eleventh century.

6.13 Chapter Summary

This chapter has presented all the relevant design symmetry data by focusing on spatial and temporal scales. Using the Social Network Analysis allowed for various patterns within each ecozone through time and across the entire study area to be identified. In the next chapter, the relevance and interpretations of these patterns will be discussed, with the aim of answering the research questions presented in Chapter 1.

Table 6.1 Counts and relative frequencies (%) of design symmetries, including undecorated vessels (a) and design symmetries without undecorated vessels (b) in the Msuluzi Branch

a

	n	Rel.freq (%)
Sym1	1167	8.5
Sym2	872	6
Sym3	1436	11
Sym4	1506	11
Sym5	894	6.5
Sym6	174	1
Sym7	17	0.5
Asym	41	0.5
None	7480	55
Total	13587	

b

	n	Rel.freq (%)
Sym1	1167	19
Sym2	872	14
Sym3	1436	24
Sym4	1506	24.5
Sym5	894	14.5
Sym6	174	3
Sym7	17	0.3
Asym	41	0.7
Total	6107	

Table 6.2 Counts and relative frequencies (%) of all symmetry types with undecorated vessels (a) as well as design symmetries without undecorated vessels (b) across each of the three ceramic facies (Msuluzi, Ndondondwane, and Ntshekane)

a

	Msuluzi		Ndondondwane		Ntshekane	
	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)
Sym1	552	16.9	481	5.06	134	16.22
Sym2	336	10.28	457	4.81	79	9.56
Sym3	584	17.88	780	8.21	72	8.72
Sym4	613	18.76	816	8.59	77	9.32
Sym5	289	8.85	456	4.8	149	18.04
Sym6	87	2.66	79	0.83	8	0.97
Sym7	12	0.37	5	0.05	0	0
Asym	8	0.24	31	0.32	2	0.24
None	786	24.06	6389	67.3	305	36.92
Total	3267		9494		826	

b

	Msuluzi		Ndondondwane		Ntshekane	
	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)
Sym1	552	22.25	481	15.49	134	25.72
Sym2	336	13.54	457	14.72	79	15.16
Sym3	584	23.54	780	25.12	72	13.82
Sym4	613	24.71	816	26.28	77	14.78
Sym5	289	11.65	456	14.69	149	28.60
Sym6	87	3.51	79	2.54	8	1.54
Sym7	12	0.48	5	0.16	0	0.00
Asym	8	0.32	31	1.00	2	0.38
Total	2481		3105		521	

Figure 6.1 Relative frequencies (%) of design symmetry distribution in the Msuluzi Branch

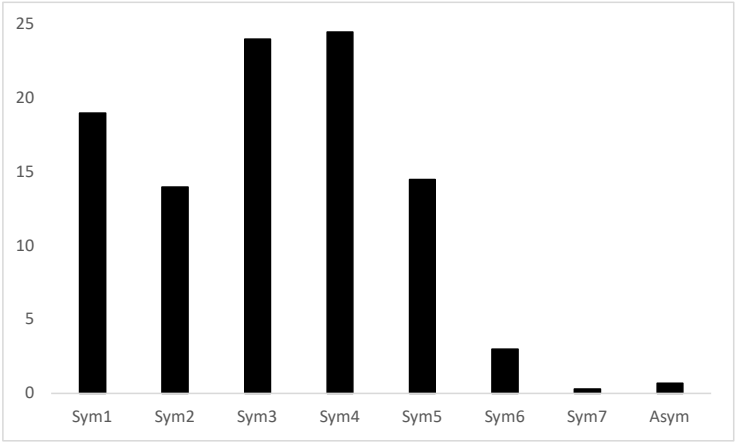


Figure 6.2 Line graph showing the relative frequencies of the Msuluzi Branch design symmetry distribution across the three relevant ceramic facies (Msuluzi, Ndondondwane, and Ntshekane)

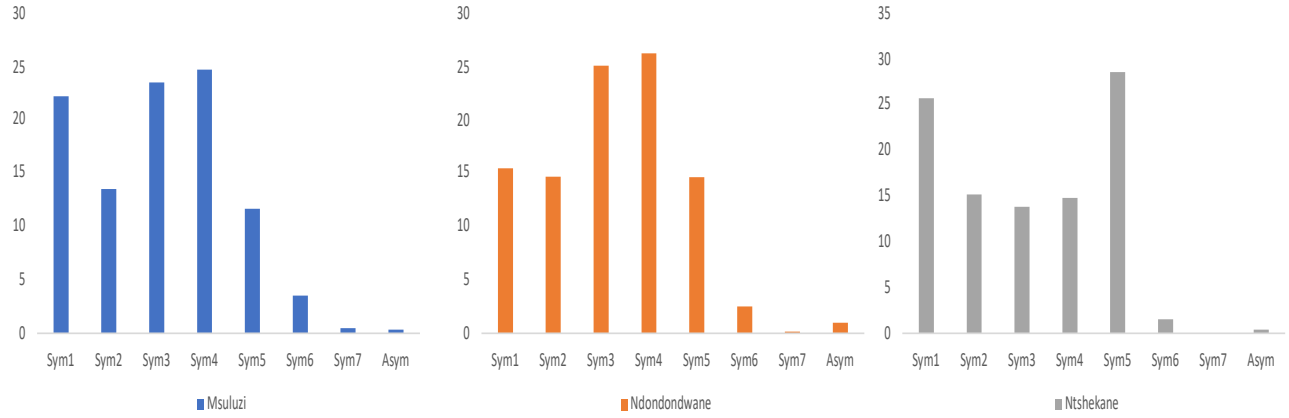


Table 6.3 The scale of comparison used across all Brainerd-Robinson Coefficient of Similarity scores in this dissertation

Percentiles	Similar/Dissimilar	Color Code
<59% (118-0)	very dissimilar	
60-69%(119-138)	dissimilar	
70-79% (139-158)	similar	
80-99% (159-198)	very similar	
100% (199-200)	identical	

Table 6.4 Chi-square test of independence for all Msuluzi Branch ceramic facies

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	184	156
Ndondondwane	184	200	151
Ntshekane	156	151	200

Table 6.5 Chi-square test of independence for all Msuluzi Branch ceramic facies

Chi-square (Observed value)	20.545
Chi-square (Critical value)	23.685
DF	14
p-value	0.114
alpha	0.05

Figure 6.3 Visual display of (a) traditional, (b) unmodeled, and (c) Bayesian-modelled radiocarbon dates for the Msuluzi Sequence

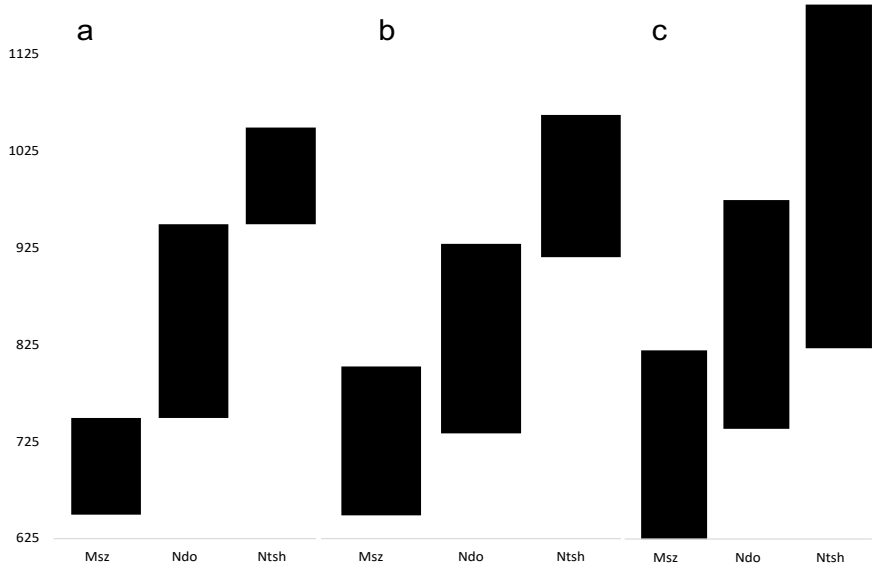


Table 6.6 Modelled start and end boundaries for Msuluzi, Ndondondwane, and Ntshekane ceramic facies—a confidence interval of 68% (top) and 95% (bottom)

Facies	Modelled Start Date (cal. AD)	Modelled End Date (cal. AD)	Modelled Span (years)
Msuluzi	645-705	720-781	11-202
Ndondondwane	775-853	860-940	0-185
Ntshekane	1099-1207	1168-1262	0-103

Facies	Modelled Start Date (cal. AD)	Modelled End Date (cal. AD)	Modelled Span (years)
Msuluzi	625-760	696-820	0-264
Ndondondwane	739-893	800-975	0-285
Ntshekane	822-1045	912-1177	0-198

Note. Bayesian Model #16, all samples included a charcoal outlier, sigma boundaries, and an overlapping-phase model type.

Figure 6.4a Modelled start and end boundaries for the Msuluzi Sequence and Blackburn facies Bayesian Model #16, all samples included a charcoal outlier, sigma boundaries, and an overlapping-phase model type. Appendix A, Figure A.1 contains complete results, including individual site dates and the Bayesian model script. The Oxcal script used for the Bayesian Model can be found in Appendix B

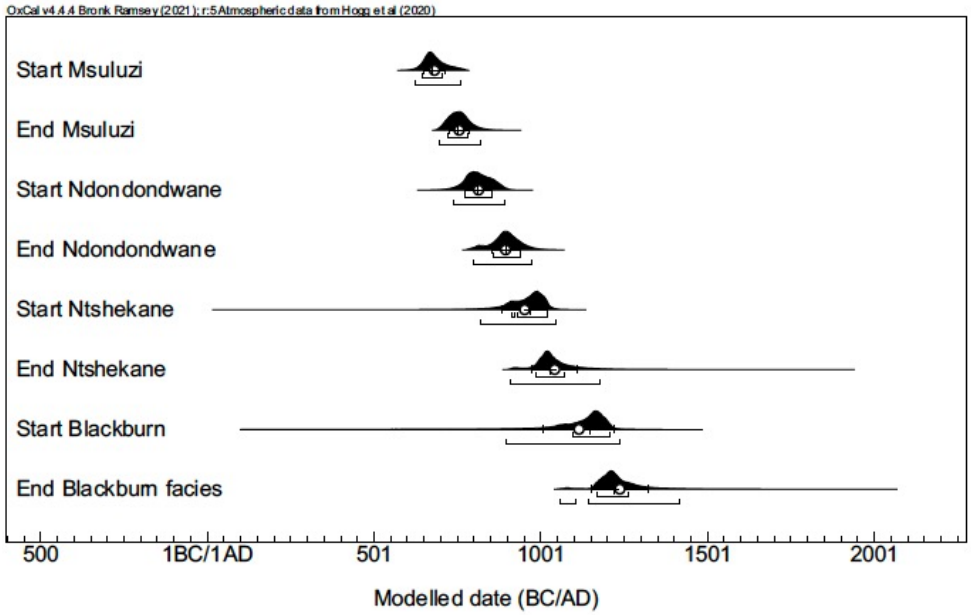


Figure 6.4b Modelled span of each ceramic facies in the Msuluzi Sequence and Blackburn facies. Bayesian Model #16, all samples included a charcoal outlier, sigma boundaries, and an overlapping-phase model type

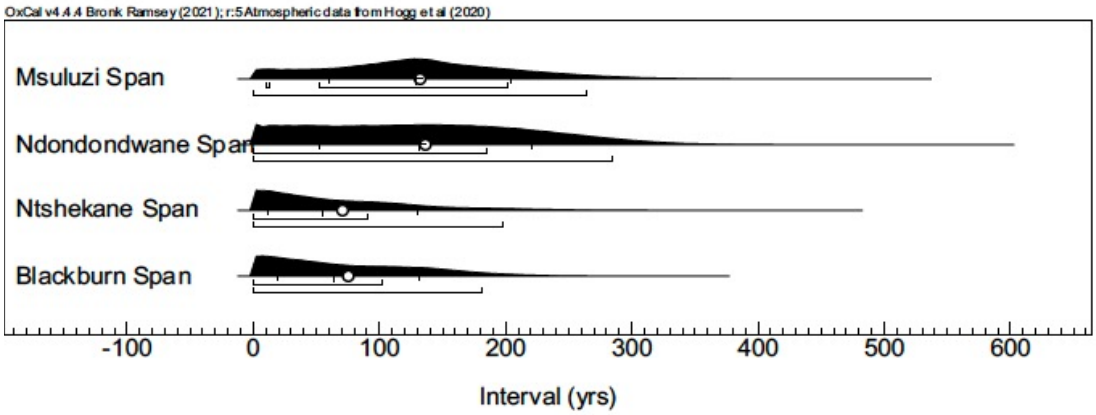


Table 6.7 Count and relative frequency (%) counts of the four apportioned periods, AD 625, AD 675, AD 725, and AD 775 across the Msuluzi Phase

	Msuluzi Phase (AD 625)		Msuluzi Phase (AD 675)		Msuluzi Phase (AD 725)		Msuluzi Phase (AD 775)	
	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)
Sym1	75	16	225	17	213	16	83	18
Sym2	40	7.5	147	11	130	10.5	57	12
Sym3	108	23	243	18	225	17.5	95	21
Sym4	56	12	282	21	222	17.5	88	19
Sym5	36	7.5	106	8	134	10.5	58	13
Sym6	12	3	26	2	43	3	9	2
Sym7	2	0	3	0	7	1	0	0
Asym	0	0	5	0	3	0	4	1
None	145	31	316	23	315	24	68	14
Total	474		1353		1292		462	

Figure 6.5 Line graph of and relative frequency (%) counts of the four apportioned periods, AD 625, AD 675, AD 725 and AD 775 across the Msuluzi Phase

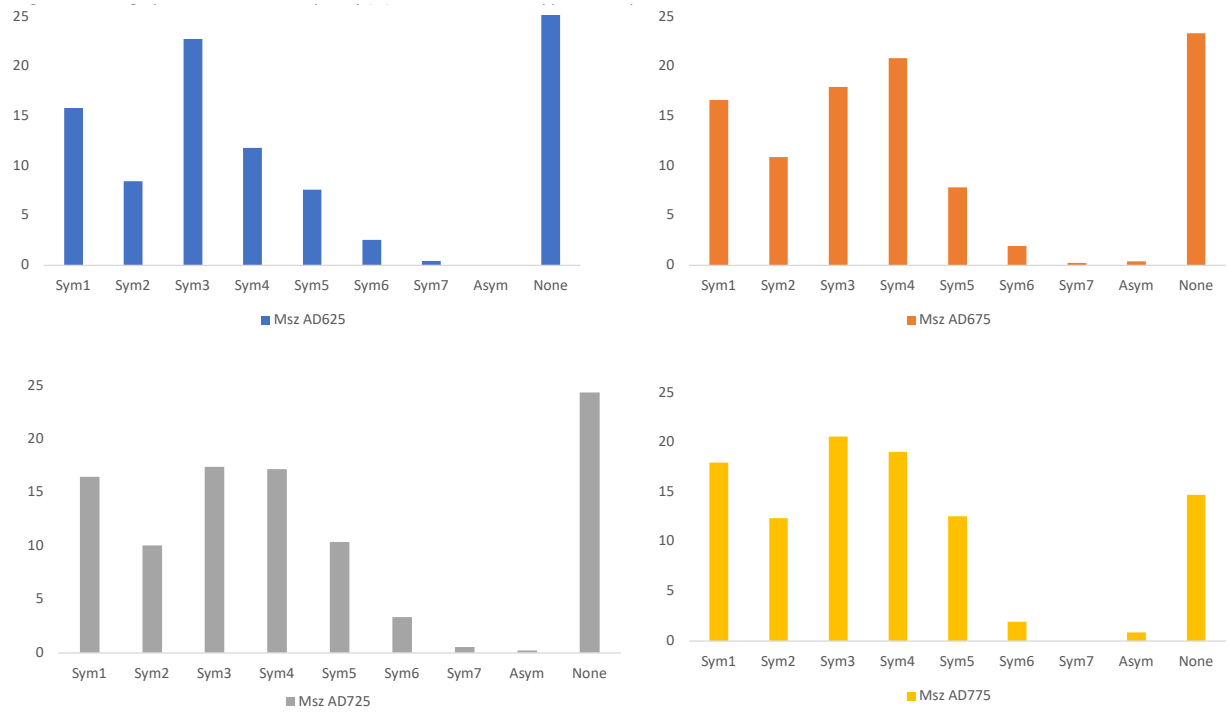


Table 6.8 Brainerd-Robinson Coefficient of Similarity scores of the four apportioned periods, AD 625, AD 675, AD 725 and AD 775, across the Msuluzi Phase. All scores calculated out of 200

	Msuluzi Phase (AD 625)	Msuluzi Phase (AD 675)	Msuluzi Phase (AD 725)	Msuluzi Phase (AD 775)
Msuluzi Phase (AD 625)	200	174	177	162
Msuluzi Phase (AD 675)	174	200	189	179
Msuluzi Phase (AD 725)	177	189	200	177
Msuluzi Phase (AD 775)	162	179	177	200

Figure 6.6 Line graph of and relative frequency (%) counts of the five apportioned periods, AD 725, AD 775, AD 825, AD 875, and AD 925 across the Ndondondwane Phase

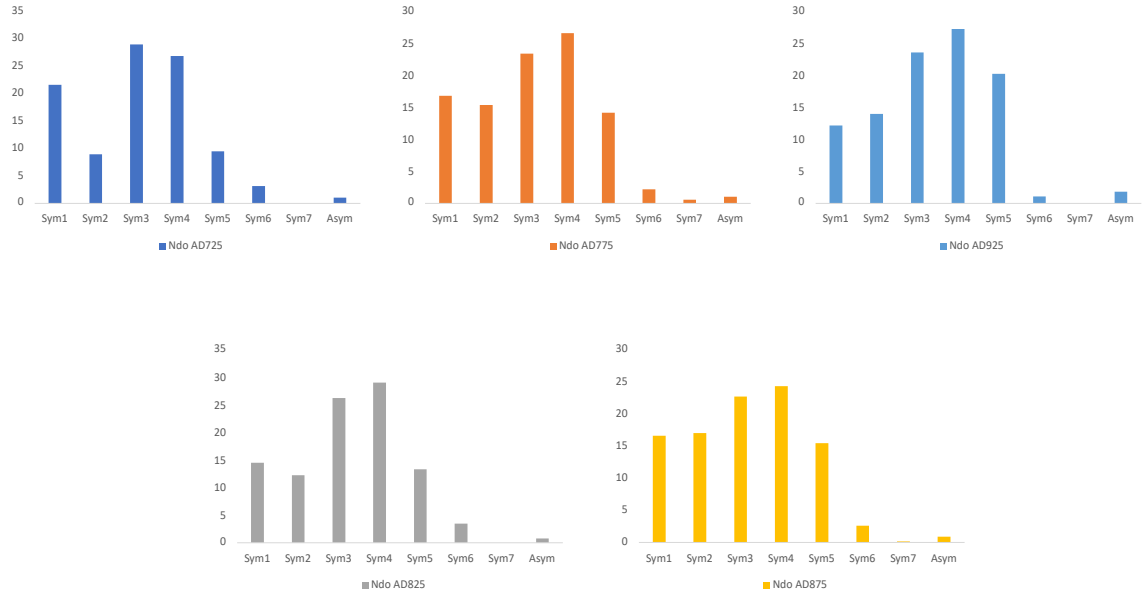


Table 6.9 Count and relative frequency (%) counts of the five apportioned periods, AD 725, AD 775, AD 825, AD 875, and AD 925 across the Ndondondwane Phase

	Ndondondwane Phase (AD725)		Ndondondwane Phase (AD 775)		Ndondondwane Phase (AD 825)		Ndondondwane Phase (AD875)		Ndondondwane Phase (AD 925)	
	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)
Sym1	41	7	115	5	147	5	114	5	33	3
Sym2	17	3	105	5	124	4	117	5	38	4
Sym3	55	9	160	8	266	8	156	6	64	7
Sym4	51	9	182	9	294	9	167	7	74	8
Sym5	18	3	97	5	135	5	106	4	55	6
Sym6	6	1	15	1	35	1	18	1	3	0
Sym7	0	0	4	0	0	0	1	0	0	0
Asym	2	0	7	0	8	0	6	0	5	1
None	393	68	1413	67	2170	68	1746	72	692	71
Total	583		2098		3179		2431		964	

Table 6.10 Brainerd-Robinson Coefficient of Similarity scores of the five apportioned periods, AD 725, AD 775, AD 825, AD 875 and AD 925, across the Ndondondwane Phase. All scores calculated out of 200

	Ndondondwane Phase (AD725)	Ndondondwane Phase (AD 775)	Ndondondwane Phase (AD 825)	Ndondondwane Phase (AD 875)	Ndondondwane Phase (AD 925)
Ndondondwane Phase (AD725)	200	177	180	171	166
Ndondondwane Phase (AD 775)	177	200	186	193	185
Ndondondwane Phase (AD 825)	180	186	200	182	181
Ndondondwane Phase (AD 875)	171	193	182	200	181
Ndondondwane Phase (AD 925)	166	185	181	181	200

Table 6.11 Count and relative frequency (%) counts of the four-hundred-year apportioned periods, AD 775-AD 875, AD 875-AD 975, AD 975-AD 1075, and AD 1075-AD 1175 across the Ntshekane Phase

	Ntshekane (AD775-AD875)		Ntshekane (AD875-AD975)		Ntshekane (AD975-1075)		Ntshekane (AD1075-1175)	
	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)	n	rel freq. (%)
Sym1	24	20	66	12.45	93	18	15	10
Sym2	16	13	78	14.72	62	12	3	2
Sym3	21	17	80	15.09	51	10	5	3
Sym4	24	20	80	15.09	53	10	14	10
Sym5	14	12	100	18.87	101	19	20	14
Sym6	1	1	6	1.13	6	1	0	0
Sym7	0	0	0	0	0	0	0	0
Asym	0	0	4	0.75	1	0	0	0
None	21	17	116	21.89	158	30	86	60
Total	121		530		525		143	

Figure 6.7 Relative frequency (%) counts of the four-hundred-year apportioned periods, AD 775-AD 875, AD 875-AD 975, AD 975-AD 1075, and AD 1075-AD 1175 across the Ntshekane Phase

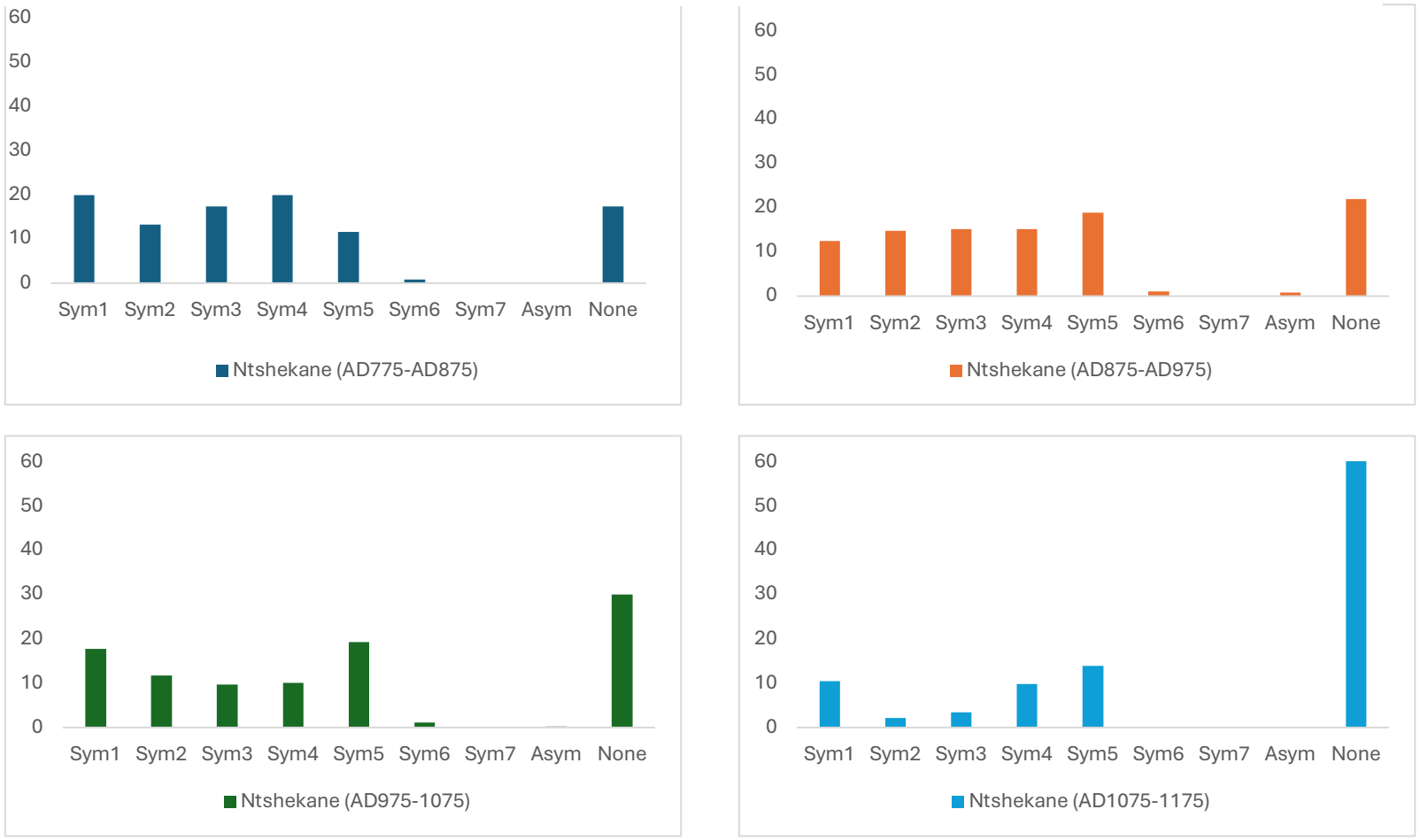


Table 6.12 Brainerd-Robinson Coefficient of Similarity scores of the four-hundred-year apportioned periods, AD 775-AD 875, AD 875-AD 975, AD 975-AD 1075, and AD 1075-AD 1175 across the Ntshekane Phase. All scores calculated out of 200

	Ntshekane (AD775-AD875)	Ntshekane (AD875-AD975)	Ntshekane (AD975-1075)	Ntshekane (AD1075-AD1175)
Ntshekane (AD775-AD875)	200	171	158	110
Ntshekane (AD875-AD975)	171	200	172	123
Ntshekane (AD975-AD1075)	158	172	200	140
Ntshekane (AD1075-AD1175)	110	123	140	200

Figure 6.8 Relative frequencies (%) of (a) overall and Msuluzi facies design symmetries across Msuluzi Confluence and(b) design symmetries across the seventh and eighth-century apportioned periods of Msuluzi Confluence

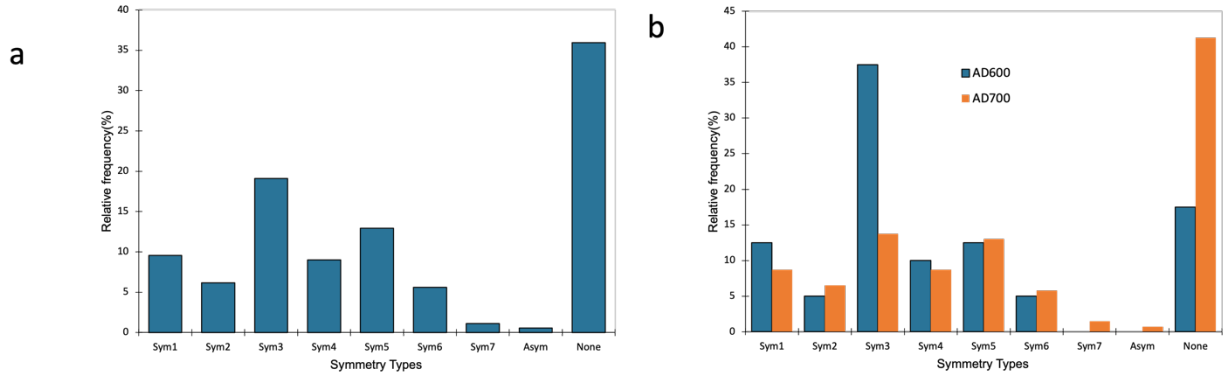


Table 6.13 Brainerd-Robinson Coefficient of Similarity scores of the two apportioned periods, AD 600 and AD 700. All scores calculated out of 200

	Magogo (AD600)	Magogo (AD700)	Magogo (AD800)
Magogo (AD600)	200	168	186
Magogo (AD700)	168	200	168
Magogo (AD800)	186	168	200

Figure 6.9 Relative frequency scores (%) of design symmetries at Magogo during the (a) Msuluzi phase, (b) Msuluzi/Ndondondwane Transitional phase, and the (c) Ndondondwane phase

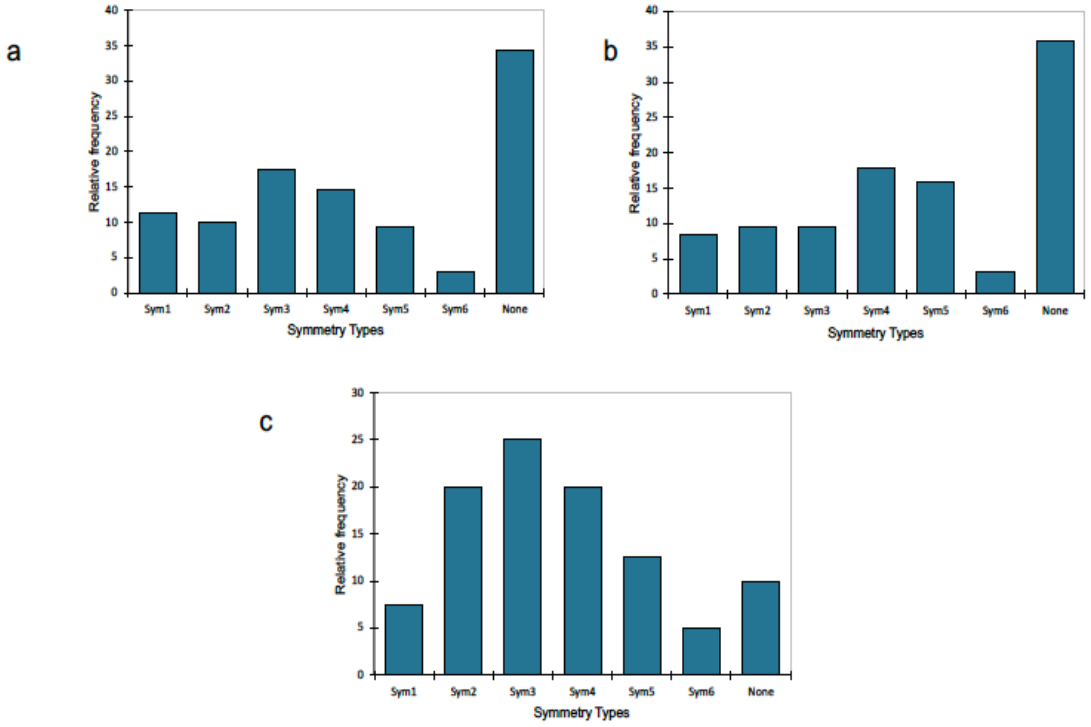


Figure 6.10 Relative frequency scores (%) of design symmetries at Magogo during the (a) seventh, (b) eighth, and (c) ninth centuries

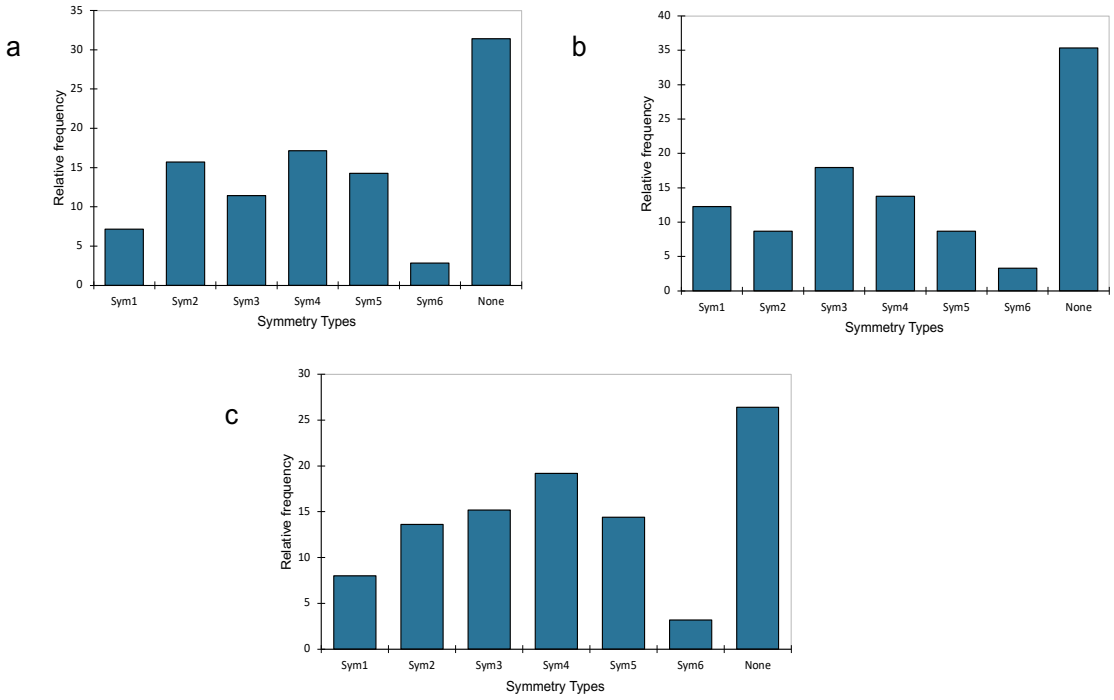


Table 6.14 Brainerd-Robinson Coefficient of Similarity scores of the three ceramic facies, Msuluzi, Msuluzi to Ndondondwane transition, and Ndondondwane at Magogo. All scores calculated out of 200

	Magogo (Msuluzi)	Magogo (Msuluzi/Ndondondwane Transition)	Magogo (Ndondondwane)
Magogo (Msuluzi)	200	177	144
Magogo (Msuluzi/Ndondondwane Transition)	177	200	140
Magogo (Ndondondwane)	144	140	200

Table 6.15 Brainerd-Robinson Coefficient of Similarity scores of the three apportioned periods AD 600, AD 700, and AD 800 at Magogo. All scores were calculated out of 200

	Magogo (AD600)	Magogo (AD700)	Magogo (AD800)
Magogo (AD600)	200	168	186
Magogo (AD700)	168	200	168
Magogo (AD800)	186	168	200

Figure 6.11 Relative frequency scores (%) of overall and Msuluzi facies design symmetries at Mhlopeni

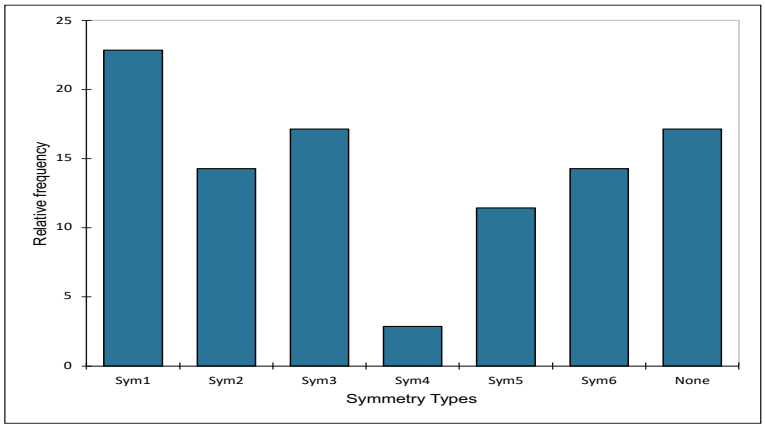
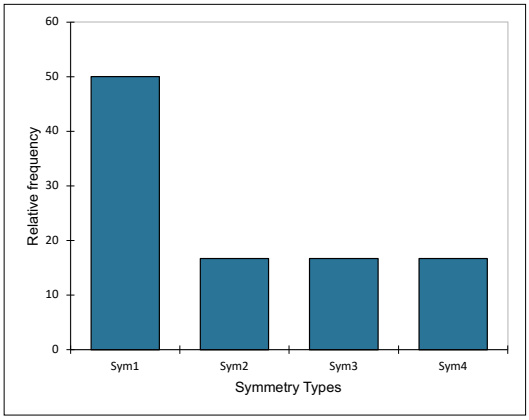


Figure 6.12 Relative frequency scores (%) of (a) design symmetries apportioned to AD 600, and (b) to AD 700 at Mhlopeni

a



b

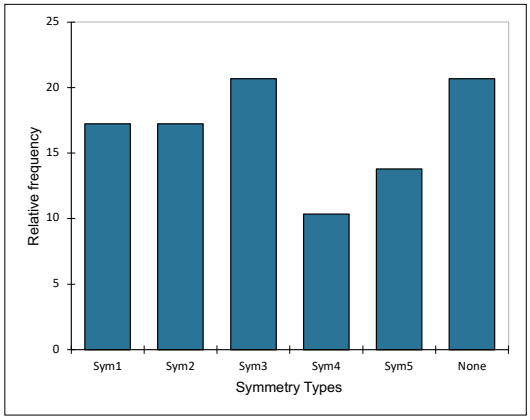


Table 6.16 Brainerd-Robinson Coefficient of Similarity scores of the two apportioned periods AD 600, AD 700 at Mhlopeni. All scores were calculated out of 200

	Mhlopeni AD600	Mhlopeni AD700
Mhlopeni AD600	200	122
Mhlopeni AD700	122	200

Figure 6.13 Relative frequency scores (%) of overall design symmetries at Ntshekane

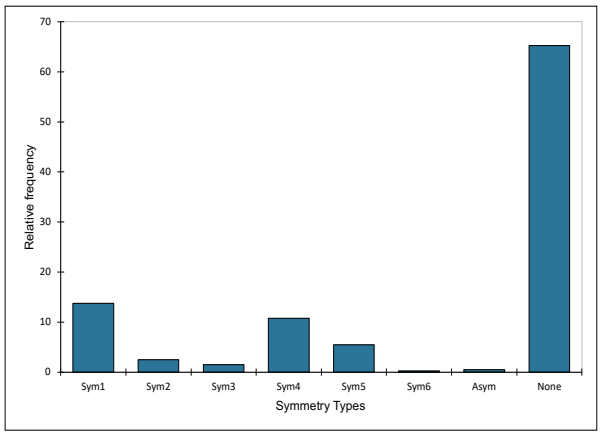


Figure 6.14 Relative frequency scores (%) of (a) Msuluzi, (b) Ndondondwane and (c) Ntshekane facies design symmetries at Ntshekane

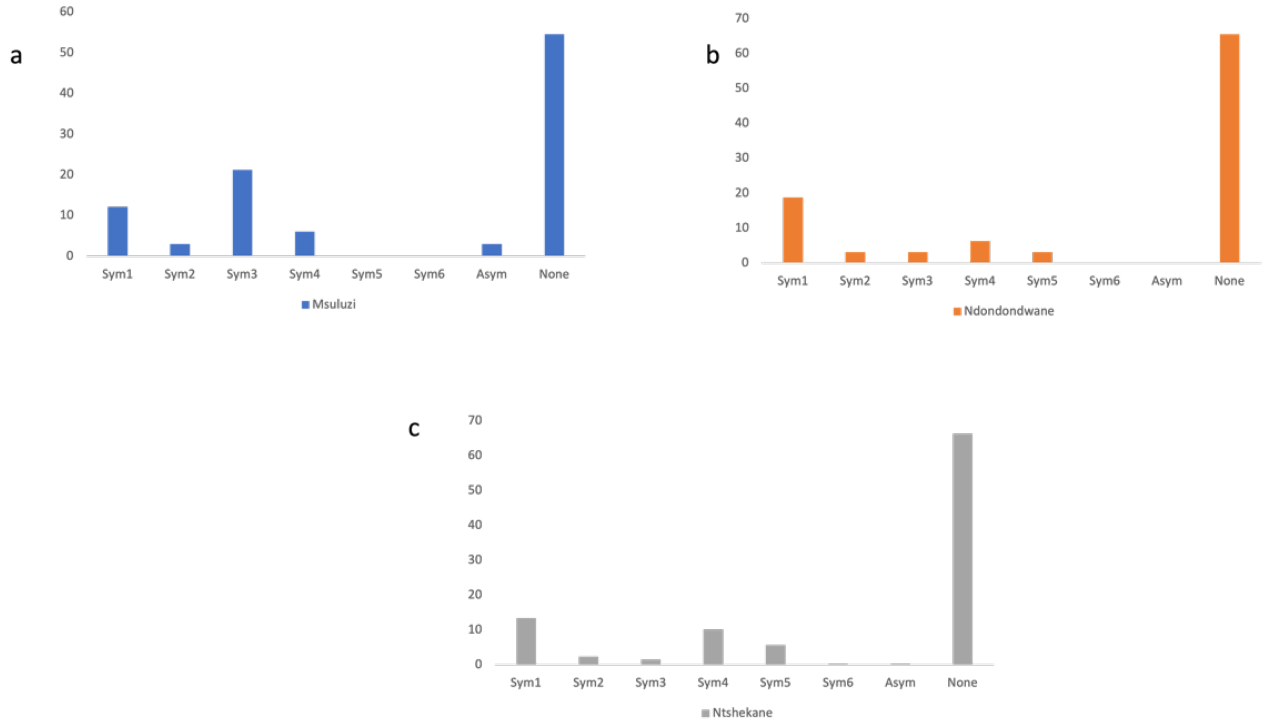


Figure 6.15 Relative frequency scores (%) of (a) AD 600, (b) AD 700, (c) AD 800, (d) AD 900, (e) AD 1000, and (f) AD 1100 apportioned design symmetries at Ntshekane

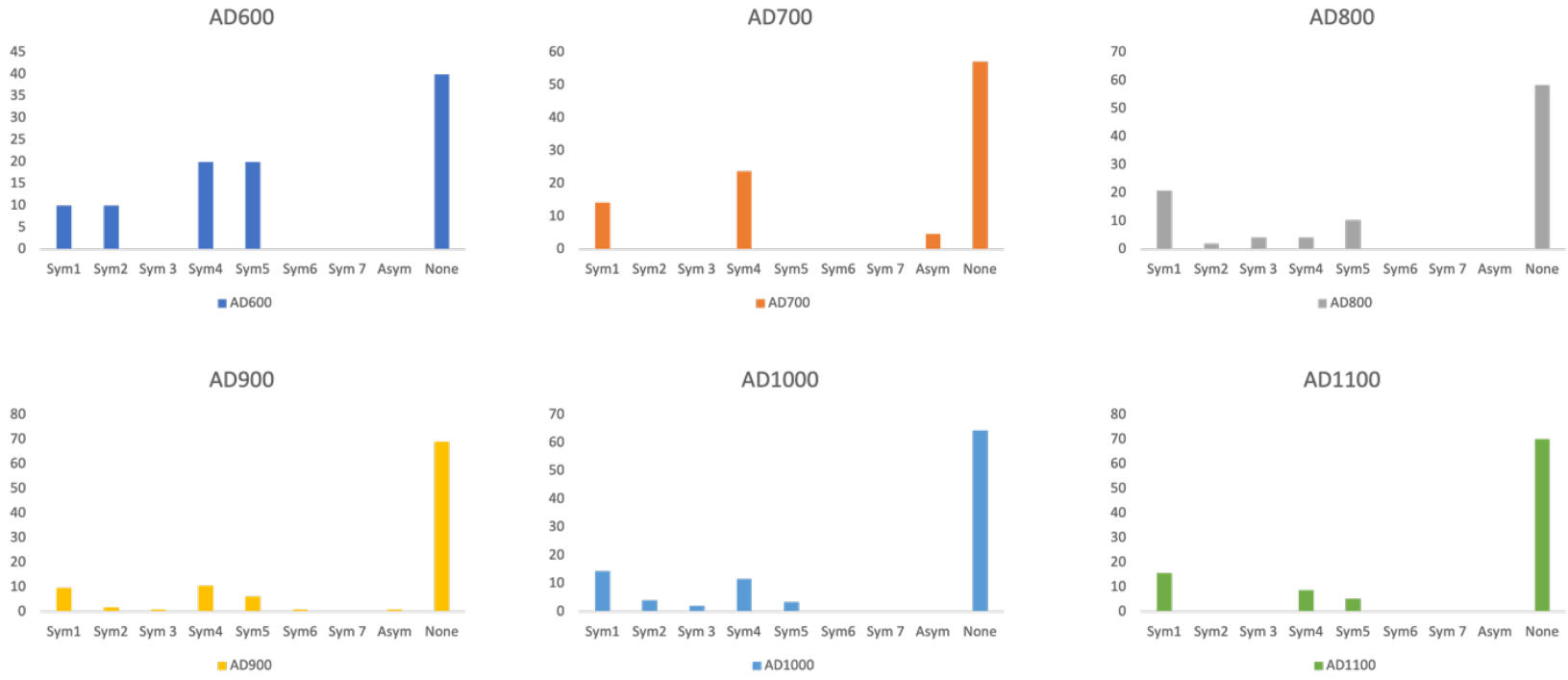


Table 6.17 Brainerd-Robinson Coefficient of Similarity scores of the three ceramic facies, Msuluzi, Ndondondwane, and Ntshekane, at the Ntshekane site. All scores calculated out of 200

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	158	154
Ndondondwane	158	200	185
Ntshekane	154	185	200

Table 6.18 Brainerd-Robinson Coefficient of Similarity scores of the six apportioned periods AD 600, AD 700, AD 800, AD 900, AD 1000, and AD 1100 at Ntshekane. All scores were calculated out of 200

	AD600	AD700	AD800	AD900	AD1000	AD1100
AD600	200	140	133	137	138	112
AD700	140	200	151	157	166	143
AD800	133	151	200	162	169	163
AD900	137	157	162	200	182	169
AD1000	138	166	169	182	200	164
AD1100	112	143	163	169	164	200

Figure 6.16 Relative frequency scores (%) of overall and Ndondondwane facies design symmetries at Mamba I

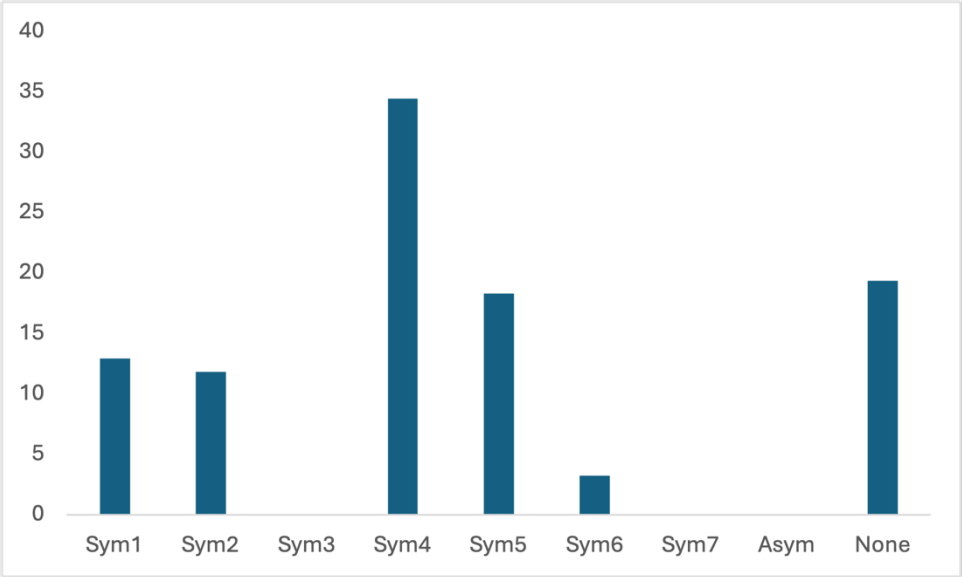


Figure 6.17 Relative frequency scores (%) of (a) AD 700, (b) AD 800, (c) AD 900 apportioned design symmetries at Mamba I

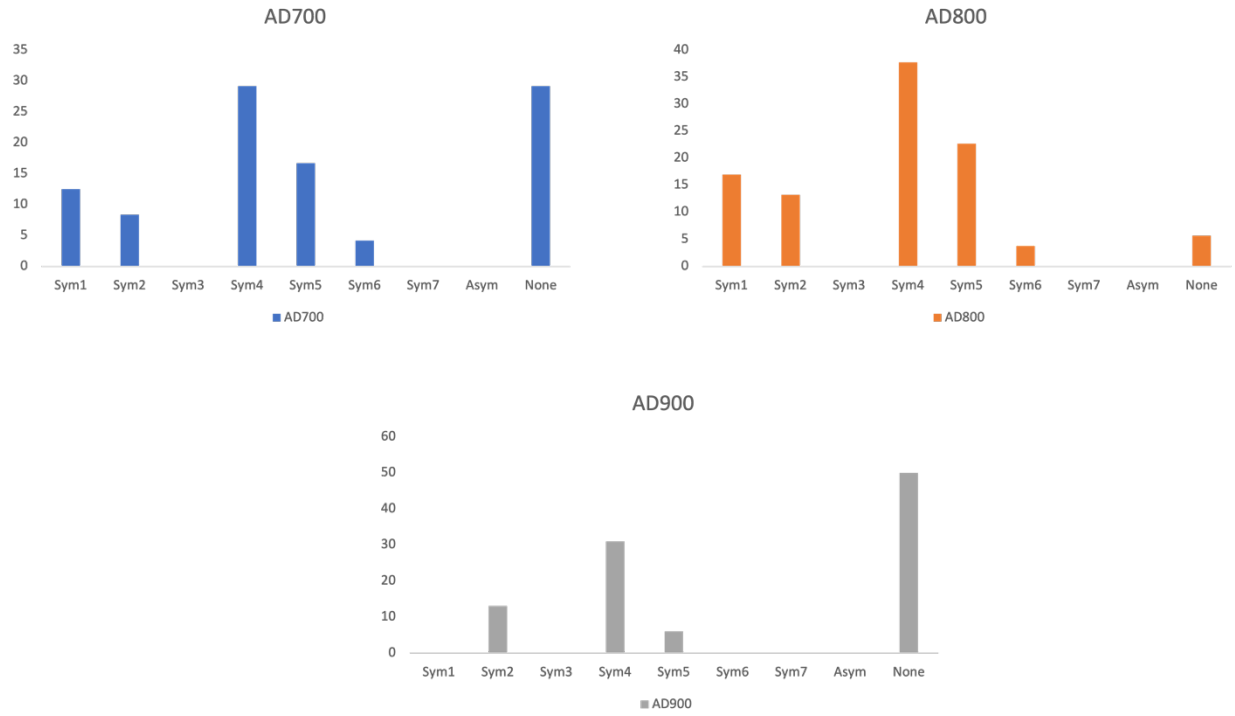


Table 6.19 Brainerd-Robinson Coefficient of Similarity scores of the three apportioned periods AD 700, AD 800, and AD 900 at Mamba I. All scores were calculated out of 200

	AD700	AD800	AD900
AD700	200	152	146
AD800	152	200	111
AD900	146	111	200

Figure 6.18 Relative frequency scores (%) of overall and Msuluzi facies and AD 600 and AD 700 apportioned design symmetries at Mamba II

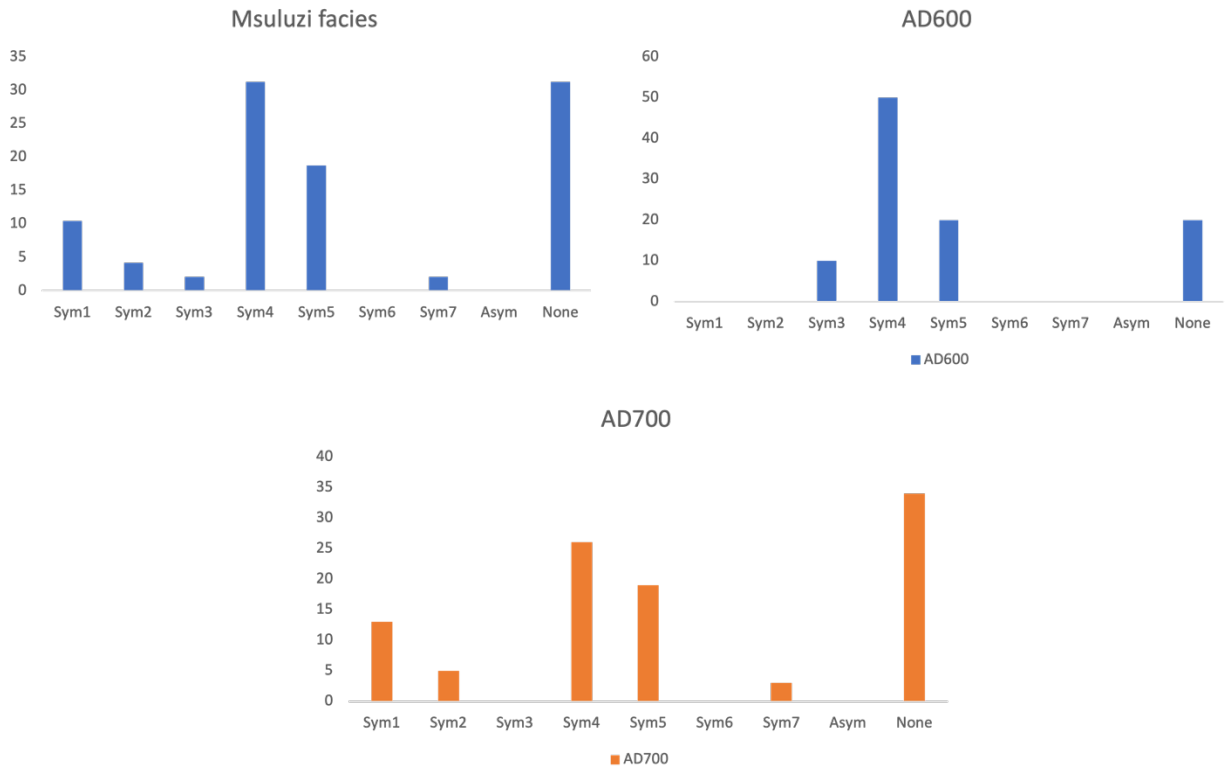


Table 6.20 Brainerd-Robinson Coefficient of Similarity scores of the two apportioned periods AD 600 and AD 700 at Mamba II. All scores were calculated out of 200

	AD600	AD700
AD600	200	129
AD700	129	200

Figure 6.19 a)Relative frequency scores (%) of the overall design symmetries at Ndondondwane with undecorated vessels and b) relative frequency scores (%) of the overall design symmetries at Ndondondwane without undecorated vessels

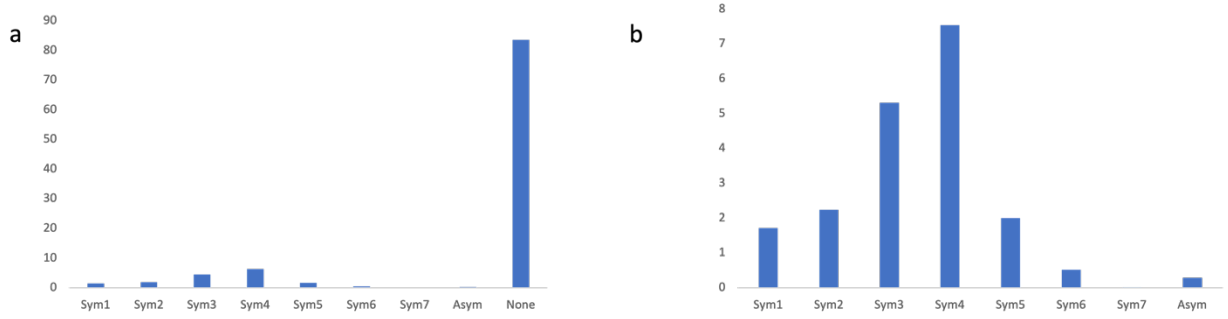


Figure 6.20 Relative frequency scores (%) of the three apportioned periods (a) AD 700, (b) AD 750, (c) AD 800 design symmetries without undecorated vessels at Ndondondwane

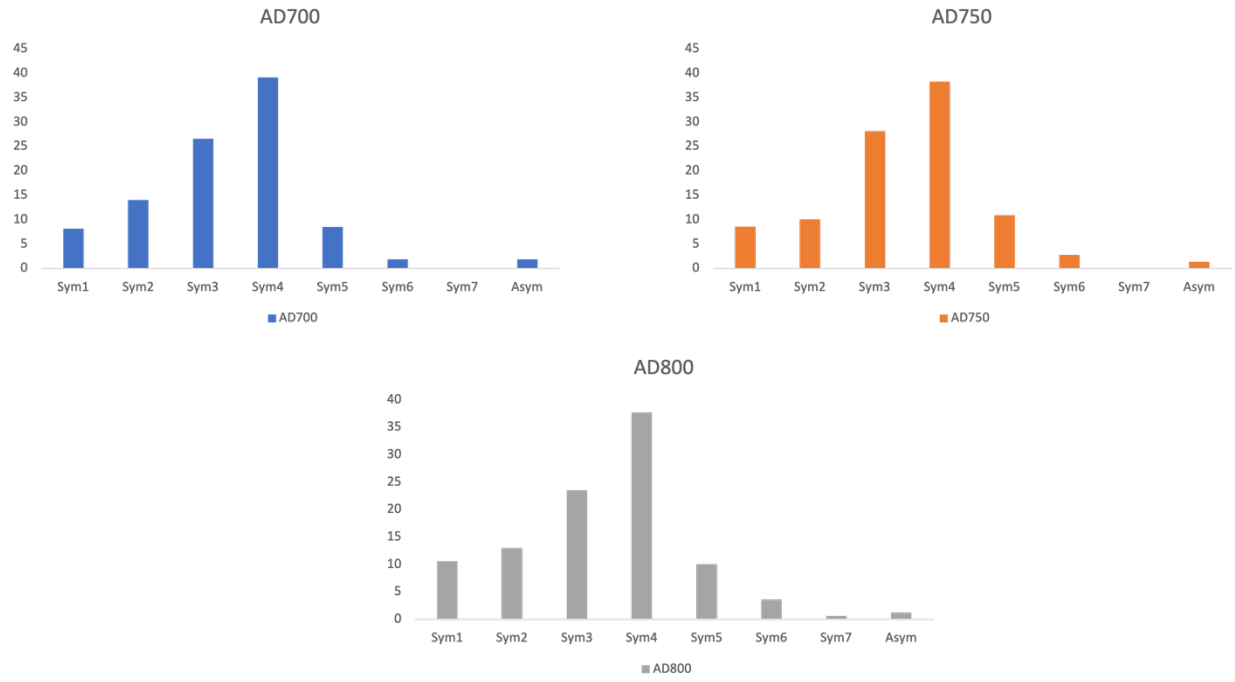


Table 6.21 Brainerd-Robinson Coefficient of Similarity scores of the three apportioned periods AD 700, AD 750, and AD 800 at Ndondondwane. All scores were calculated out of 200

	AD700	AD750	AD800
AD700	200	191	196
AD750	191	200	188
AD800	196	188	200

Figure 6.21 Relative frequency scores (%) of (a) overall, (b) Msuluzi, and (c) Ndondondwane facies design symmetries at Wosi

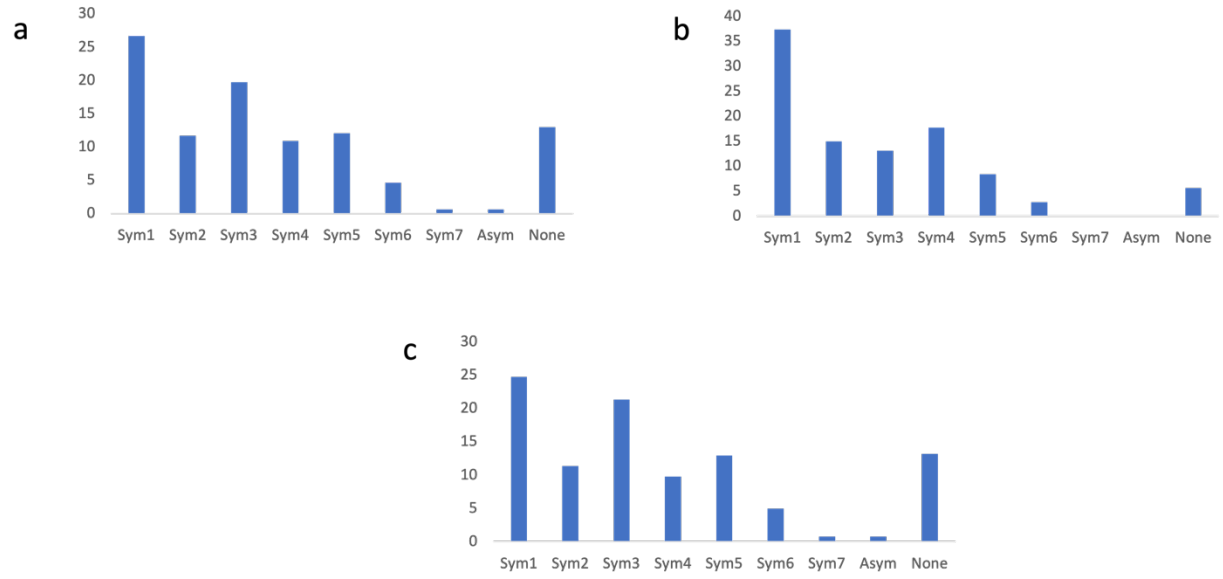


Table 6.22 Brainerd-Robinson Coefficient of Similarity scores of the Msuluzi and Ndondondwane facies at Wosi All scores were calculated out of 200

	Msuluzi	Ndondondwane
Msuluzi	200	152
Ndondondwane	152	200

Figure 6.22 Relative frequency scores (%) of the three apportioned periods, AD 600, AD 700, and AD 800 design symmetries at Wosi

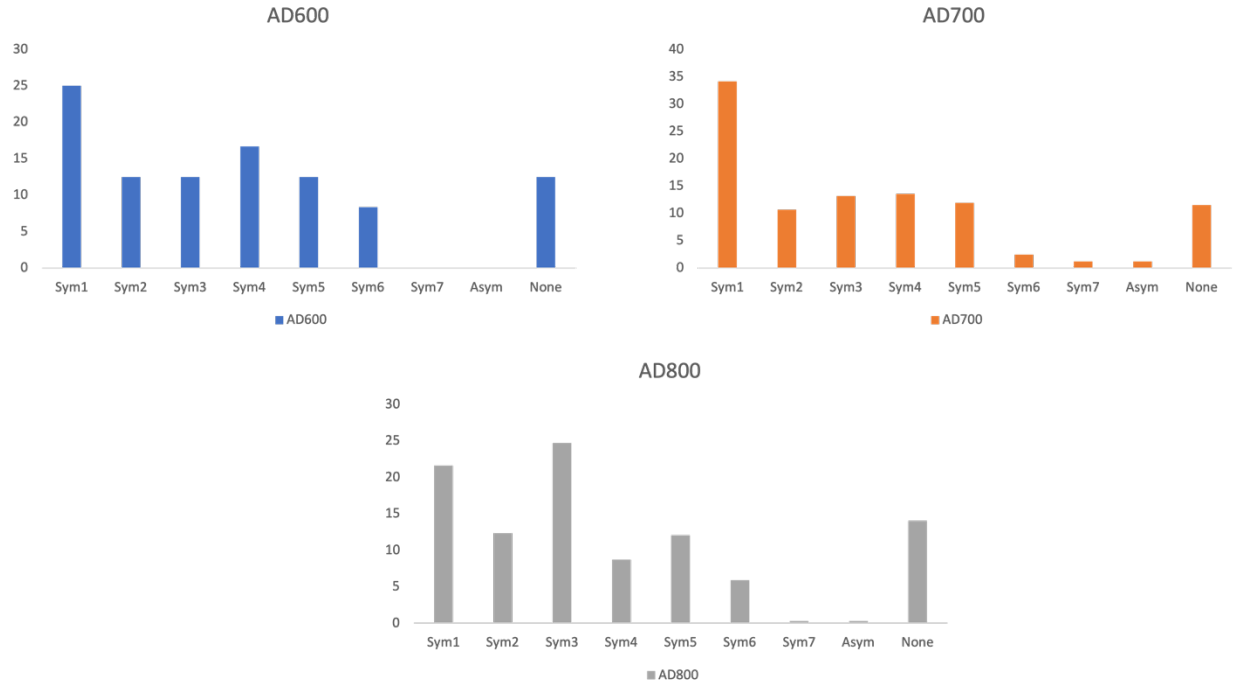


Figure 6.23 Relative frequency scores (%) of (a) overall, (b) Msuluzi, (c) Ndondondwane, and (d) Ntshekane facies design symmetries at Nsuze

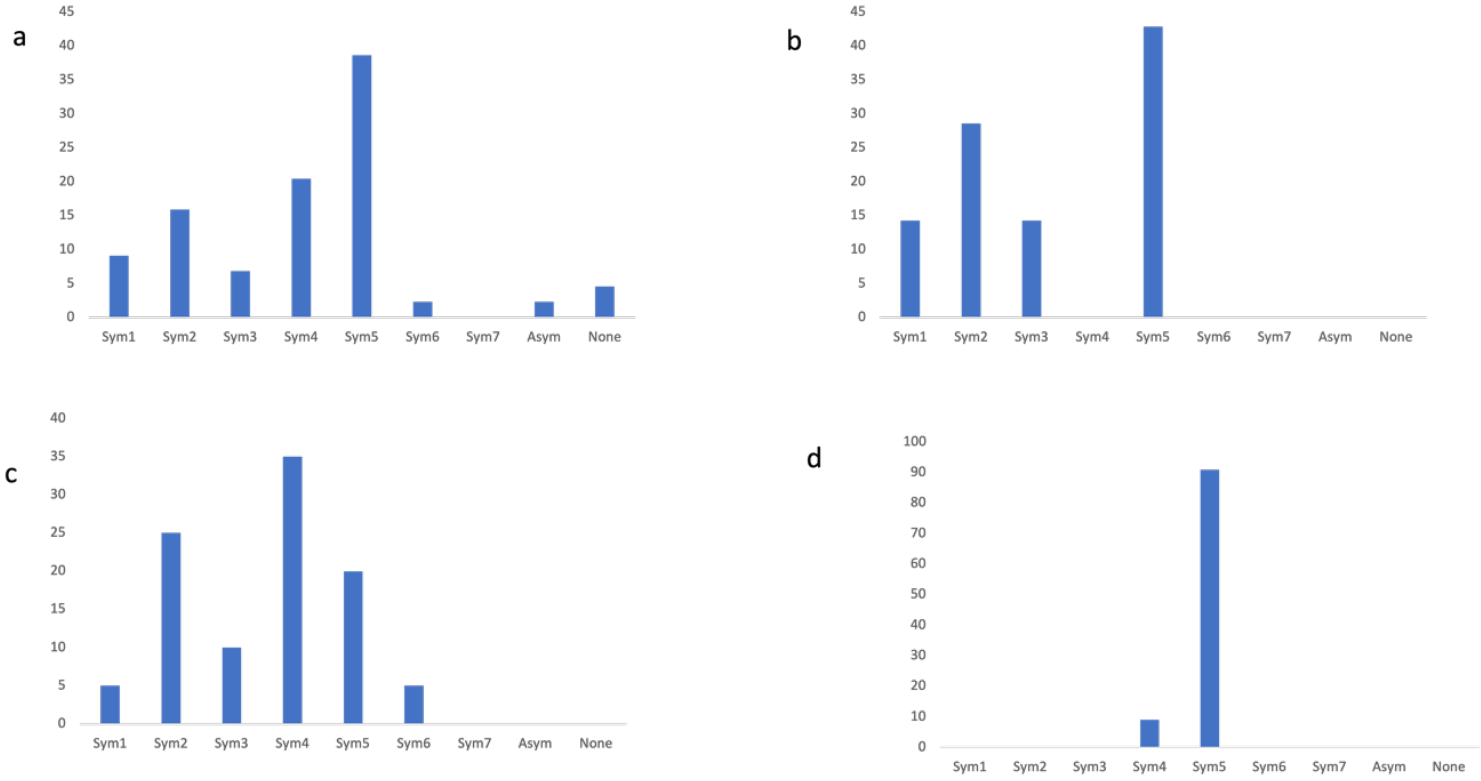


Figure 6.24 Relative frequency scores (%) of apportioned periods, AD 700, AD 800, AD 900, and AD 1000 at Nsuze

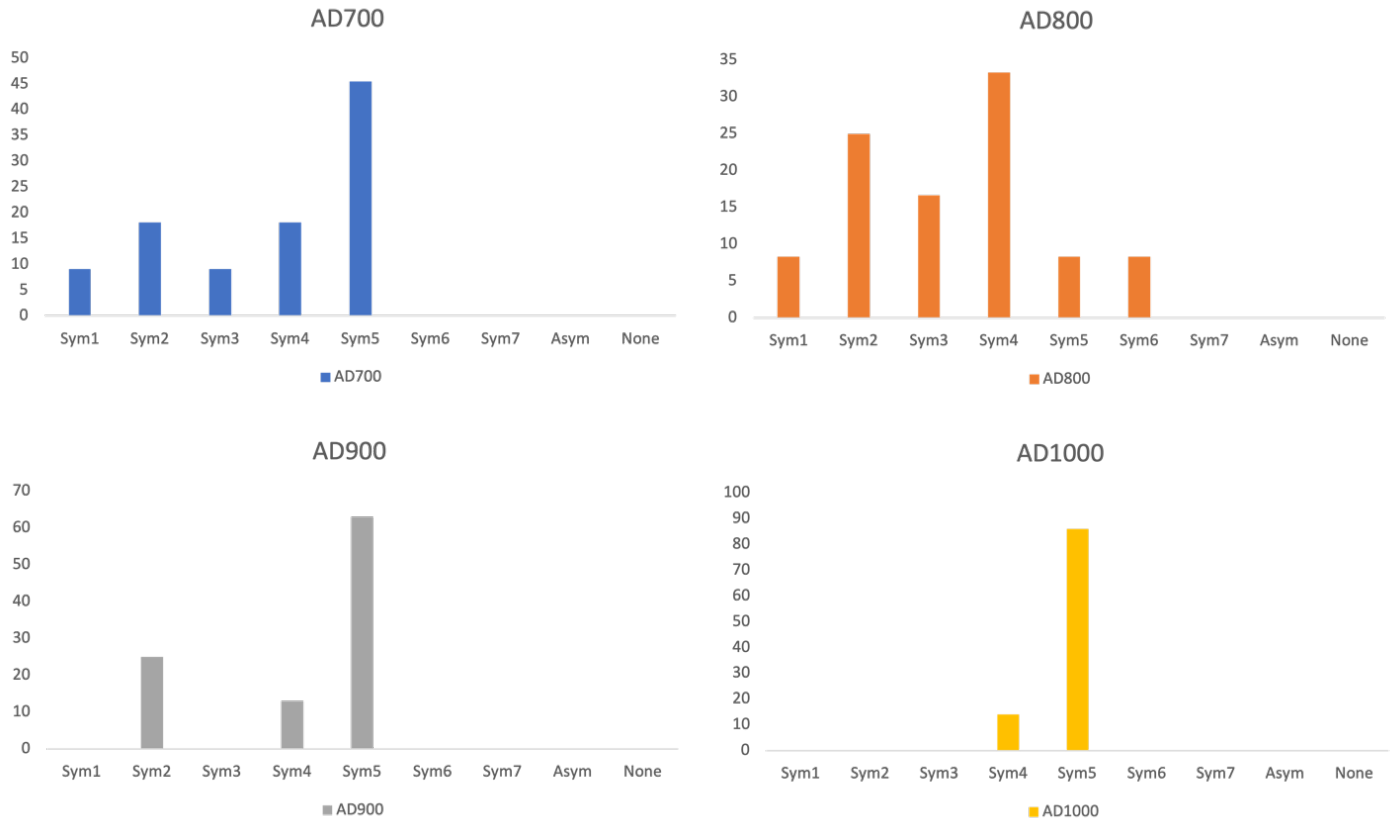


Table 6.23 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi, Ndondondwane, and Ntshekane facies and the (b) four apportioned periods AD 700, AD 800, AD 900, and AD 1000 at Nsuze. All scores were calculated out of 200

a)

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	120	86
Ndondondwane	120	200	58
Ntshekane	86	58	200

b)

	AD700	AD800	AD900	AD1000
AD700	200	124	152	119
AD800	124	200	92	45
AD900	152	92	200	150
AD1000	119	45	150	200

Figure 6.25 Relative frequency scores (%) of overall, Ndondondwane facies, and the apportioned periods design symmetries at ShuShu

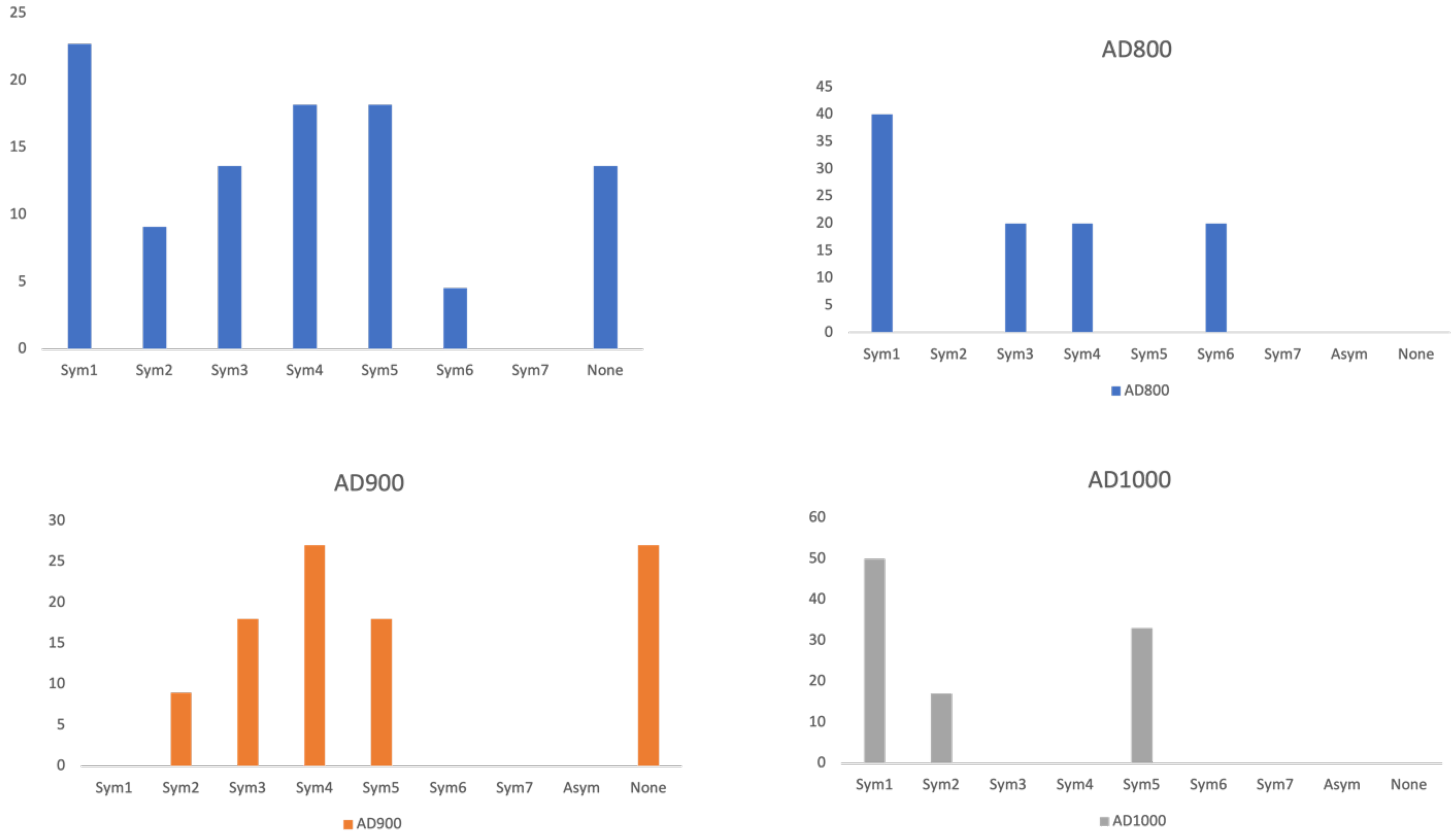


Table 6.24 Brainerd-Robinson Coefficient of Similarity scores of three apportioned periods AD 800, AD 900, and AD 1000 at ShuShu. All scores were calculated out of 200

	AD800	AD900	AD1000
AD800	200	76	80
AD900	76	200	55
AD1000	80	55	200

Figure 6.26 Relative frequency scores (%) of (a) overall, (b) Msuluzi, (c) Ndondondwane, and (d) Ntshekane facies design symmetries at KwaGandaganda

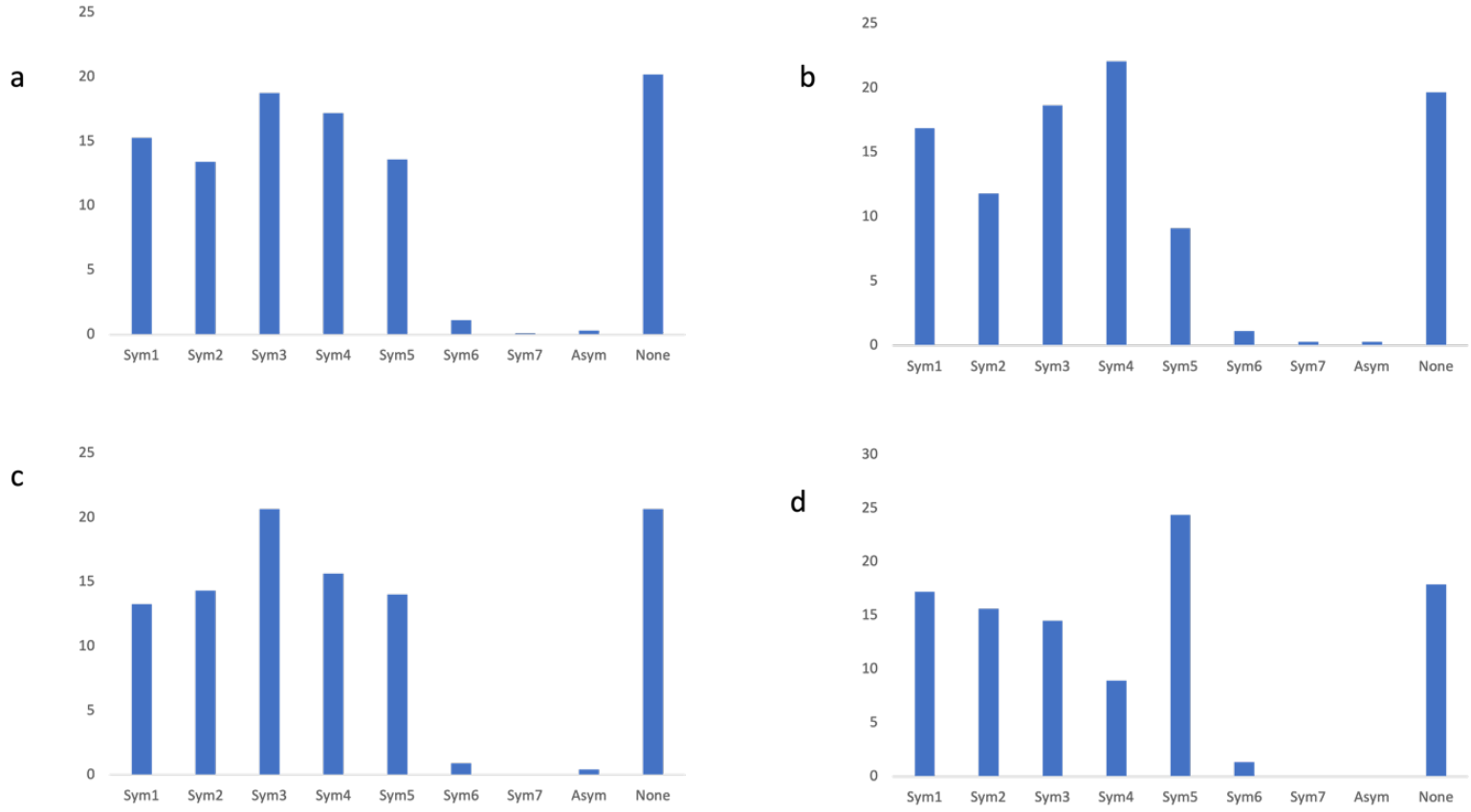


Figure 6.27 Relative frequency scores (%) of design symmetries apportioned periods AD 600, AD 700, AD 800, AD 900, and AD 1000 at KwaGandaganda

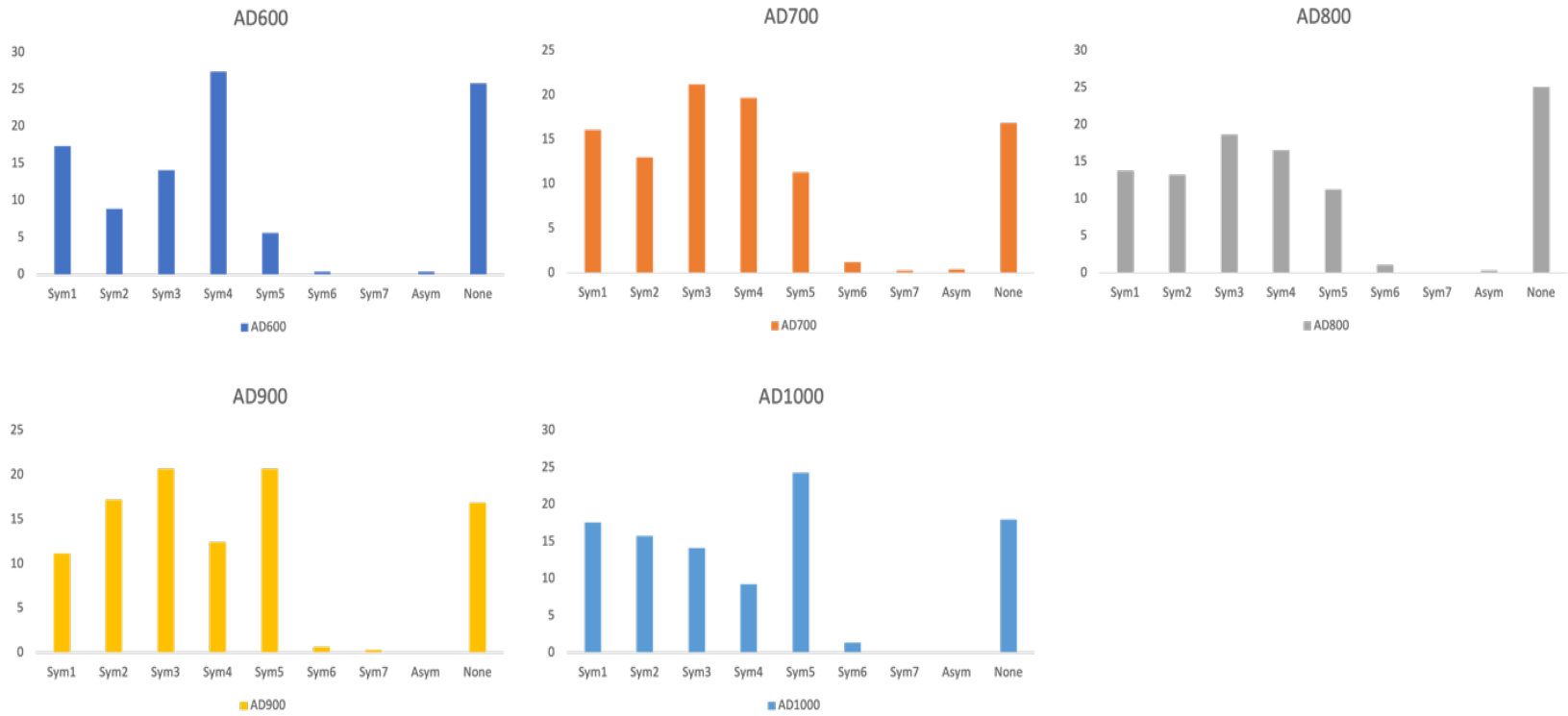


Table 6.25 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi, Ndondondwane, and Ntshekane facies and the (b) five apportioned periods AD 600, AD 700, AD 800, AD 900, and AD 1000 at KwaGandaganda. All scores were calculated out of 200

A)

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	179	161
Ndondondwane	179	200	168
Ntshekane	161	168	200

B

	AD600	AD700	AD800	AD900	AD1000
AD600	200	164	170	140	146
AD700	164	200	183	173	164
AD800	170	183	200	169	161
AD900	140	173	169	200	177
AD1000	146	164	161	177	200

Figure 6.28 Relative frequency scores (%) of (a) overall, (b) Msuluzi and (c) Ndondondwane facies at Inanda Quarry

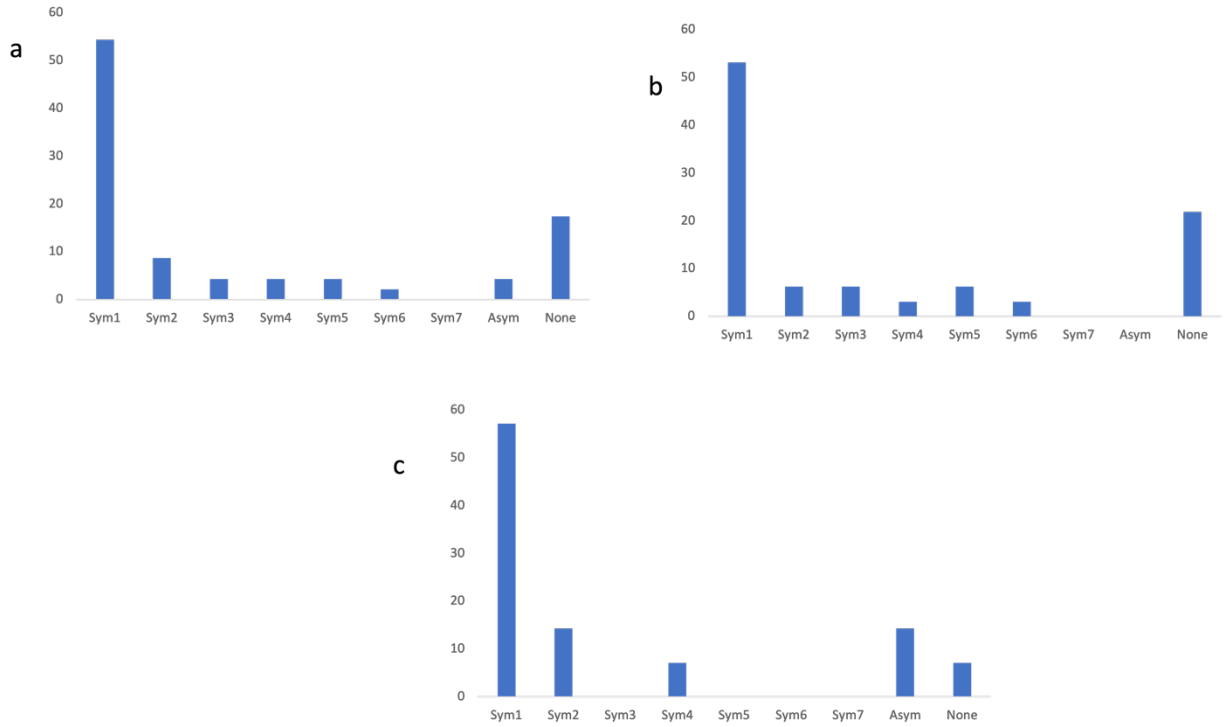


Figure 6.29 Relative frequency scores (%) of the two apportioned periods AD 600 and AD 700 at Inanda Quarry

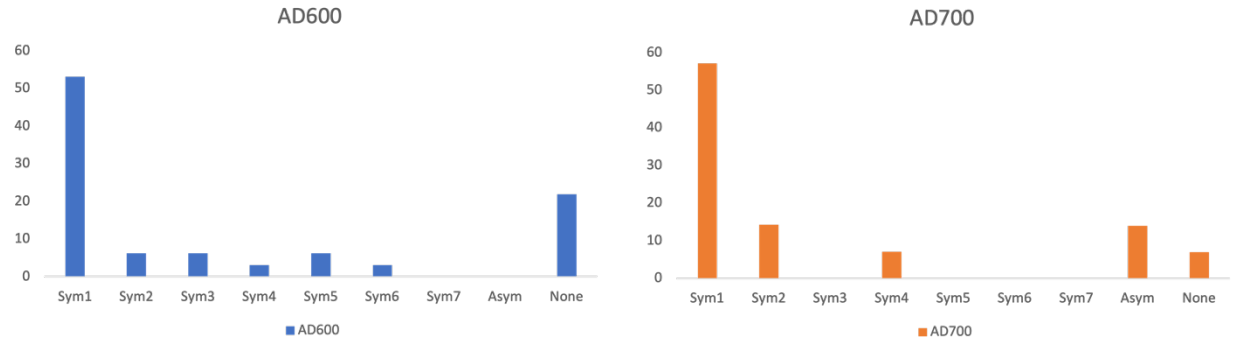


Table 6.26 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi and Ndondondwane facies and the (b) two apportioned periods AD 600 and AD 700 at Inanda Quarry. All scores were calculated out of 200

A)

	Msuluzi	Ndondondwane
Msuluzi	200	139
Ndondondwane	139	200

B)

	AD600	AD700
AD600	200	139
AD700	139	200

Figure 6.30 Relative frequency scores (%) of overall/Msuluzi and the three apportioned periods AD 600, AD 700, and AD 800 at Nanda

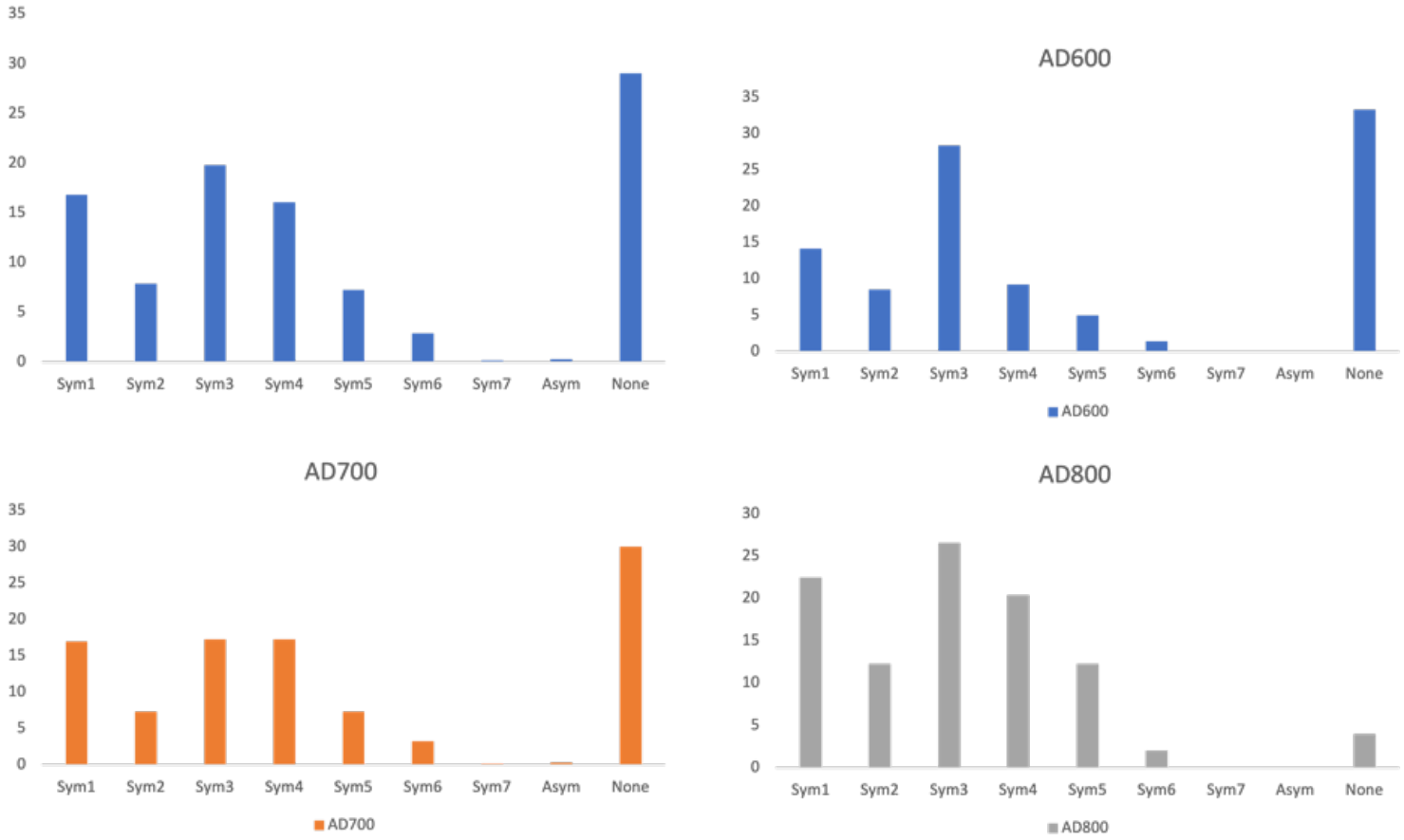


Table 6.27 Brainerd-Robinson Coefficient of Similarity scores of the three apportioned periods AD 600, AD 700, and AD 800 at Nanda. All scores were calculated out of 200

	AD600	AD700	AD800
AD600	200	169	138
AD700	169	200	145
AD800	138	145	200

Figure 6.31 Relative frequency scores (%) of (a) overall, (b) Msuluzi, and (c) Ndondondwane facies at the Nanda Dam site

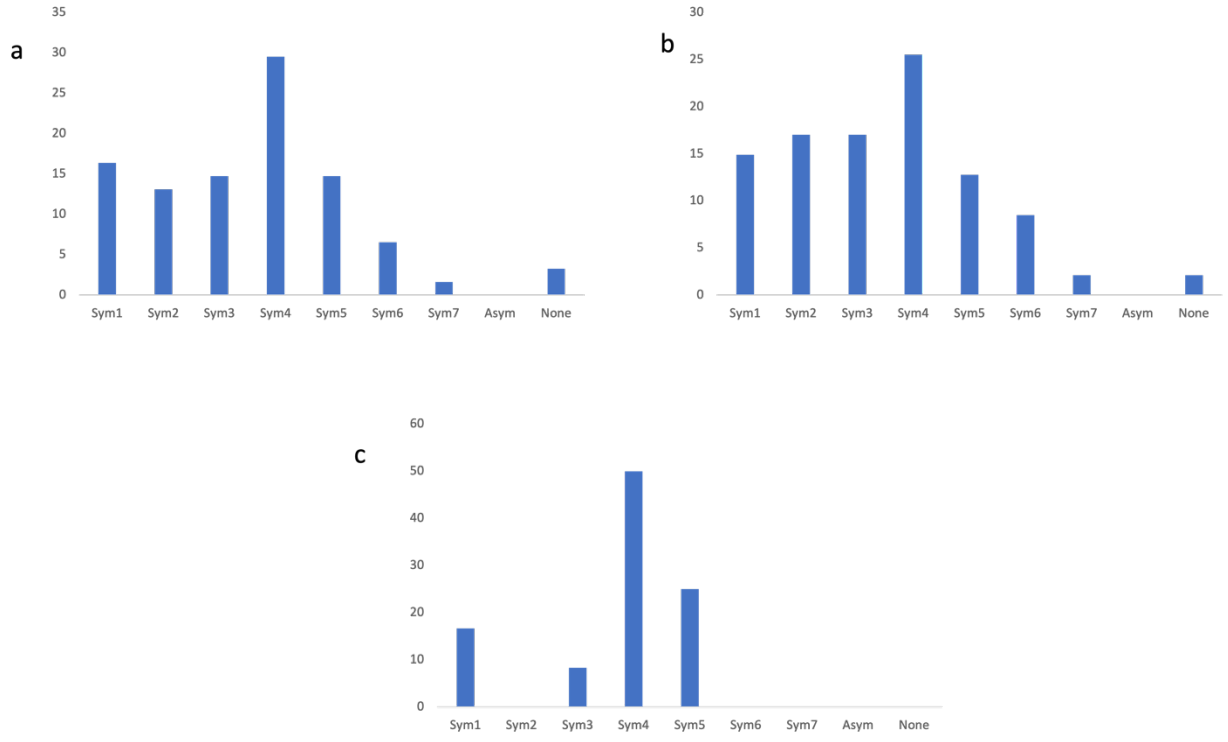


Figure 6.32 Relative frequency scores (%) of the three apportioned periods AD 600, AD 700, and AD 800 at Nanda Dam site

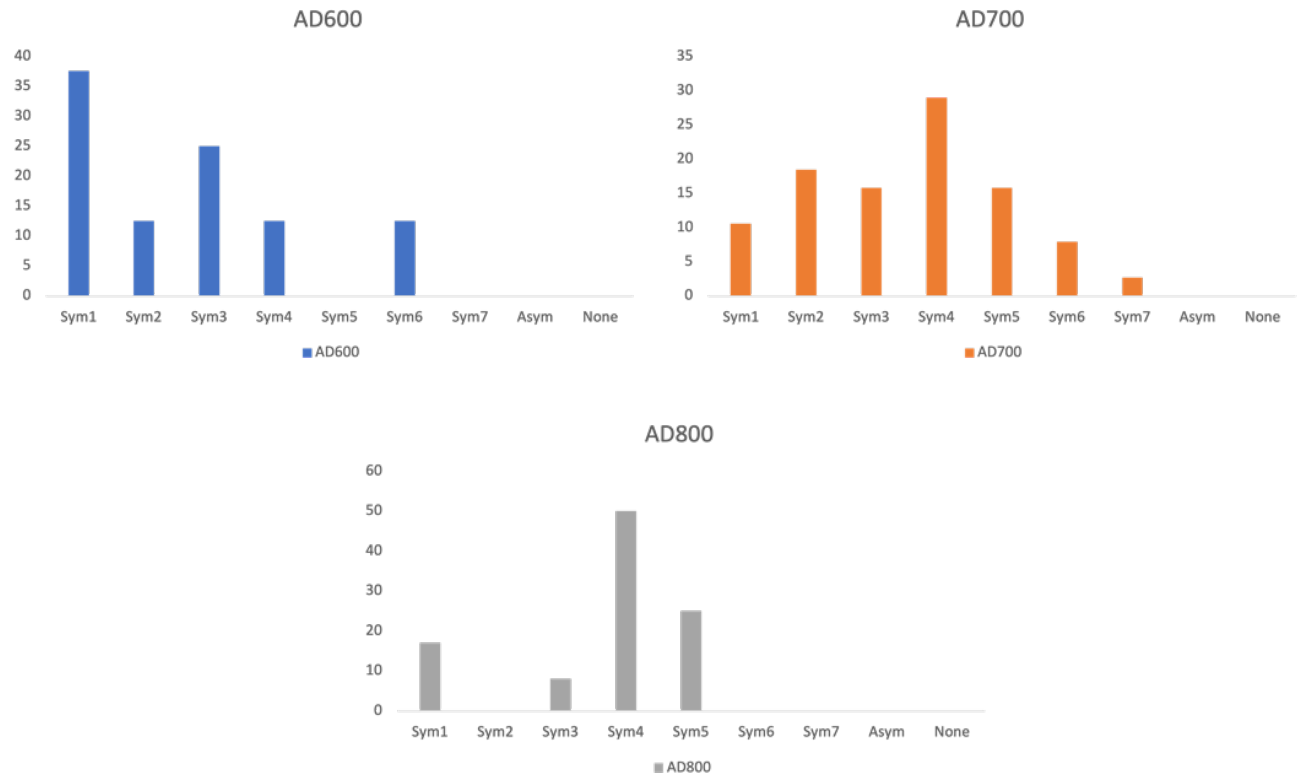


Table 6.28 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi and Ndondondwane facies and the (b) three apportioned periods AD 600, AD 700, and AD 800 at the Nanda Dam site. All scores were calculated out of 200

A)

	Msuluzi	Ndondondwane
Msuluzi	200	125
Ndondondwane	125	200

B)

	AD600	AD700	AD800
AD600	200	118	75
AD700	118	200	127
AD800	75	127	200

Figure 6.33 Relative frequency scores (%) of (a) overall, (b)Msuluzi, and (c) Ndondondwane facies at the 2930DB48 site

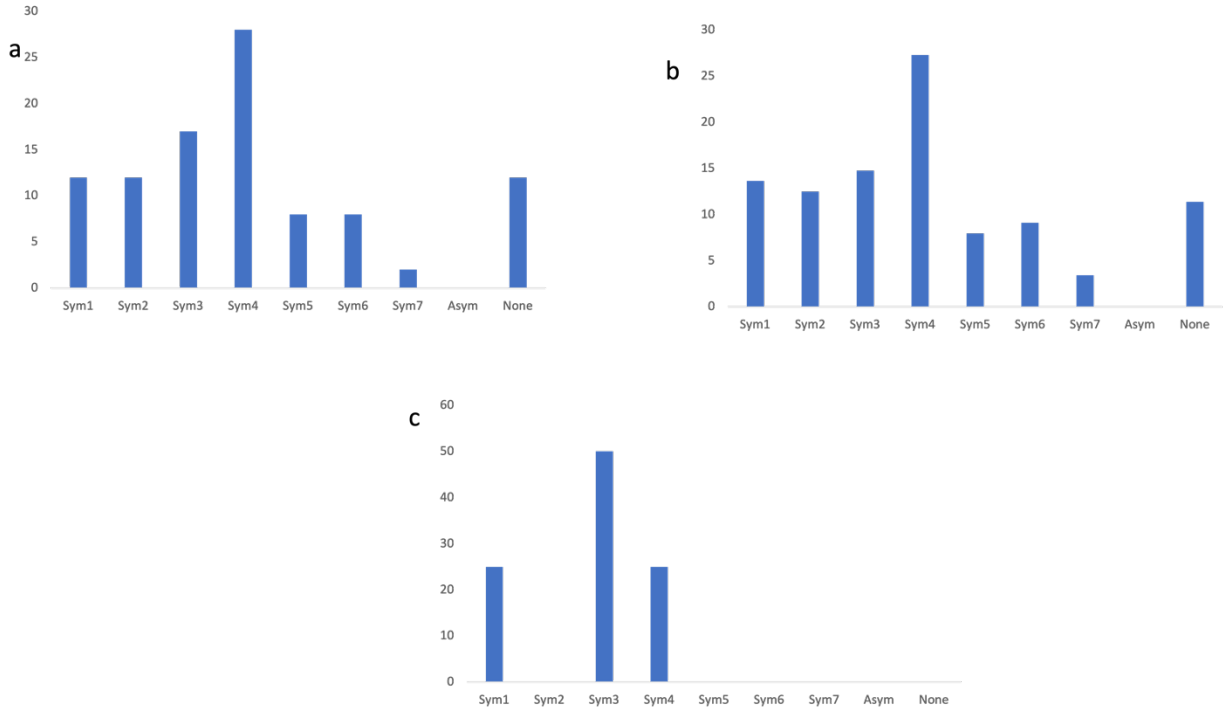


Figure 6.34 Relative frequency scores (%) of the three apportioned periods AD 600, AD 700, and AD 800 at 2930DB48 site

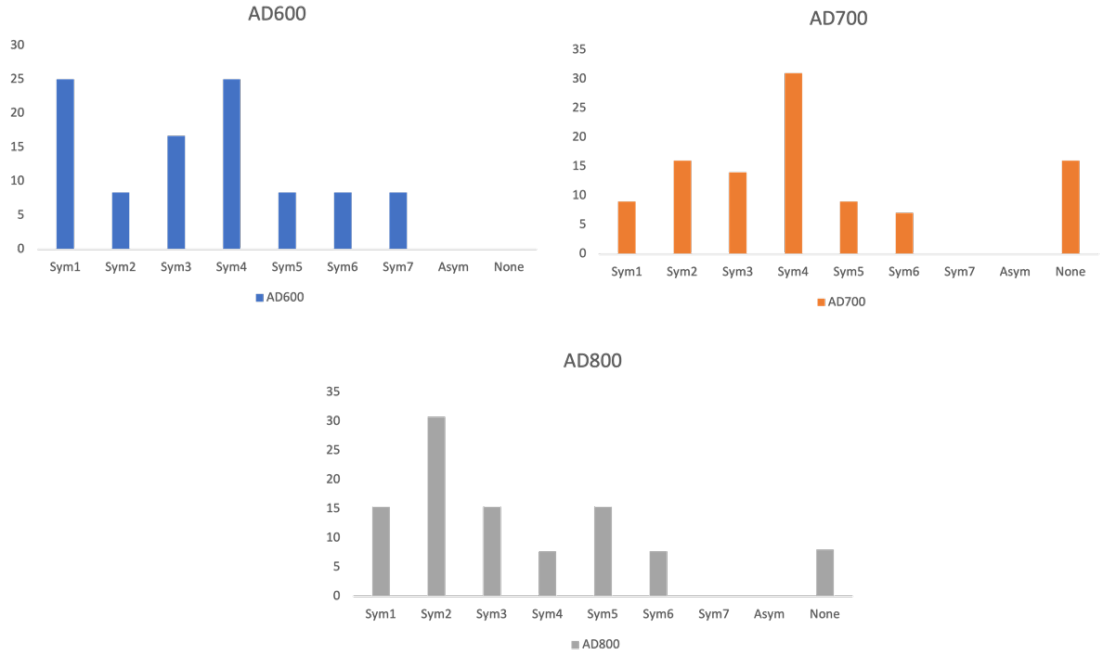


Table 6.29 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi and Ndondondwane facies and the (b) three apportioned periods AD 600, AD 700, and AD 800 at 2930DB48 site. All scores were calculated out of 200

A)

	Msuluzi	Ndondondwane
Msuluzi	200	107
Ndondondwane	107	200

B)

	AD600	AD700	AD800
AD600	200	142	142
AD700	142	200	120
AD800	142	120	200

Figure 6.35 Relative frequency scores (%) of (a) overall, (b) Msuluzi, (c) Ndondondwane, and (d) Ntshekane facies at Emberton Way

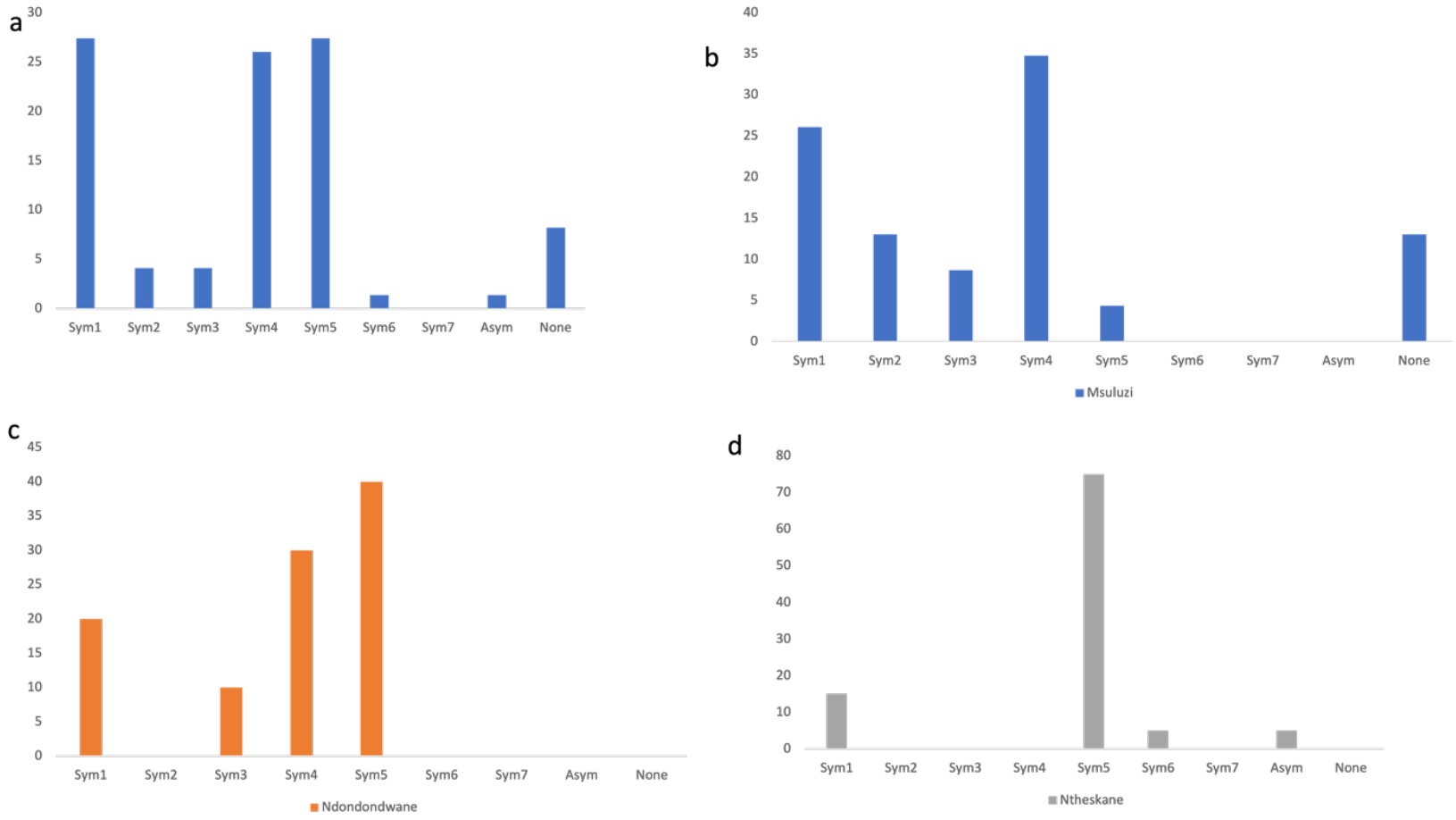


Figure 6.36 Relative frequency scores (%) of the three apportioned periods AD 800, AD 900, and AD 1000 at Emberton Way

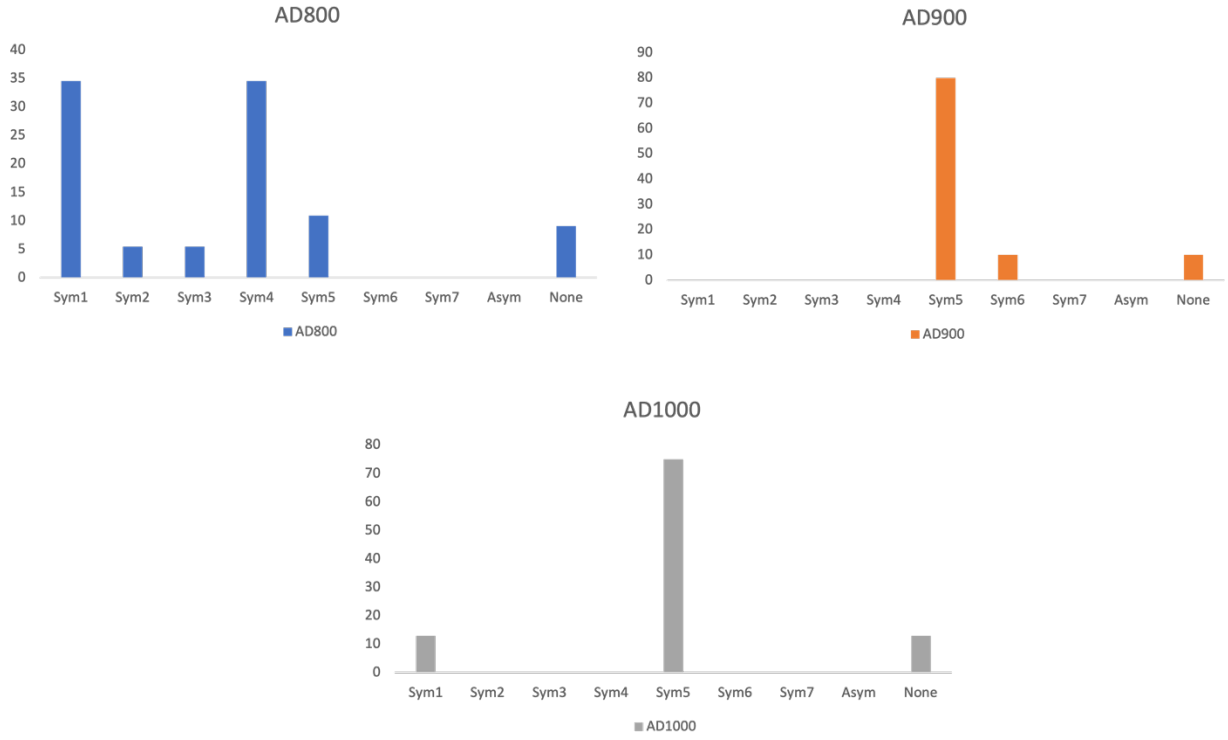


Table 6.30 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi, Ndondondwane, and Ntshekane facies and the (b) three apportioned periods AD 800, AD 900, and AD 1000 at Emberton Way. All scores were calculated out of 200

A)

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	126	49
Ndondondwane	126	200	110
Ntshekane	49	110	200

B)

	AD800	AD900	AD1000
AD800	200	22	65
AD900	22	200	150
AD1000	65	150	200

Figure 6.37 Relative frequency scores (%) of the (a) overall, (b) Msuluzi, (c) Ndondondwane, and (d) Ntshekane facies at Mhlanga Lagoon

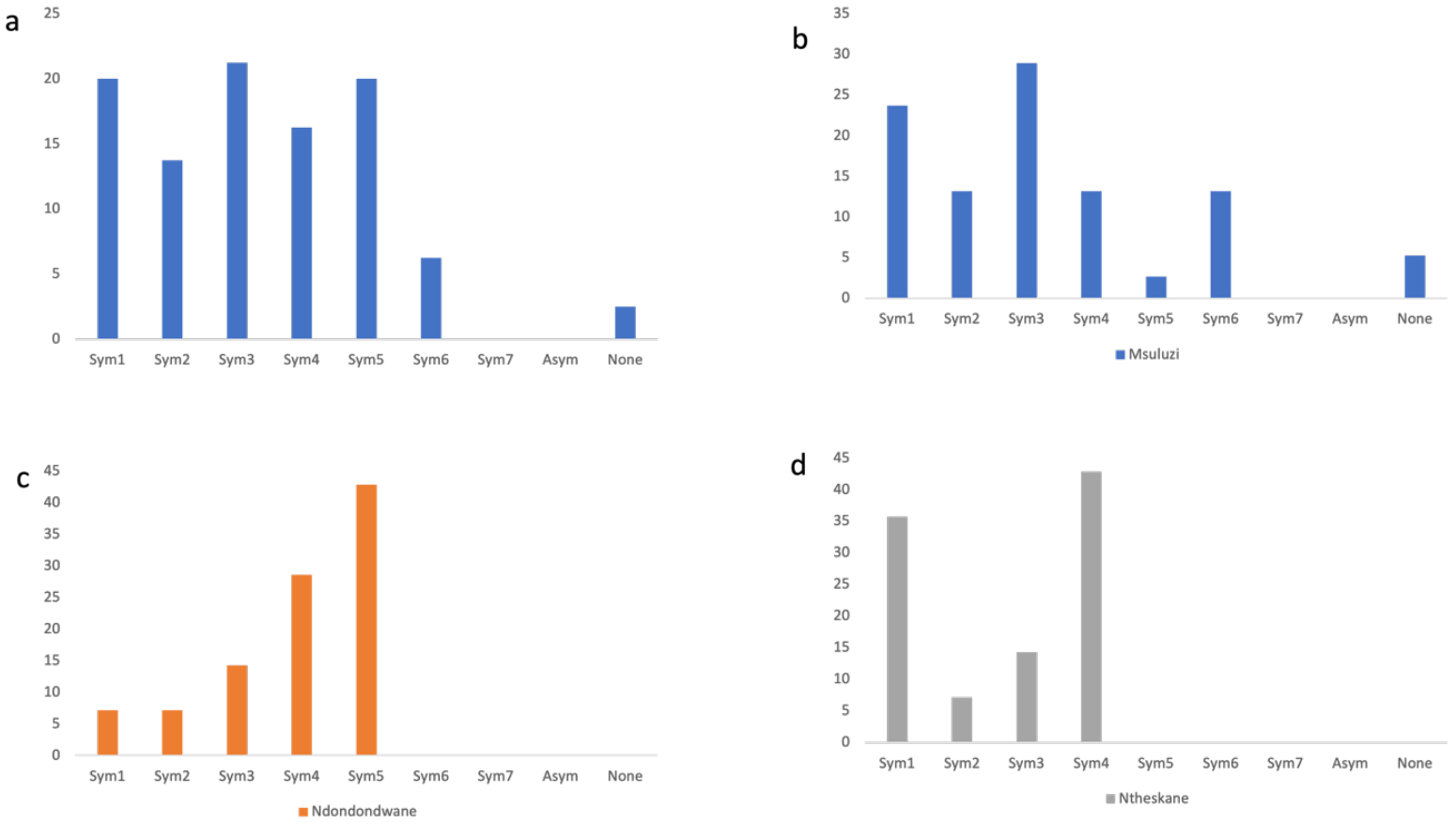


Figure 6.38 Relative frequency scores (%) of the three apportioned periods AD 800, AD 900, and AD 1000 at Mhlanga Lagoon

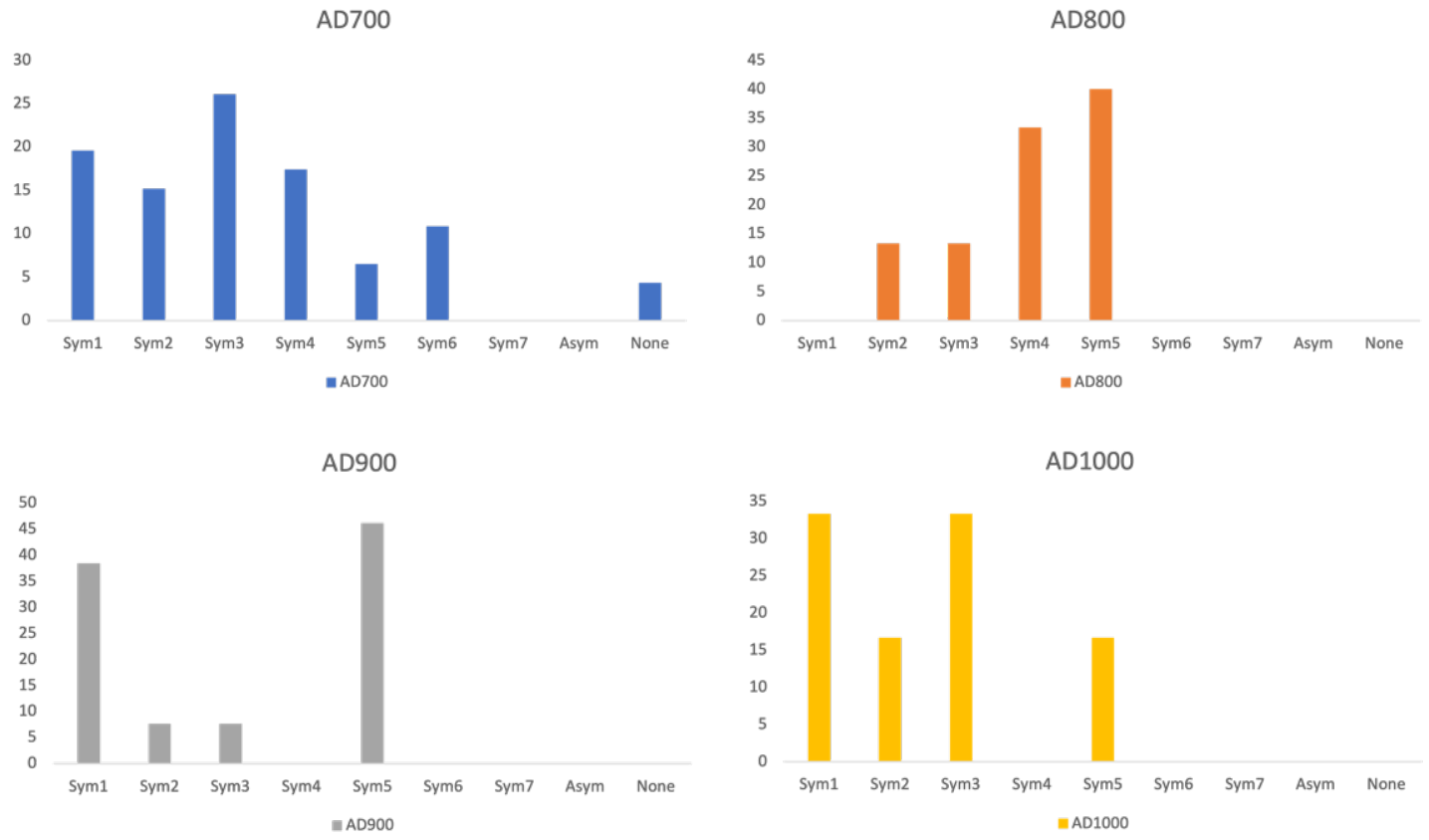


Table 6.31 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi, Ndondondwane, and Ntshekane facies and the (b) three apportioned periods AD 800, AD 900, and AD 1000 at Mhlanga Lagoon. All scores were calculated out of 200

A)

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	89	95
Ndondondwane	89	200	143
Ntshekane	95	143	200

B)

	AD800	AD900	AD1000
AD800	200	111	87
AD900	111	200	131
AD1000	87	131	200

Figure 6.39 Relative frequency scores (%) of the (a) overall, Msuluzi, and Ndondondwane facies at Sinkwazi

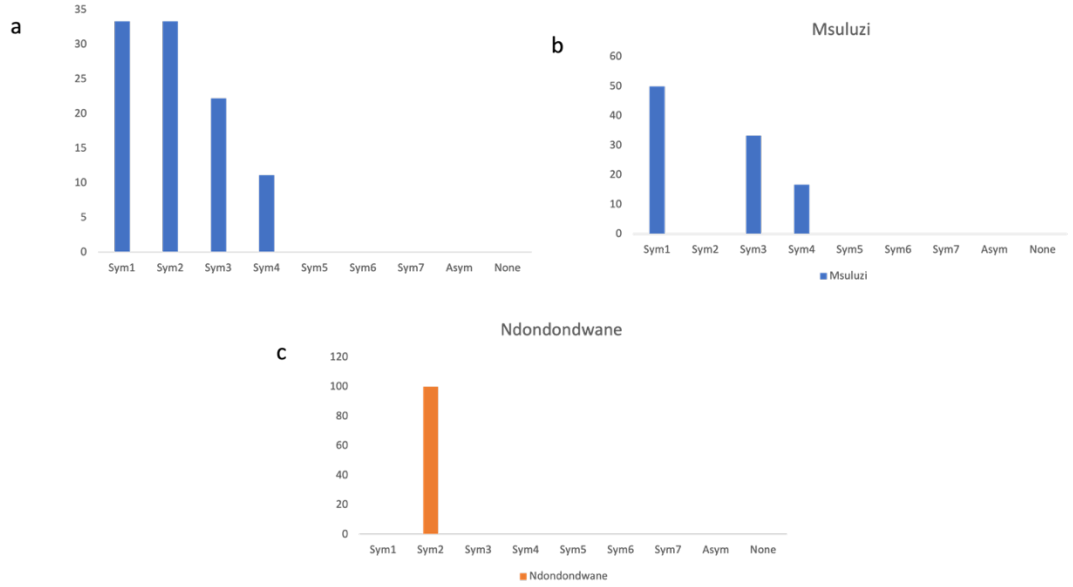


Figure 6.40 Relative frequency scores (%) of the two apportioned periods AD 700 and AD 800 at Sinkwazi

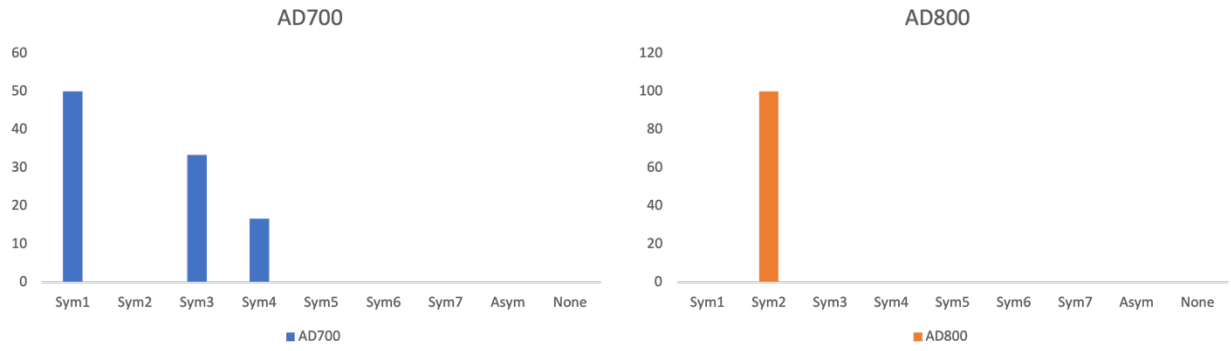


Figure 6.41 Relative frequency scores (%) of the (a) overall, (b) Msuluzi, (c) Ndondondwane, and (d) Ntshekane facies at Shrimp Lane

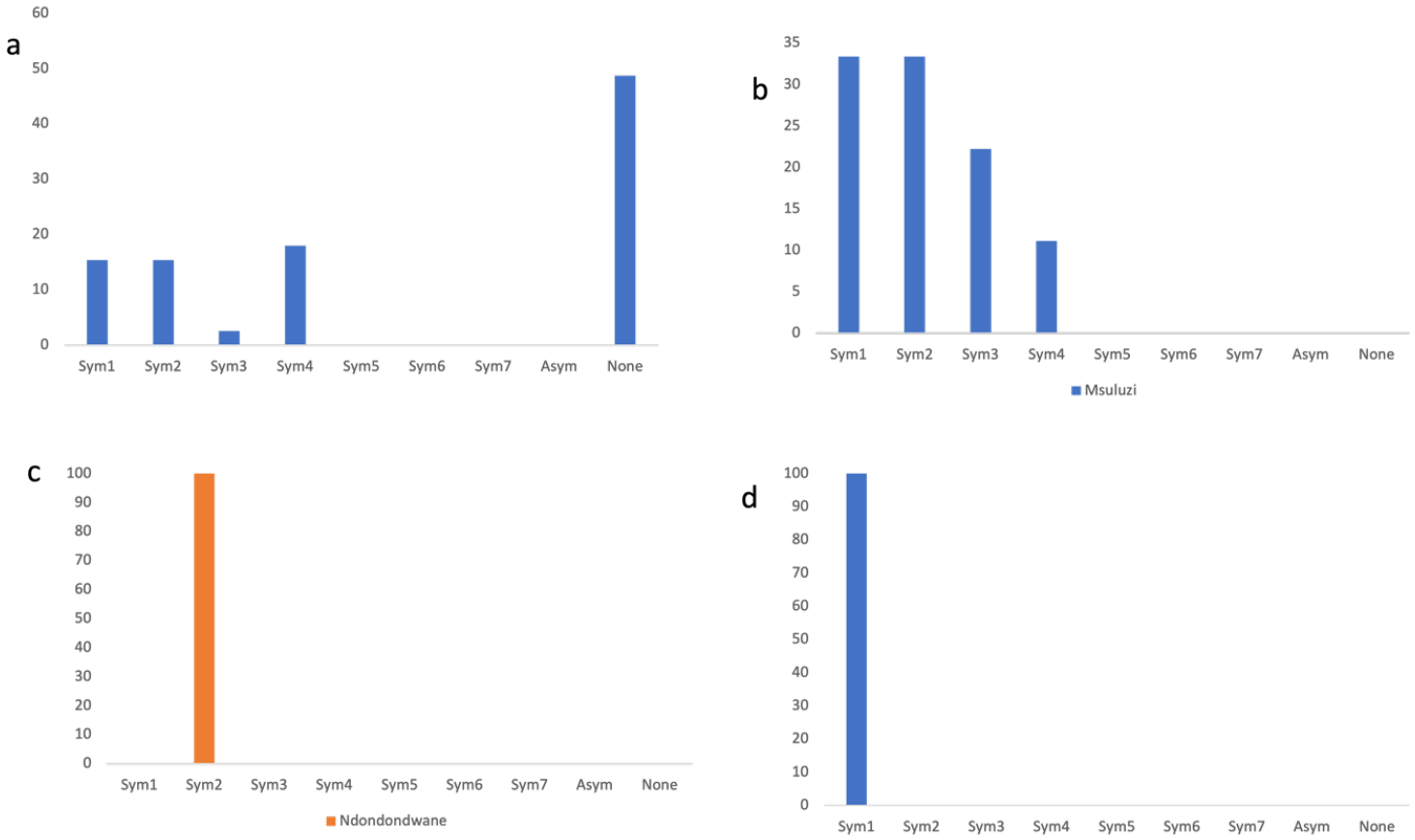


Figure 6.42 Relative frequency scores (%) of the two apportioned periods, AD 700 and AD 800 at Shrimp Lane

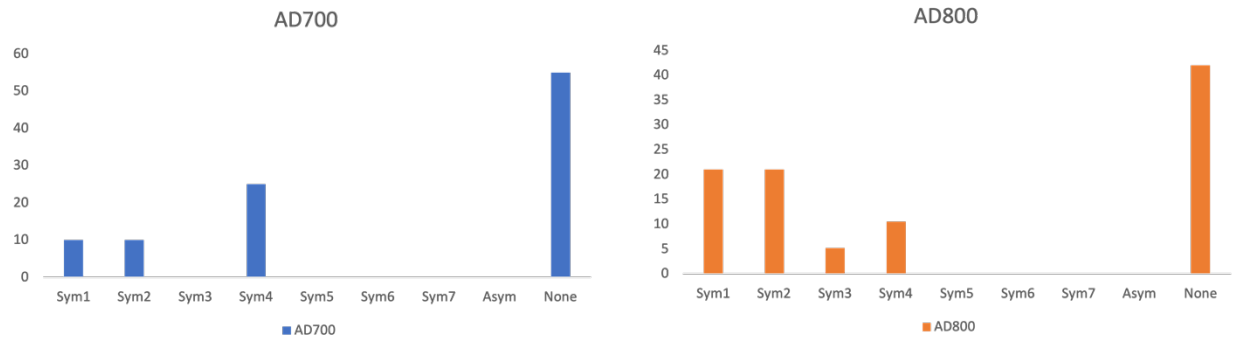


Table 6.32 Brainerd-Robinson Coefficient of Similarity scores of the (a) Msuluzi, Ndondondwane, and Ntshekane facies and the (b) two apportioned periods AD 700 and AD 800 at Shrimp Lane. All scores were calculated out of 200

	Msuluzi	Ndondondwane	Ntshekane
Msuluzi	200	139	50
Ndondondwane	139	200	44
Ntshekane	50	44	200

	AD700	AD800
AD700	200	145
AD800	145	200

Figure 6.43 Frequency seriation plot of the(a) Upper Thukela Basin, (b) Lower Thukela Basin, (c) uMngeni Valley, and (d) Coastal Belt ecozone's design symmetries and Simpson Evenness scores

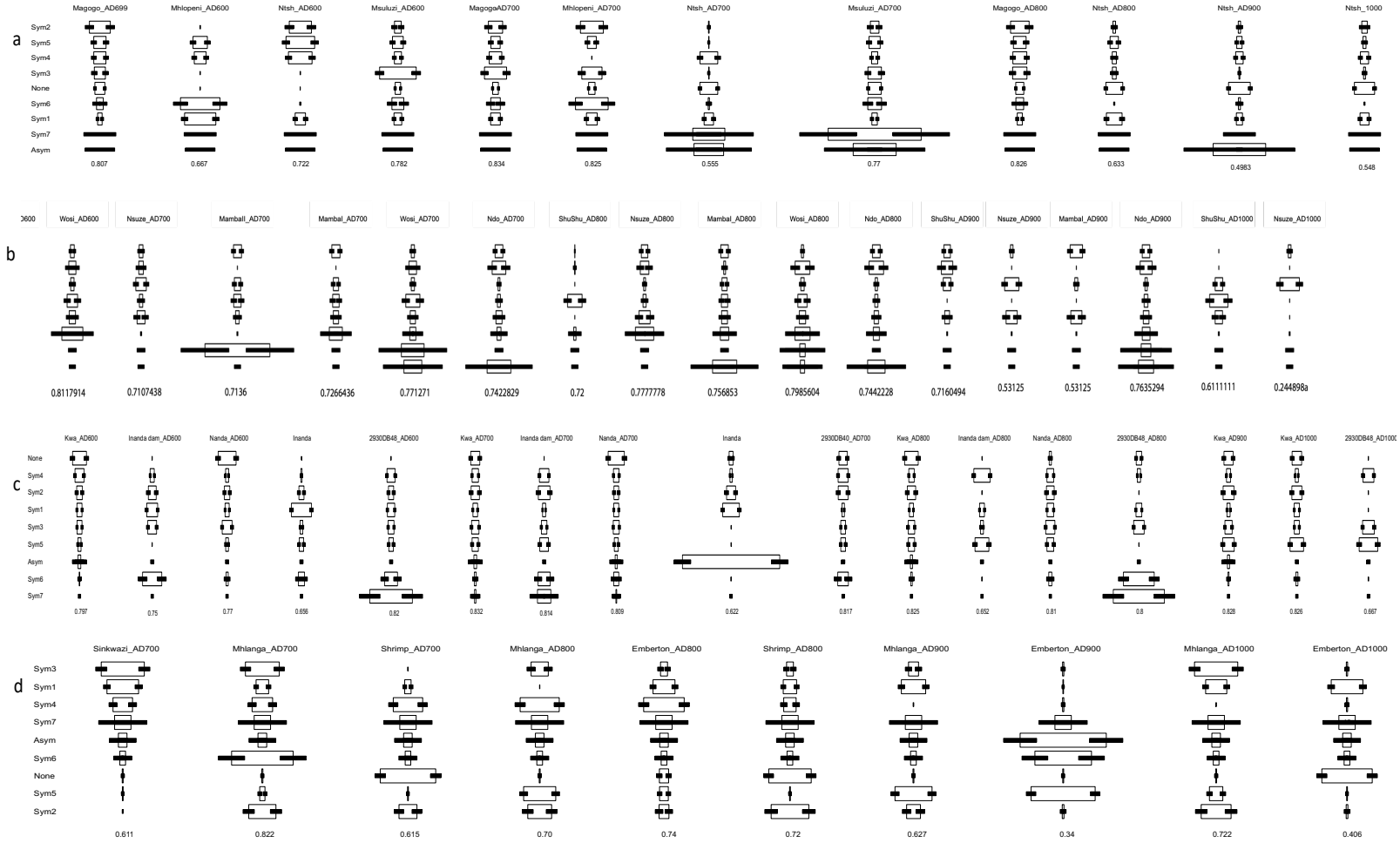
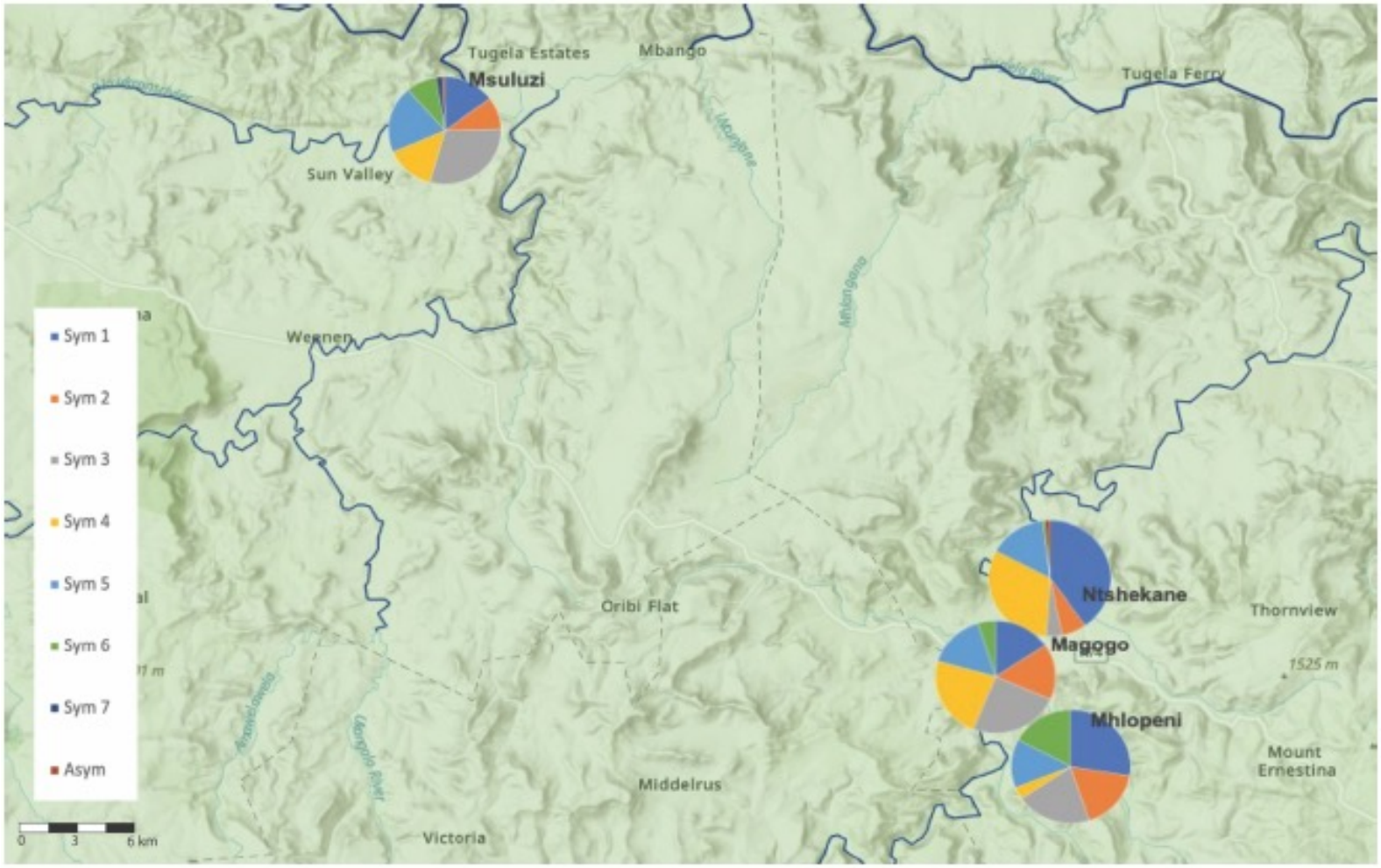


Table 6.33 Network measures and indices for each sequential network in each Ecozone

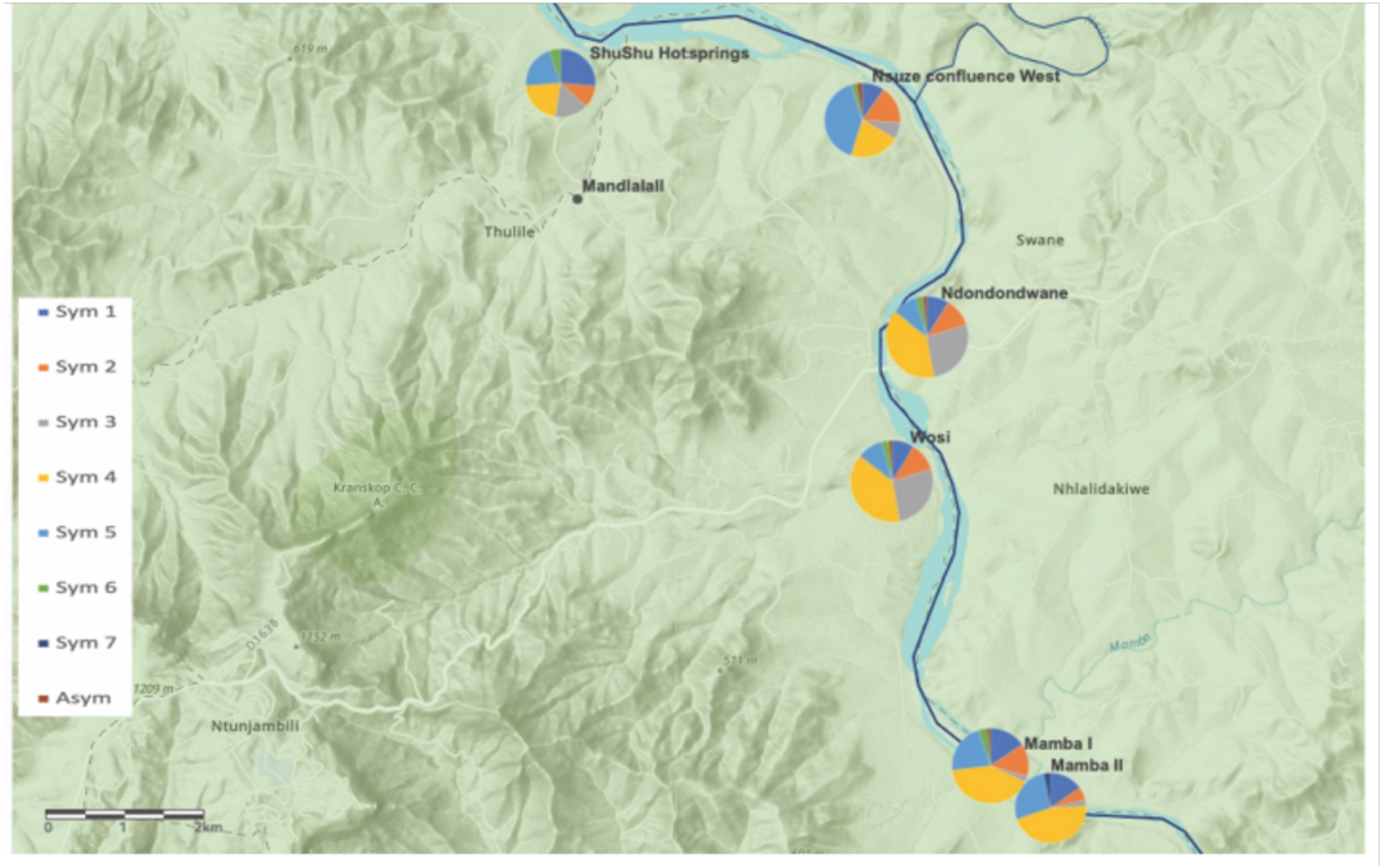
Network Measures	Upper Thukela Basin	Lower Thukela Basin	uMngeni Valley	Coastal Belt
BR graph threshold	50%	55%	55%	50%
Network degree centrality	0.2727273	0.2287582	0.2426471	0.3090909
Average Degree	7	10.1111111	10.118	2.90909091
Network betweenness centrality	0.1471074	0.1553417	0.06822028	0.2392593
Node betweenness centrality	6.18333335	3.77777778	3.17647059	4.54539091
Network Eigenvector centrality	0.3040935	0.2756516	0.2916681	0.6241807
Node eigenvector centralities	0.74658876	0.75497633	0.74264582	0.48930667
Node closeness centrality	0.71425503	0.71760518	0.73701366	0.50054737
Network closeness centralities	0.4637066	0.2891269	0.3334927	NaN
Max-k-core	6	10	9	3
% of Nodes in Max k-core	0.83	67	0.59	0.46
% of Nodes in k-core of >- 4	0.83	78	0.88	0
cut points	1(Ntsh_1)	0	0	3
Max geodesic distance	3	3	3	5
Average Shortest Path	1.47	1.444444	1.397	2.11
Nodes	12	18	17	11
Edges	42	91	86	16
isolates	0	0	0	1
Density	0.636	0.595	0.632	0.291
Diameter	3	3	3	5
Clustering Coefficient	0.829	0.852	0.82	0.496
Closed Tried count	78	267	232	8
Open Tried Count	57	178	189	23
cut points	1(Ntsh_1)	0	0	3
Bridges	1	2	2	0

Figure 6.44 Occupations and Design Symmetry Distributions for the (a) Upper Thukela Basin, (b) Lower Thukela Basin, (c) uMngeni Valley, the (d) Coastal belt

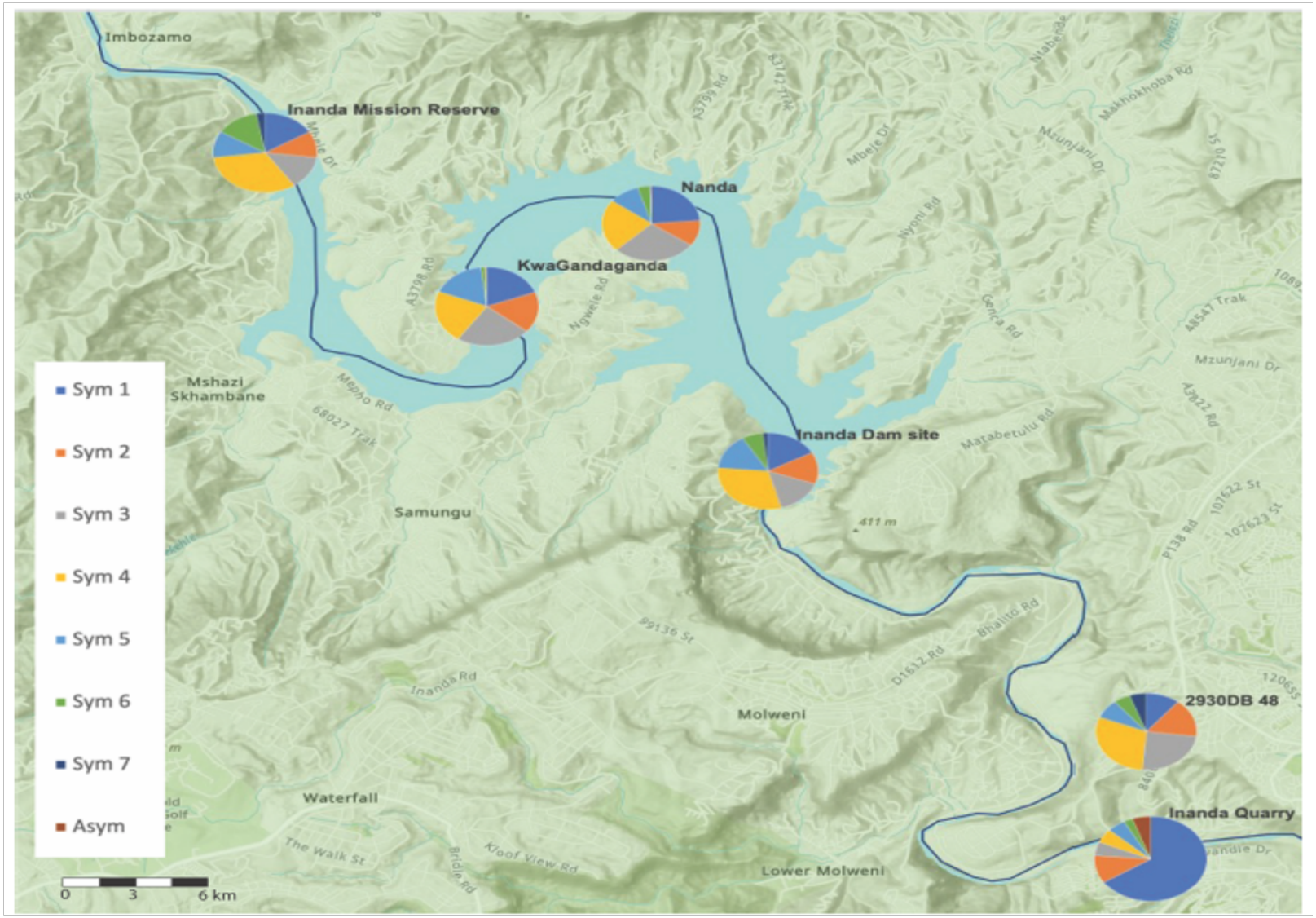
A)



B)


ShuShu Hotsprings
Nsuze confluence West
Mandlalali
Thulile
Swane
Ndondondwane
Wosi
Nhlalidakiwe
Kranskop
Ntunjambili
Mamba I
Mamba II
Sym 1
Sym 2
Sym 3
Sym 4
Sym 5
Sym 6
Sym 7
Asym
0
1
2km

C)


Imbozamo
Inanda Mission Reserve
Nanda
KwaGandaganda
Inanda Dam site
2930DB 48
Inanda Quarry
Mshazi
Skhambane
Samungu
Molweni
Waterfall
Lower Molweni
Sym 1
Sym 2
Sym 3
Sym 4
Sym 5
Sym 6
Sym 7
Asym
0
3
6 km

D)

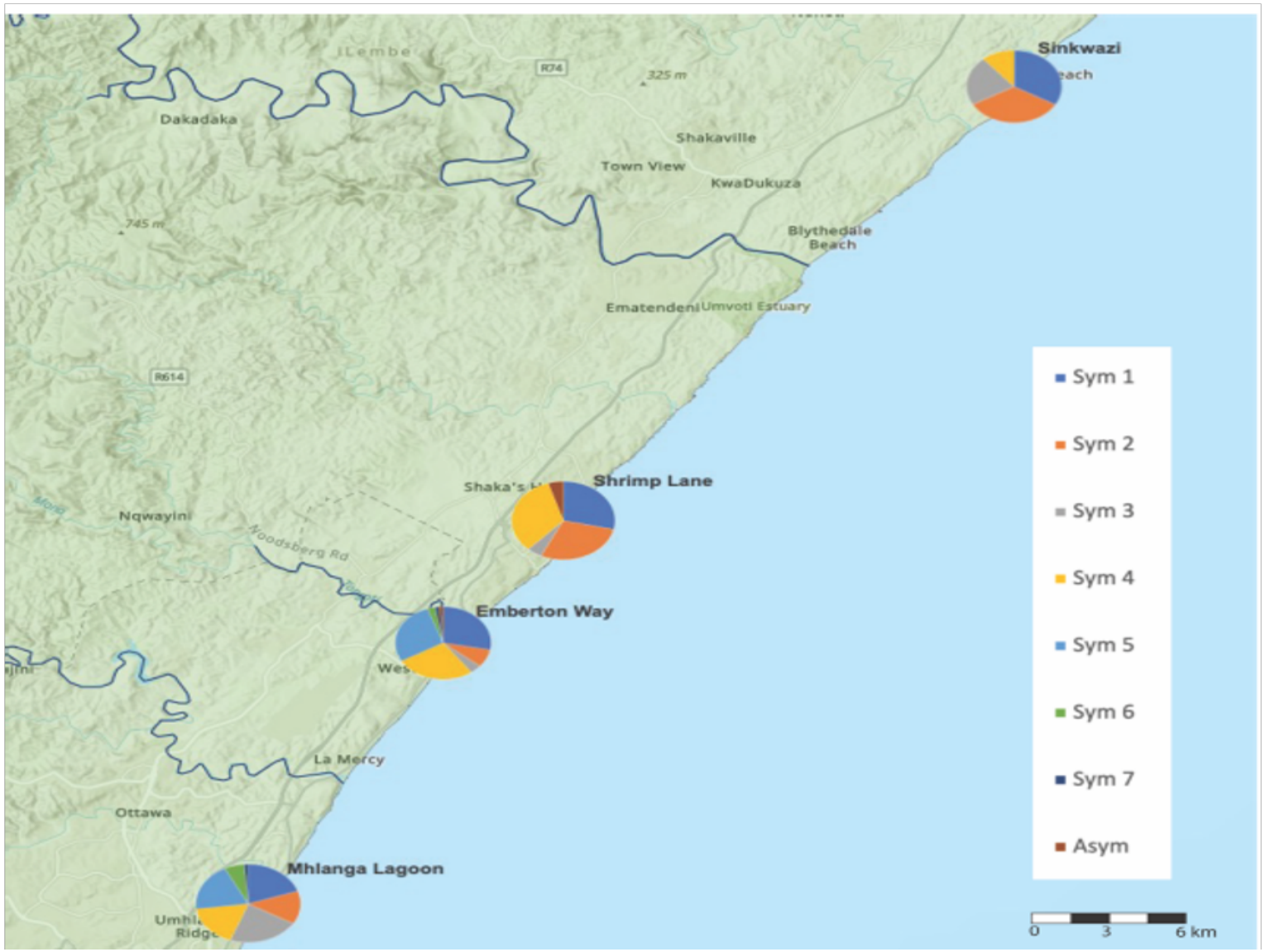

Sinkwazi
Dakadaka
Shakaville
Town View
KwaDukuza
Blythedale Beach
Ematendeni
Umvoti Estuary
R74
325 m
745 m
R614
Shrimp Lane
Nqwayini
Woodsberg Rd
Emberton Way
La Mercy
Ottawa
Mhlanga Lagoon
Sym 1
Sym 2
Sym 3
Sym 4
Sym 5
Sym 6
Sym 7
Asym
0
3
6 km

Figure 6.45 Upper Thukela Basin sequential apportioned network data and visual representation. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set to 50%

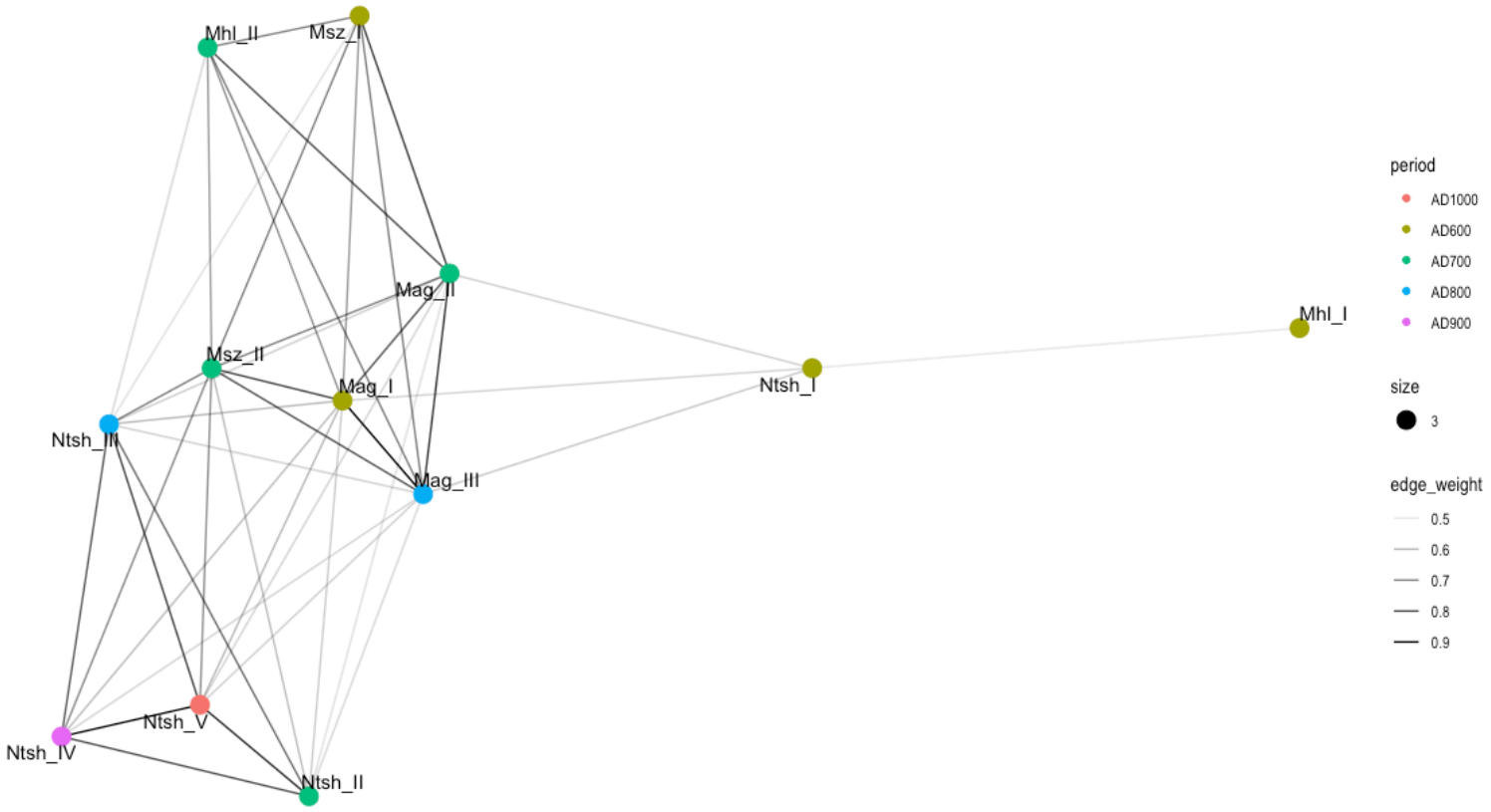


Figure 6.46 Lower Thukela sequential apportioned network data and visual representation. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 55%

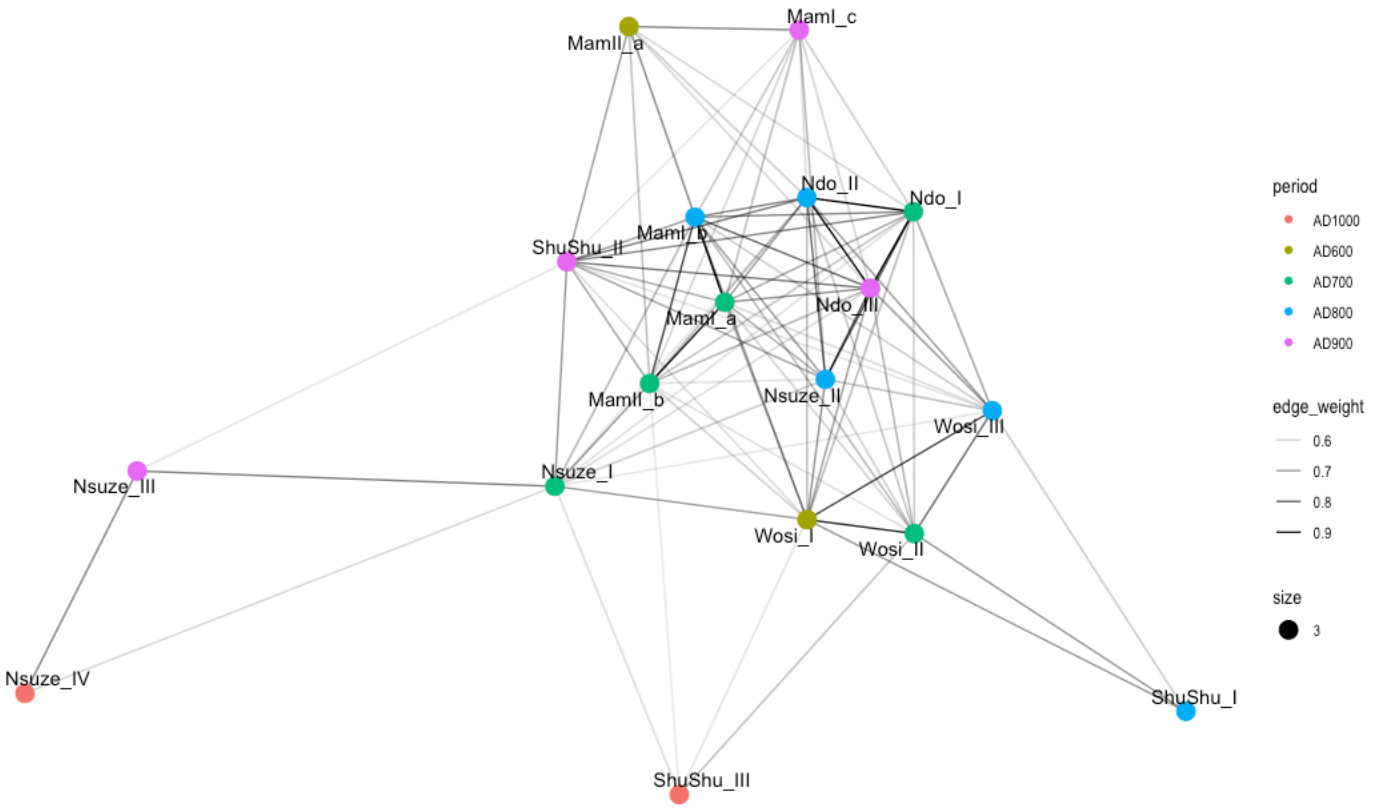


Figure 6.47 uMngeni Valley sequential apportioned network data and visual representation. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 55%

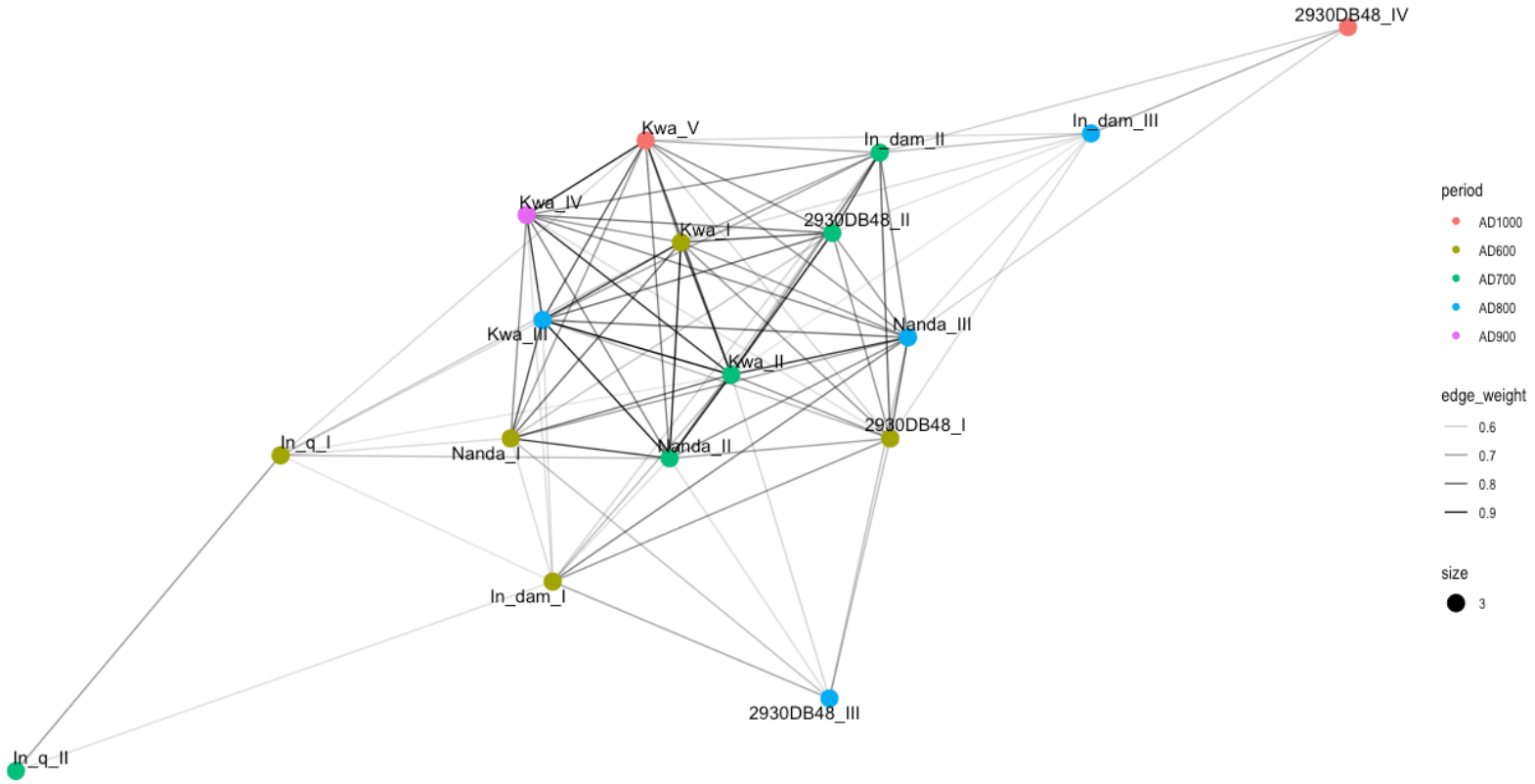


Figure 6.48 Coastal Belt sequential apportioned network data and visual representation. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 55%

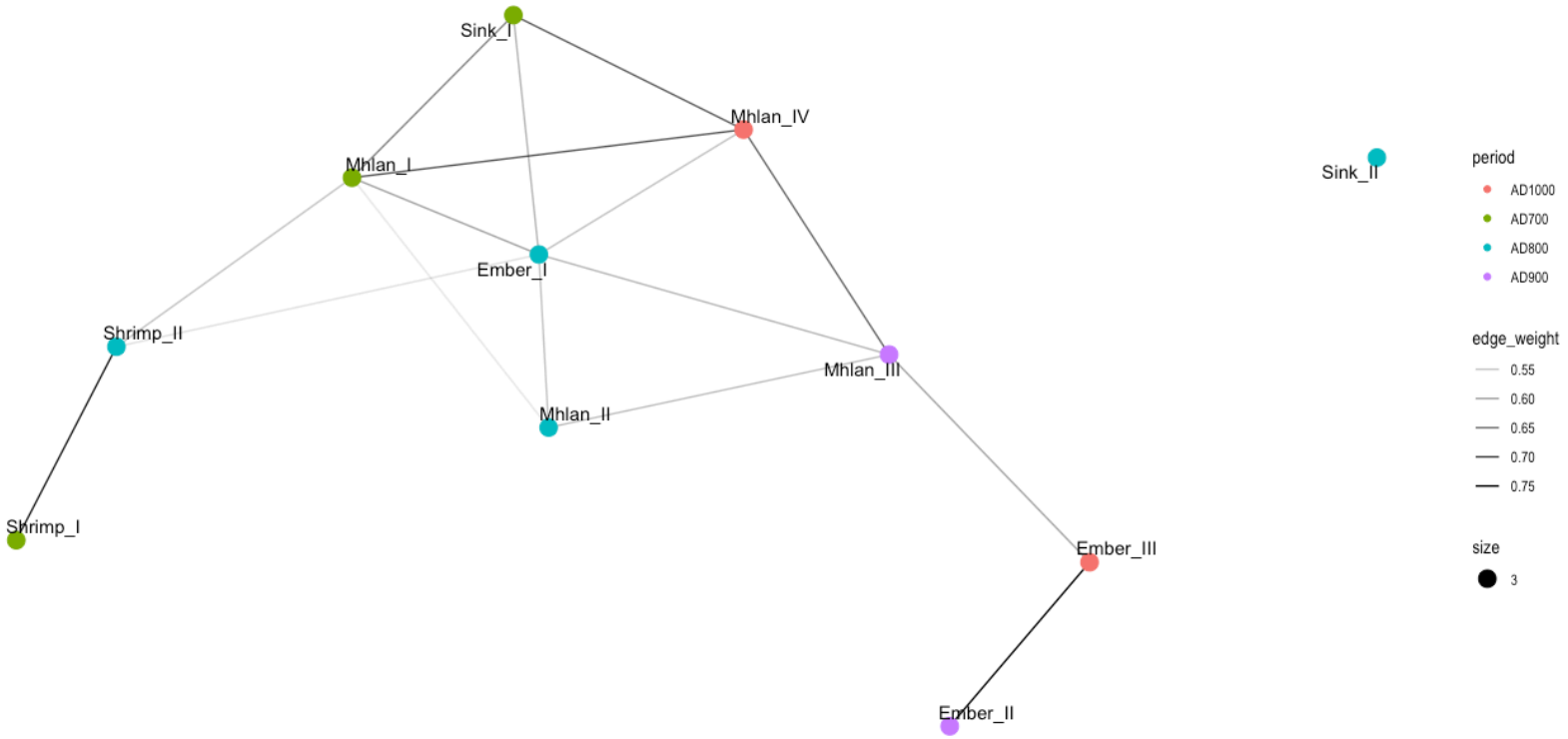
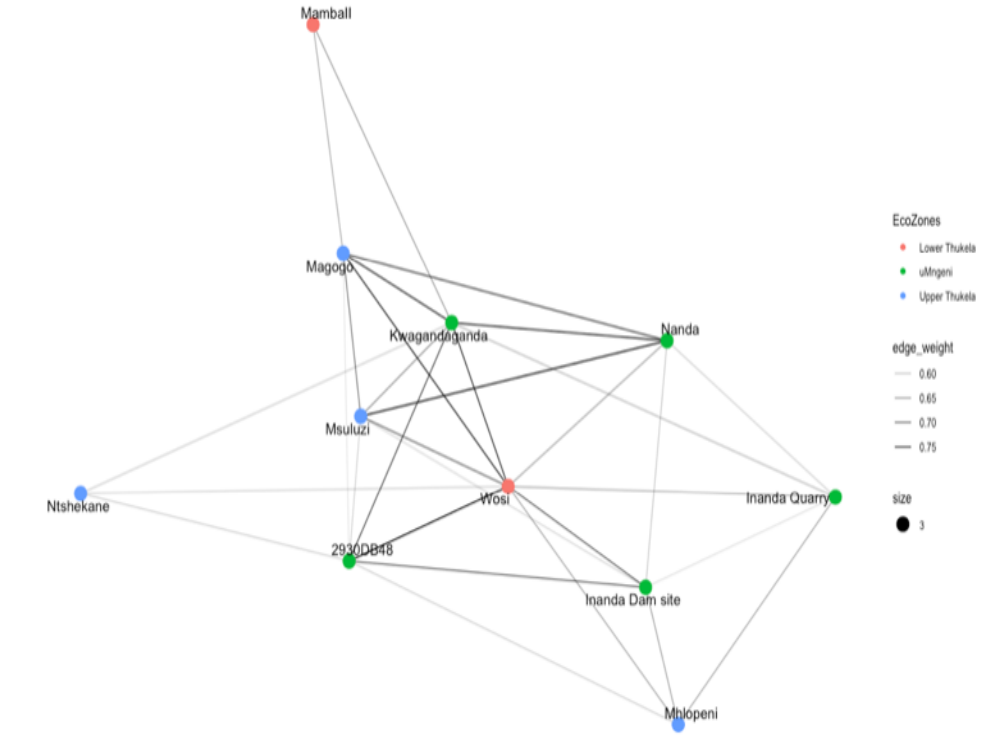


Figure 6.49 AD 600 apportioned slice sequential apportioned network data, visual representation, and Walktrap community detection. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 55%



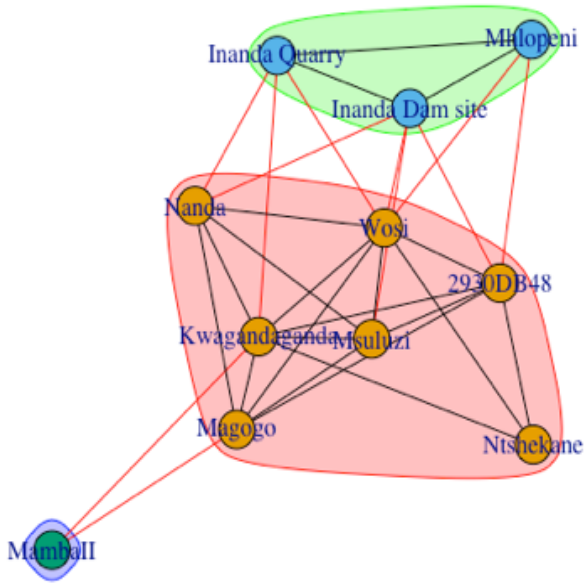


Figure 6.50 AD 700 apportioned slice sequential apportioned network data, visual representation, and Walktrap community detection. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 55%

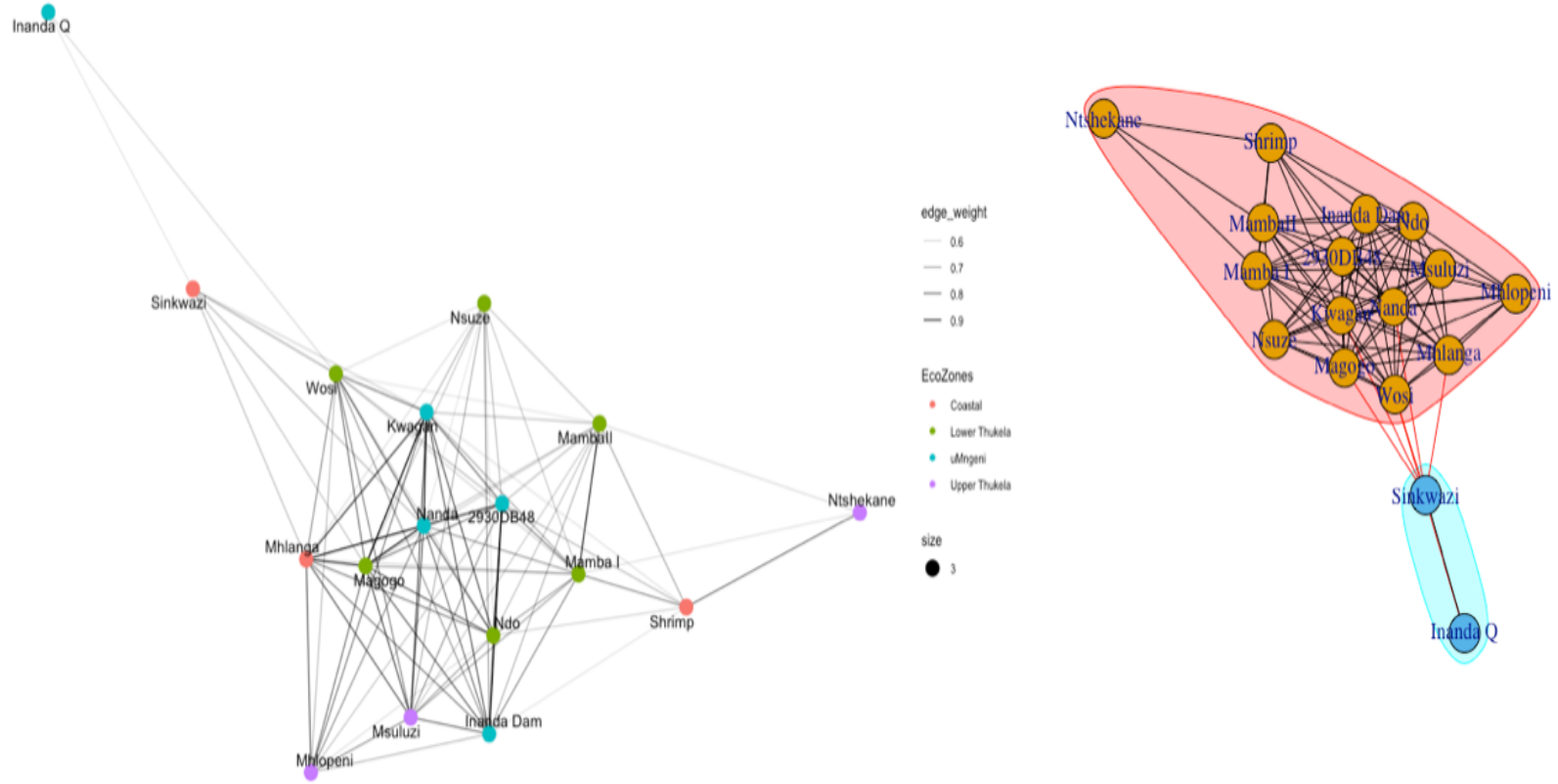


Figure 6.51AD 800 apportioned slice sequentially apportioned network data, visual representation, and Walktrap community detection. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 55%

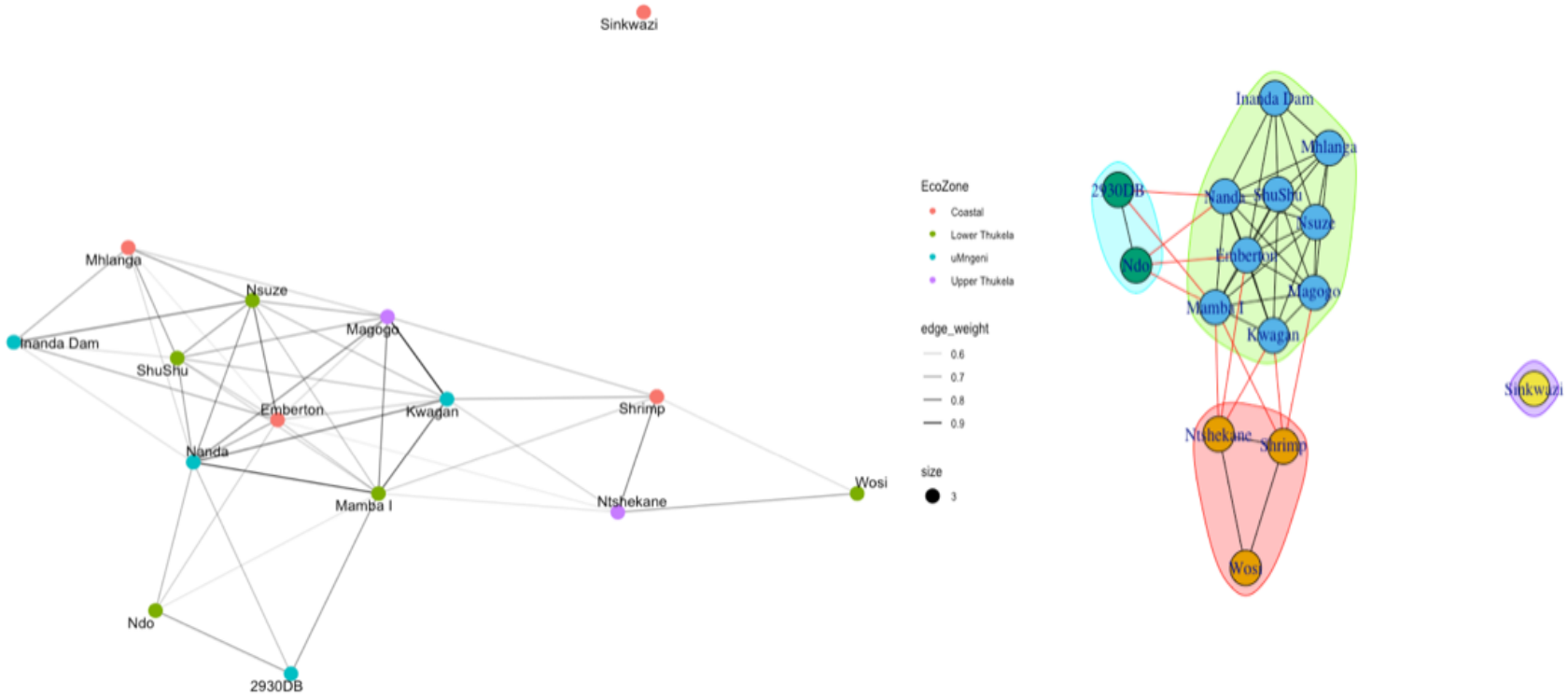


Figure 6.52 AD 900 apportioned slice sequential apportioned network data, visual representation, and Walktrap community detection. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 50%

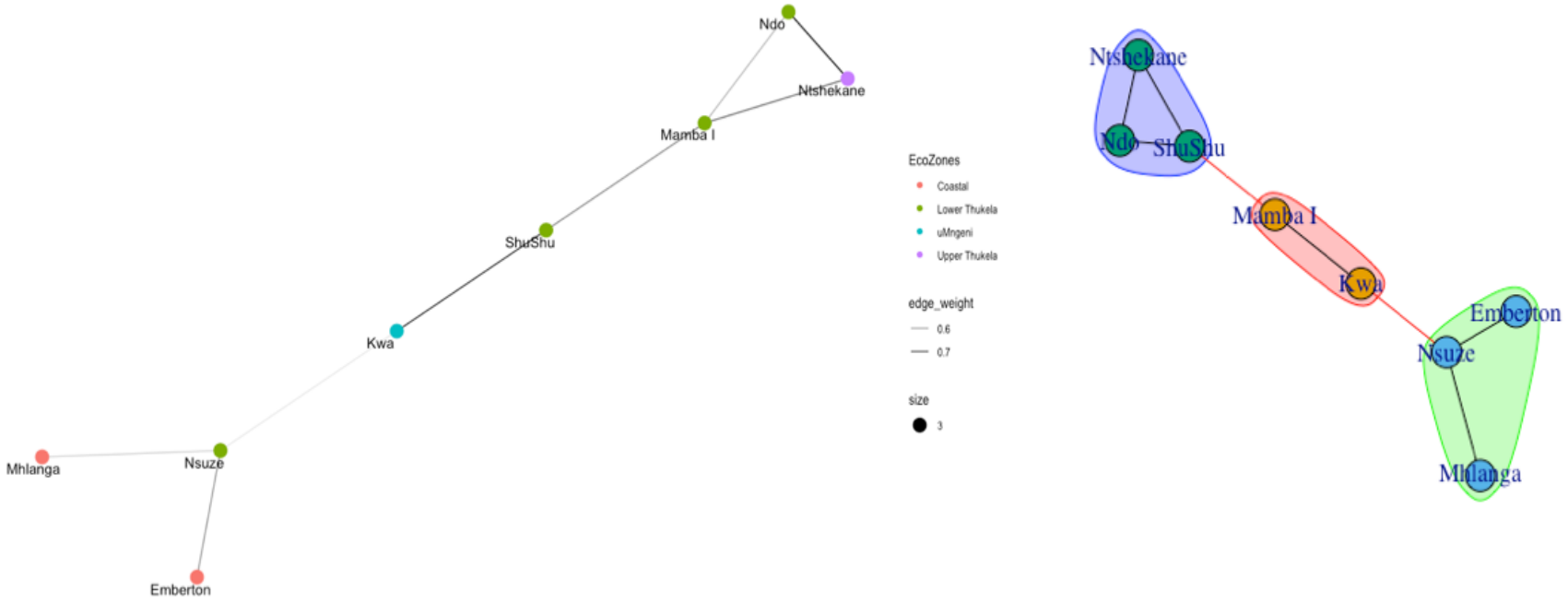


Figure 6.53 AD 1000 apportioned slice sequential apportioned network data and visual representation and Walktrap community detection. Based on a weighted Brainerd-Robinson Coefficient of Similarity scores network with a cutoff point set at 50%

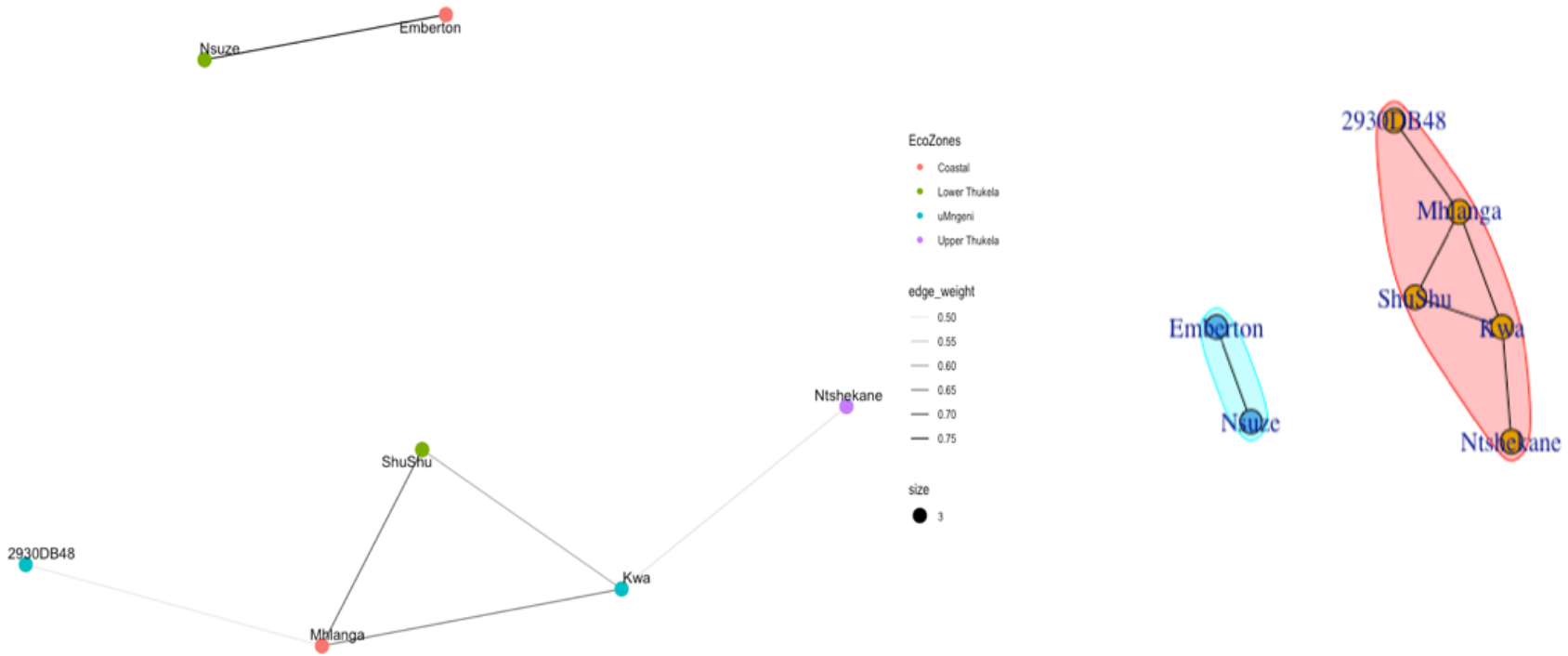


Table 6.34 Network measures and indices for each apportioned slice

Network Measures	AD600-AD700	AD700-AD800	AD800-AD900	AD900-AD1000	AD1000-AD1100
BR cutoff for graph/threshold	55.000	55.000	55.000	50.000	50.000
Network degree centrality	0.336	0.206	0.276	0.143	0.214
Average Degree	5.636	10.706	6.133	2.000	1.714
Network betweenness centrality	0.134	0.100	0.107	0.347	0.167
Node betweenness centrality	2.364	2.882	3.533	5.625	1.000
Network Eigenvector centrality	0.392	0.246	0.629	0.624	0.653
Node eigenvector centralities	0.679	0.783	0.447	0.532	0.534
Node closeness centrality	0.697	0.761	0.660	0.397	0.752
Network closeness centralities	0.493	0.281	NaN	0.254	0.636
Max-k-core	4	10	6	2	2
% of Nodes in Max k-core	0.818	0.71	0.47	0.375	0.42
% of Nodes in k-core of >- 3	0.91	0.94	0.87	0	0
cut points	0	1	0	4	2
Max geodesic distance	3	3	3	5	3
Average Shortest Path	1.473	1.36	1.582	2.607	1.545
Nodes	11	17	15	8	7
Edges	31	91	46	8	6
isolates	0	0	1	0	0
Density	0.564	0.669	0.438	0.286	0.286
Diameter	3	3	3	5	3
Clustering Coefficient	0.73	0.866	0.772	0.389	0.556
Closed Tried count	35	281	70	1	1
Open Tried Count	60	156	92	7	4
Bridges	2	2	0	1	0

Chapter 7. Discussion and Conclusions

7.1 Introduction and aim of the dissertation

The preceding chapters have established the rationale for this study, discussed past approaches to ceramic decorative stylistic analysis, situated this research in a theoretical and analytical framework, and introduced the study area and sample. These preceding chapters highlighted the interconnectivity between objects and people and how various stages and steps of ceramic *chaînes opératoires* can be identity markers. Still, specific sets of the *chaînes opératoires* (e.g. clay processing, shaping, firing) may not express the same dimensions of identity cross-culturally or through time.

This dissertation introduced a novel and complementary method for ceramic analysis. Rather than concentrating on the manufacturing processes or decorative features of ceramics, it explores the fundamental design principles that potters employed in creating ceramic vessels. This chapter provides a systematic discussion of the trends identified in applying these analytical methods in response to the following research questions:

What is the relationship between pottery decorative style and identity?

Which aspects of identity are indicated through pottery decorative style?

Which stylistic analytical methods distinguish identity at the communal level?

Is it possible to identify communities of producers through a stylistic approach?

In asking whether it is possible to identify social entities on a scale smaller than language groups, I hypothesized that if certain methods of stylistic analysis can distinguish people who belong to the same language group, then different methods of analysis should distinguish other kinds of social relationships, such as those grounded in economic relations (Plog, 1980), political relations (Bowser, 2000), or generational differences amongst potters (Dietler & Herbich, 1994b, 1998, 2008; Fowler & Greenfield, 2009; Herbich & Dietler, 1994). Alternatively, if different methods of stylistic analysis cannot distinguish entities within ceramic traditions sequences, and facies, as previously defined by language groups, then it is unlikely that early farming people in southern Africa used ceramic style, intentionally or unintentionally, to signal their communal social identities.

7.2 What is the relationship between pottery decorative style and identity?

The question of the relationship, if any, between the decorative aspects of pottery and the multiplicity and complex process of social identity has been discussed *ad infinitum* in the social sciences (see Chapters 2 and 3). Chapters 2 to 4 discussed a range of relevant relationship(s) between material culture patterning and social identity (Braun, 1991; Carr, 1995; Carr & Neitzel, 1995; Conkey, 1990; Conkey & Hastorf, 1990; David et al., 1991; Hegmon, 1992, 1998; Hodder, 1982b, 1982a, 1990, 1992, 1995; MacEachern, 1998; Shennan, 1989; Stark, 1998). The aim of this chapter is not to revise these topics but rather to identify a salient contribution of this research: the current predominant approaches to ceramic analysis, the core concept approach (see Chapter 2 for a detailed discussion on the core concept approach in southern African Iron Age studies) does not allow for understanding smaller scale variability in the design of the ceramics. This concern has long been apparent in southern African archaeology. The argument that particular analytical approaches would be able to answer specific research questions and questions at different spatial and cultural scales has been noted in discussions on the interaction between early Urewe and Kalundu Tradition communities in KwaZulu-Natal. Several researchers (Huffman, 2004; Whitelaw, 2013, 2019a; Whitelaw & Mazel, 2023; Whitelaw & Moon, 1996) have argued that settlement organization, site location, and stylistic differences in ceramics identify a second influx of farmers into the region during the seventh century. Other researchers have concluded that changes in ceramic styles do not signal a second influx of new EIA agriculturalists into the region because many of the decorative motifs found on Mzonjani vessels (Urewe) seem to be present on the Kalundu phase ceramic vessels (Parkington & Hall, 2009, p. 77).

Parkington and Hall (2009) astutely alluded that these differences in argument could be attributed to the differential analytical approaches employed by researchers. For instance, Maggs (1984a) used a multidimensional list to compare stylistic attributes in a matrix. This approach is geared towards identifying attribute-level stylistic differences between Mzonjani and Kalundu ceramics. Consequently, smaller-scale stylistic similarities can be identified because the approach aims to avoid identifying complex, multi-dimensional types. On the other hand, in focusing on the intersections of shape, motif type and motif layouts, the Core Concept approach applied by Whitelaw & Moon (1996) seeks to parse pottery into one tradition or phase, with the aim of distinguishing discontinuity between ceramic style units. That approach (see Chapter 2) intended to isolate differences (Parkington & Hall, 2009, p. 77). Therefore, neither the multidimensional

list nor the Core Concept approach is ideal for understanding continuity and discontinuity on a smaller scale.

Design symmetry analysis (Chapter 4) was chosen as an analytical method for this study for several key reasons. First, it has been repeatedly demonstrated that symmetries can isolate variability and track continuity on various scales, including on an intra-site level (see Minch & Price, 2018). Second, symmetries are sensitive to the temporal and spatial dispersal of design structures amongst multiple groups (see Washburn et al., 2022; Washburn & Matson, 1984). Third, this analytical approach is mathematically objective and thus free from many subjective nomenclature biases plaguing archaeology. Lastly, the design symmetry analysis has the added advantage of being applicable to various material culture types that carry geometric and non-geometric designs, from ceramics to textiles (Bertacchini et al., 2024; Chan et al., 2021; Chudasri et al., 2023; Cromwell, 2021; Kunkhet & Chudasri, 2022; Marsden & Thomas, n.d.; Pelkey, 2022; Perez, 2023; Powell & Bamforth, 2020; Reinhardt & Welters, 1999; Sanad & Hanafy, 2017; Van Esterik, 2023; Washburn et al., 2022, 2023).

The utilization of design symmetry analysis in this study is a novel approach in this region (however, see Garrett, 1997, who reviewed the design symmetries used by Nesta Nala, a modern-day Zulu potter in South Africa). The primary benefit of applying this method to pottery from early farming communities in southeastern Africa was establishing a relationship between defined ceramic facies and design symmetries. To achieve this, I examined whether the three specific ceramic facies within the Msuluzi Branch—Msuluzi, Ndondondwane, and Ntshekane—exhibit identifiable design symmetry combinations. Using Huffman's (1980, 2007) terminology, the goal was to determine if sets of symmetry types are unique to specific ceramic facies and if any discrete design symmetries are distinctive within each facies (see Chapter 6 for detailed results). This would be analogous to having a symmetry set or specific symmetry types act as *fossile directeurs* for the Msuluzi, Ndondondwane, or Ntshekane stylistic units. The test revealed that specific design symmetry repertoires were not associated with discrete ceramic facies and phases.

This test, discussed above, had two main implications. First, it demonstrates that design symmetries vary independently from isolated decorative attributes or multidimensional types used by previous methods. These methods are limited by their focus on either continuity (multidimensional list) or discontinuity (core concept approach) in ceramic style, but not both. Second, the analysis underscores that symmetry analysis measures only a single aspect of

decorative style and design structure, and therefore, it is not a typology (Washburn, 2021, p. 903). This is, I argue, the most important characteristic of design symmetry analysis. As discussed in detail in Chapter 3, types, typologies, and periodization are essential heuristics for situating archaeological data in space and time and for identifying and tracing large-scale mobility and regional variability (Crellin, 2020; Griffiths, 2017; Harris & Cipolla, 2017; Holland-Lulewicz, 2021; Whitelaw, 2012). However, these 'ideal' types and periodizations can hinder understanding more nuanced aspects of the past on smaller and alternative scales. Instead, I demonstrated that when design symmetry is situated within assemblage theory, it allows for a more dynamic understanding of the relationship between pottery decorative style and social identity. In the following sections, I discuss several key ways the relationship between style and identity manifested in the study region.

7.3 Continuity and discontinuity in design symmetries among sites

Chapter 3 highlighted that pottery production is a performative process consisting of long periods of repetition, continuity and discontinuity (Jones, 2012, p. 117). Working on the supposition that pottery production was a seasonal activity occurring during the dry, warm months (see Fowler, 2002, p. 297), there would have been periods of activity punctuated by periods of inactivity or 'boredom.' Such periods of stasis, as discussed in Chapter 3, when understood as a rhythm from which possibilities and potential are transcended, are crucial in contributing to social and cultural practices (Anderson, 2004; Bissell, 2007). Meaning-making is promoted and thrust into being through periods of boredom (Barbalet, 1999). Design structures would have been reproduced through a process that evoked pottery production improvisatory skills. At sites in the study area, the performative practice of applying and configuring the design structure of pottery is a practice that saw potters recalling and indexing past pottery. The reproduction of skills and the iteration of techniques (the interaction between gestures and matter) (Lucas, 2012, p. 198; Mauss, 1973), connecting each pot to the next in the process of enchainment (Brittain & Harris, 2010; Chapman & Gaydarska, 2007; Jones, 2007, 2012; Lucas, 2012; Wallis, 2013) flows through periods of activity and inactivity (boredom) recalled and improvised, year after year, allowing for consistency and continuity in the design structure of the pottery at many of the sites in the study region. Ruptures or discontinuities and variability in the design symmetry could be due to several factors. One such factor causing disjuncture could be the possibility of turbulent times related to pottery learning networks.

This study understands design symmetries as part of the *chaîne opératoire* (Lucas, 2012; Mauss, 1993), in which knowledge transfer occurs through apprenticeship within learning networks. This could cause continuity and ruptures in design structures applied to pottery over time. Thus, the design application of pottery involves bodily performances and memory, through which materiality emerges (see Lucas, 2012, p. 197 Mauss, 1993). Various ethnographical and ethnoarchaeological studies have identified that learning to apply decoration to pottery is a complex phenomenon, one that is only mastered near the end of the apprenticeship (Crown, 2014; Curtis, 1962; Gosselain, 2000, 2008, 2016; Hasaki, 2012; Wallaert, 2008, 2012; Wallaert-Pêtre, 2001).

Decoration as part of a learning network is a form of memory work. A fundamental tenet of such memory-making processes is indexing and recurrent citations of various social aspects, past and present (Fredriksen & Lindahl, 2023; Lucas, 2012, pp. 195–201; Mills & Walker, 2008; see Chapter 3). Many ethnographical and archaeological examples have shown how decorative motifs cite past or present (but geographically distinct) considerations or people and are openly and consciously acknowledged amongst potters (see Forni, 2007, 2013, 2016, 2018; Garrett, 1997; Labi, 2023; Perrill, 2007; Ross, 2007; R. Watt, 2020). Potters continually reconstruct and stretch their design repertoires, indexing and citing from various social situations. Such processes challenge ideas regarding the homogeneity of designs and the temporal and spatial variability of specific design repertoires (Gosselain, 2016, p. 62). Citations and indexing depend on successful knowledge transmission between the teacher and apprentice (see Gosselain, 2011, pp. 214-221; Fredriksen & Lindhal, 2023). Therefore, memory work is susceptible to breaches and ruptures between generations of potters (Fredriksen & Lindhal, 2023). The repetition of skills and processes through performative actions, such as pottery production, are improvised and recalled from one potting season to the next, providing constancy and continuity (Jones, 2012, p. 117) in the decorative motifs and design symmetry over considerable periods. Therefore, if there are gaps or breaches between generations of communities of potters due to turbulent times or sites becoming persistent places, which sees communities moving back to a locale after a period of absence, a more pronounced variability in the design symmetry might be noted.

Thus, at sites such as Ndondondwane, continuity in the design symmetry through time remains consistent, with little variability noted in the design symmetry. This is expected as Ndondondwane was occupied only once for a relatively short period (less than 100 years). No

ruptures were noted in the design symmetry at Ndondondwane; this continuity, however, does not necessitate homogeneity and inertia at the site. Instead, I argue that the design symmetry can be understood as a *simulacrum*, where reproduction and indexing of past and alternative social events produce variability (see Chapter 3; Deleuze, 1991, p. 262). However, such variability, though present, is not a tipping point or phase tradition in which rapid and noticeable traditions are pushed to the front (see DeLanda, 2000, 2002; Harris, 2018a, 2018b; Robb & Pauketat, 2013). Framed within an assemblage theory perspective, which emphasizes an ontology where everything is always in motion, ever-changing assemblages emerge at various scales (Crellin, 2020). In this view, change is also constantly in motion but, importantly, occurs unevenly happening at different times and tempos. To analyze changes in assemblages that occur at varying rates, DeLanda's (2000) concept of phase transitions is particularly useful. Phase transitions represent critical shifts in social, economic, and material systems. However, these significant changes are not the result of sudden, radical events; rather, they emerge through a series of smaller, interconnected processes (DeLanda, 2000; see also Crellin, 2020; Robb & Pauketat, 2013). At Ndondondwane, the variability in design symmetry was notable but did not result in critical shifts in the community's overarching social and economic processes. Other sites, such as KwaGandaganda and Wosi, however, do not have such temporal continuity in the design symmetry as Ndondondwane.

At KwaGandaganda, the design symmetry remained relatively consistent across all periods of occupation. However, the later part of the occupation saw the site's design symmetry decisively shift after the ninth century, transcending both the Ndondondwane and Ntshekane facies. Whitelaw (1994a,1994b) argued that KwaGandaganda was continually occupied, stretching from the Msuluzi through to the Ntshekane facies (see Chapter 5) and was a 'political capital' due to the presence of glass beads and large quantities of worked ivory recovered at the site (Coutu et al., 2016; Whitelaw, 1994b; Whitelaw & Mazel, 2023). Suppose KwaGandaganda had a central role in the region's political and economic viability and was occupied continually for over four centuries. What would cause the design symmetry to remain relatively consistent and shift during the ninth century? As I will discuss later, an overall drastic shift in the design symmetry of the Msuluzi Sequence during the eighth and ninth centuries was noted, which I argue correlates to environmental and climatic changes throughout the Southeastern Lowlands. Thus, at KwaGandaganda, potters might have indexed social and ecological factors affecting day-to-day activities in the design of their vessels. Understanding how the design symmetry at a site such as

KwaGandaganda is folded into and connected to larger assemblages would allow further reasons to be ascertained as to why the design symmetry shifted during the ninth century.

At Wosi, stable temporal continuity in the design symmetry with nuanced shifts was noted. This is because, as van Schalkwyk (1994b, p. 94) argued using a multidimensional attribute list approach, ceramic styles from Msuluzi to Ndondondwane shifted in situ while the site was continually occupied. No other apparent change at Wosi was noted in the rest of the material culture, nor was there any suggestion of an influx of new people onto the site. Thus, it appears the localized shift in ceramic style occurred over a relatively short period. The design symmetry as an assemblage was connected to larger assemblages, and the slight temporal shifts noted in design symmetries could have been due to a change in what was being indexed and cited.

At many of the sites analyzed, including Ntshekane, Magogo, Mhlopeni, Mamba I, Mamba II, Nsuze, ShuShu Hotsprings, 2930DB 48 (Mission Reserve), Emberton Way, Mhlanga Lagoon, Shrimp Lane, and Sinkwazi, more significant temporal ruptures in the design symmetry were identified. Here, a few examples will be discussed.

First, at Ntshekane, there is a trend of more significant discontinuity in the design symmetry over time, especially after AD 700. Three factors need to be considered at Ntshekane. Firstly, Huffman & Whitelaw (2019, pp. 146-147; also see Whitelaw & Mazel, 2023) argue that Ntshekane was a capital and most likely had 100 to 150 occupants (see Chapter 5 for a discussion). The 52 imported glass beads found during recent excavations are taken as evidence of elite control over access to resources and their redistribution as part of their links to the broader East Coast Trade network. In more recent times, it has been noted that among the Bantu peoples of southern Africa, the distribution of ivory was a privilege enjoyed only by political leaders (Shaw, 1974, p. 121). Thus, to maximize the capital gains from trade goods, political leaders would have wanted to control as much of the interior portion of the East Coast trade as possible. In exchange for imported glass beads, ivory, a chiefly material sourced and processed locally, was exported (Huffman & Whitelaw, 2019, p. 147). Thus, the presence of glass beads at EIA sites such as Ntshekane suggests the site held political importance in the region and, therefore, participated in trade networks. Simultaneously, the presence of ivory at sites like KwaGandaganda, Wosi, and Ndondondwane points to their political importance (Whitelaw, 1994b, pp. 46-47; Coutu et al., 2016).

However, it is arguable that more than the presence of 52 glass beads is needed to identify a political capital. Furthermore, no processed or unprocessed ivory was found at Ntshekane. If

glass beads were not traded for ivory and ivory processing was not essential at Ntshekane, can we still equate glass beads and ivory with political capitals based on the above scheme? Similar patterns are seen in the Lowveld of South Africa, where excavations at EIA sites such as LE 6 & 7, TSH 1 & SK17 recovered glass beads but negligible amounts of ivory (Antonites, 2024; Grody, 2016; Jordaan, 2016; Plug, 1989a, 1989b). The sites mentioned above—Ntshekane, Wosi, Ndondondwane, and KwaGandaganda—are the region's only extensively excavated and researched sites. Ivory and glass beads might have been identified if such large-scale excavations were possible at other EIA sites in the Southeastern Lowlands. With this being said, the presence of glass beads worked ivory, and high quantities of metallurgy suggests that sites such as Ntshekane, Ndondondwane, KwaGandaganda, and Wosi had a more prominent role in the region (Beukes, 2000; Coutu et al., 2016; Fowler, 2002, 2011a; Fowler et al., 2000, 2004; Fowler & Greenfield, 2009; Fread, 2007; Greenfield et al., 1997a, 2000; Greenfield & Miller, 2004; Greenfield & van Schalkwyk, 2003; House et al., 2023; Huffman & Whitelaw, 2019; Loubser, 1984, 1993a; Maggs, 1984b; Maggs & Michael, 1976; Malainey, 2000; Miller & Whitelaw, 1994a; Morris, 1993; Owens et al., 2023; Singer, 2007, 2008; Stofberg & Loubser, 1984; van Schalkwyk, 1991, 1994c; Voigt & Peters, 1994; Voigt & Von Den Driesch, 1984; Whitelaw, 1994b, 2005, 2019a, 2019b).

Second, Huffman and Whitelaw's (2019) research suggests that a growing population continued to inhabit Ntshekane throughout the three phases (Msuluzi, Ndondondwane, and Ntshekane) (see Owens et al., 2023)). At least ten livestock pens were identified by Huffman & Whitelaw (2019) during the Ntshekane phase horizon, four during the Ndondondwane phase, and only two during the Msuluzi phase horizon. Thus, if a single 'family unit' at Ntshekane is represented by one livestock pen, Ntshekane developed from a small homestead to a much larger village-type settlement. Thus, it is suggested that Ntshekane was continuously occupied throughout all three ceramic phases. However, the lack of C^{14} dates complicates this view. Only two dates, both from the Ntshekane facies, were obtained during the 1970s excavation. This makes it difficult to determine if Ntshekane was occupied for the entire Msuluzi Sequence (about 450 years) or only for a part of it, ending before the first millennium. For instance, the Bayesian model of the existing C^{14} dates indicates occupation of approximately 170 years; however, this is not a complete picture.

Lastly, Huffman and Whitelaw (2019) identified Blackburn pots *in situ* at Ntshekane, pointing to the interaction between people making Ntshekane and Blackburn-style pottery. How should the temporal shift in design symmetry at Ntshekane be understood? Here, this shift can be understood by distinguishing between the virtual and the actual in Deleuzian terms (Deleuze, 2004, p. 260; Lucas, 2012, p. 167; see Chapter 3). As discussed in Chapter 3, the virtual represents the realm of possibilities or potentiality, the full range of possibilities that a specific phenomenon, such as the design symmetry of pottery, can manifest. The actual is the tangible and distinct form that emerges from the virtual, and thus, in this context, would refer to the tangible design symmetries on the pottery. In Peircean terms, the virtual is the Qualisign, a sign of pure potentiality (Baron, 2021, p. 192), which has yet to be actualized. Once manifested into actual existence, they become Sinsigns, the physical experience of the world. At Ntshekane, there was a change in how the virtual was accessed and interpreted. Factors such as the changing ecological and climatic conditions during the end of the ninth and beginning of the tenth century could have pushed potters to actualize different design structures even if the virtual possibilities remained the same. The interaction between the terminal EIA community at Ntshekane and "Blackburn people" saw a shift in how social identities were expressed, fluctuating over time as alternative virtual potentials were galvanised in response to changing circumstances.

Similarly, at Nsuze and ShuShu Hotsprings, significant changes in the temporal design repertoire were observed. By the eleventh century, only a small portion of the total design repertoire (the virtual) was distinguished, likely due to a few potters actualizing a limited set of designs. The limited repertoire most likely reflects the final stages of occupying the valley.

Another contributing factor that could have led to substantial variability in the design symmetry at the above-mentioned sites could involve mobility and disruptions in pottery learning networks. Several settlement occupation patterns were observed during the Early Iron Age of the Southeastern Lowlands. At Ntshekane and KwaGandaganda, for instance, the sites most likely were occupied continually through a substantial amount of time. At the same time, Ndondondwane was a singular occupational site, only occupied during one phase (the Ndondondwane phase) for a relatively short period. In Chapter 4, the concept of persistent places (Carlton, 2021; Clark & Gilman, 2012; Díaz-Guardamino et al., 2020; Gamble, 2017; Schlanger, 1992; Shaw et al., 2016) was introduced as loci that are revisited in some regard and have seen repeated activity. These places are revisited for various social, political, and environmental reasons. For EIA communities

in this region, persistent places attracted episodic use (Shiner, 2009, p. 23). Thus, occupation and activities at persistent places such as Emberton Way and Mhlanga Lagoon would have been characterized by periods of stability, consistency, and activity disrupted by periods of absences, which could have been caused by several economic, political, or environmental factors (Daubney, 2015, pp. 22–23). However, as EIA communities in the Southeastern Lowlands moved between specific persistent places, disruptions in learning networks likely occurred, causing sharp discontinuities and shifts in pottery design symmetries. Furthermore, the occurrence of three distinct settlement occupation patterns, continuous, singular, and persistent places, during the EIA speaks to substantial mobility, disruptions, and relinking in learning and social networks.

The substantial variability of the coastal sites, Emberton Way, Mhlanga Lagoon, Shrimp Lane, and Sinkwazi, needs to be briefly discussed here, as design symmetry variability is due to factors other than shifting settlement patterns. Different patterns and material remains were identified at the coastal sites, as discussed in Chapter 5, than at the interior sites.

At Emberton Way and Mhlanga Lagoon, the material culture, such as hammer stones, grindstones, and lithics recovered, as well as the predominance of mollusc shells constituting the faunal remains, indicated that these sites were most likely used to process foraged molluscs and shellfish. Ceramic assemblages at these sites are also anomalous compared with interior sites. A bowl-to-jar ratio of 1:4, unlike the typical 1:1 or 1:2 ratio found at inland sites, suggested that ceramics served a narrower range of activities (Horwitz et al., 1991, p. 16). The abundance of ceramics, hearths, and fire stones likely supports the primary role of these sites in shellfish processing (see Berry, 1978; Berry & Schleyer, 1983; Bigalke & Voigt, 1973; Hall, 1981; Horwitz et al., 1991)

Moreover, geochemical analysis of pottery from two sites in the uMngeni Valley, Nanda and KwaGandaganda, as well as from the coastal site, Emberton Way, has identified a connection among these locations (Punyadeera et al., 1997). Some vessels made at KwaGandaganda and Nanda (and possibly other sites along the uMngeni Valley) were transported to Emberton Way. There is good evidence of the movement of vessels to and from Emberton Way. However, these patterns do not equate to trade between these two regions. It is more likely that people from the uMngeni Valley took pottery with them when they went to the coast to collect mussels and other seafood (Punyadeera et al., 1997, p. 255).

Overall, the above evidence suggests continual interaction between different inland communities over substantial periods. The temporal changes in the design symmetry would reflect the continual relational interaction. Thus, potters from various communities were in contact with each other at these coastal sites. Exposed to different designs, potters would have indexed new design symmetries. In Deluzian terms territorialization occurred through indexing, as this is the process through which things are assembled (Deleuze & Guattari, 2004, p. 555; Harris, 2018). As a consequence, reterritorialization happens as something from one location occurs in a new one, a coastal mollusc harvesting site. Knowing they would be in contact with different communities, potters would have incorporated their own iconic signs into their design symmetries, reterritorializing aspects of their social identity while away from home. Thus, because potters are intentionally signalling, the variation in design symmetry is applied.

Concurrently, entirely new decorative methods or techniques could result from these interactions. At Mhlanga Lagoon, for instance, rocker-stamping (Pillay et al., 2000; Punyadeera et al., 1997) decoration technique was identified (Horwitz et al., 1991). This decorative technique was likely achieved by rolling the edge of a mollusc shell to decorate pottery. Such a technique is not documented at other EIA sites in the region's interior and seems to have resulted from interaction amongst various communities at a coastal shellfish procurement site.

7.4 Is it possible to identify communities of producers through a stylistic approach?

The research has shown that it is possible to identify, in most cases, what I term ‘design networks’ rather than communities of producers. These design networks are similar to communities of practice and are established through learning networks and apprenticeships. They are seen as a proxy of some aspect of a social network. As mentioned earlier in this chapter, the decorative aspects of the *chaîne opératoire* are part of the later stages of apprenticeship. They are not something entrusted to novices or potters situated as peripheral participants. Design networks, I argue, distinguish social identity on a regional scale. The comparison of design symmetry across the four ecozones (Upper Thukela Basin, Lower Thukela Basin, uMngeni Valley, and Coastal Belt) reveals a regional pattern analogous to what Reinhardt and Welters (1999) observed in Greek women’s chemises, where design symmetry served to differentiate regional identities.

Many sites might have a site identity, a local design repertoire, and a design network to distinguish them from other communities. However, as assemblages, such site-level identities

should also be understood as connected and folded into larger assemblages and identities. I argue that some sites still have connections to others, as interactions allowed for indexing and citations, creating connections and relations. Each ecozone's social network analysis shows how design symmetries are assembled into larger assemblages, territorialized and deterritorialized.

7.4.1 The Msuluzi Sequence: Ecozone networks

The network visualizations for the four ecozones are presented in sequential periods, as illustrated and discussed in Chapter 6. This approach was chosen to clarify the structure of the network and highlight the "overflow" of design symmetries across the somewhat arbitrary apportioned temporal divisions. Additionally, it provides a clearer representation of the temporal changes in design symmetries.

In the Upper Thukela Basin, specific sites share strong temporal connections that extend temporally amongst each other. During the seventh-century occupation, Ntshekane was the nexus between Mhlopeni and Magogo, making It a vital bridge between the other sites in the region. Thus, in the Upper Thukela Basin, the initial settlements were relatively integrated by the eighth and ninth centuries AD, disconnecting to smaller bridging clusters during the tenth century onward.

In the Lower Thukela Basin, a central, well-connected cluster was present, with many of the individual site occupations forming strong ties. Ndondonwane, for instance, has strong ties between its three apportioned occupations. However, Ndondonwane also shares a strong connection with the ninth-century occupation at Nsuze. The uMngeni Valley showed similar patterns to what was noted in the Lower Thukela Basin, with a centralized, well-connected cluster with solid ties amongst most occupations, especially between the eighth and tenth centuries AD. The Lower Thukela Basin and uMngeni Valley show patterns opposite to what was seen in the Upper Thukela Basin, where amongst these two regions, communities became more independent closer to the end of the first millennium.

To explain this, the social capital within EIA communities should be examined. Social capital refers to the beneficial social and economic gains arising from the network of relations among community members (Birch & Hart, 2018, p. 15). Two distinctions of social capital can be made (see Chapter 4 for a discussion): bonding (inclusive) and bridging (exclusive) social capital. Bonding social capital allows for strong interconnection within a group (Birch & Hart, 2018). Thus, a bonding network identifies strong relations within and amongst group members. In

contrast, bridging social capital sees weaker and less connected relations within a group but stronger links to external groups (Birch & Hart, 2018, p. 16).

Thus, bonding network ties were identified in the Lower Thukela Basin and uMngeni Valley. Communities in these ecozones had strong internal cohesion, and the above-discussed SNA data shows that fissioning most likely occurred where new settlements grew out of already established settlements as families increased and their carrying capacity saturated. In contrast, in the Upper Thukela Basin, a different picture emerged, with temporal shifts at Ntshekane identifying a more aggregated fusion process that saw Ntshekane keep expanding as its population grew. The other sites in the Upper Thukela seem to form bridging ties with Ntshekane. Current research at Ntshekane (see Huffman & Whitelaw, 2019) has identified an aggregated settlement pattern with several contemporaneous Central Cattle Pattern-type (CCP) layouts. Such a settlement pattern resembles a Sotho-Tswana-Type pattern, "where the homestead or ward is centred around a ring of *several* primary stock pens…" (Maggs, 2023, p. 78). Thus, the SNA data showed that Ntshekane had strong bridging ties with other communities in the region during the latter part of the first millennium. However, the fusion process at Ntshekane, coupled with the above-discussed data, contrasts with a Nguni-type dispersed pattern of many homesteads organized around a single primary livestock enclosure (Maggs, 2023, p. 78). Such Nguni-type patterns are characteristic of both the EIA and later Nguni (Blackburn, Moor Park, and Nqabeni) settlement layouts. Therefore, the data discussed here complicates the current hypotheses of Nguni farms arriving at the beginning of the second millennium.

The Coastal Belt saw a more heterogeneous design repertoire within and between occupations. The variability in design symmetries can be equated to the sporadic occupation of these coastal sites. Thus, because various inland communities visited these coastal shellfish procurement sites intermittently for a substantial period of time, this is reflected in the heterogeneity of the design symmetries.

Additional information can be ascertained from the *k*-core scores for each ecozone. The highest order of *k*-cores, $k=10$, comes from the Lower Thukela Basin. The proportion of occupations connected to at least four other occupations is 0.78. Similarly, the uMngeni Valley shows a similar pattern, with the maximum order of *k*-cores at $k=9$ and connected to four or more other occupations at 0.88. No cutpoints were present at either of these networks. Therefore, the lack of cutpoints and the high order of *k*=cores shows that the occupations from these two ecozones

formed strong bonding ties (see Crowe, 2007). Bonding ties point to communities having more robust and cohesive intragroup communication (Borgatti et al., 1986; Crowe, 2007). Such relations would have created strong in-group loyalty through reciprocity between group members (Birch & Hart, 2018, p. 26). Therefore, communities in the Lower Thukela Basin and uMngeni Valley likely exhibited more distinct design symmetries at the site level. Intra-site design symmetries in these two ecozones were more unique, and less of the entire design repertoire was shared. In contrast, bridging social capital would be expected where more ties *between* communities (inter-site) provide access to various regional resources (Bodin & Crona, 2009, p. 369). Thus, with more interaction, more of the design repertoire would be shared between communities. Washburn and colleagues identified similar patterns at several sites of the Mimbres culture tradition (AD 1000-AD 1150) in southwestern New Mexico, where they noted that specific symmetries were shared across all the sites (Washburn et al., 2023, p. 38).

In comparison, a noticeable shift occurred in the network structures for the Upper Thukela Basin and the Coastal Belt. The maximum order of *k*-cores decreased to k=6 and k=3, respectively. An increase in cutpoints was also noted, suggesting these two networks comprised more bridging than bonding ties. Among communities with bridging ties, more interaction between communities would have been likely and increased cohesiveness between groups (Birch & Hart, 2018). Thus, communities in the Upper Thukela Basin, and especially among Coastal Belt sites, would have had more interaction indexing and citations between groups.

The above section discusses the design symmetries as an assemblage at various scales, at the site and as part of their respective ecozones. What was shown is how to design symmetries as assemblages are always in the process of being territorialized to specific assemblages and deterritorializing, breaking apart and forming part of alternative assemblages on alternate scales. The following section will discuss the design symmetries as part of a regional assemblage.

7.4.2 The Msuluzi Sequence: Temporal continuity and variability

The design symmetry repertoire comprising the Msuluzi Sequence is marked by significant periods of continuity, with only two notable discontinuities in the design symmetry at around AD 625 and again between AD 975 and AD 1075. How should the overall continuity and scatters of rupture and change in the design symmetry for the Msuluzi Sequence be understood? To do this, we should look at the decoration of ceramics as a performative process involving improvisation. The pottery design structure between AD 625 and AD 1075 was marked by a combination of

continuity and variability, which symmetry analysis can best address. This period was marked mainly by continuity in the design structure of the pottery. This continuity, however, does not necessitate homogeneity and inertia during this period. Instead, the design symmetry of the Msuluzi Sequence can be understood as a *simulacrum*, where variability is dynamic. There were two notable periods in which change and discontinuity in the design symmetry throughout this period. The first rupture was identified around AD 625 to AD 675. Several phenomena must be considered when considering this shift in design symmetry.

Firstly, several researchers (see Maggs, 1984a, 1984b; Parkington & Hall, 2009; Whitelaw, 2013; Whitelaw & Hall, 2016; Whitelaw & Mazel, 2023) noted that some form of relational reciprocity must have been in place between farmers producing Mzonjani ceramics and the producers of the ceramics from the early Kalundu Tradition. The degree of influence that such interaction had has been debated, with some researchers arguing that the effect of the interaction was not intensive. At the same time, others argue that decorative characteristics present on Mzonjani pottery are also found on Kalundu pottery, specifically Msuluzi vessels. This is taken as evidence of an in-situ development of pottery style rather than Msuluzi pottery coinciding with a new migration of farmers into the region (see Maggs, 1984a).

Secondly, in early syntheses about EIA settlement patterns, it was observed that Mzonjani-producing farmers settled mostly within six kilometres of the coast (see Whitelaw & Moon, 1996), and this might have been due to dry conditions further inland during the fourth century AD. During the sixth and seventh centuries, wetter conditions saw farmers shifting further inland. However, evidence of Mzonjani ceramics has been found at several sites away from the coast up into the uMngeni Valley (see Chapter 5 for a discussion on sites and ceramics). Furthermore, XRF analysis of pottery from coastal and inland EIA sites has provided evidence of communities traveling to and from coastal sites as early as the fourth century (see Horwitz et al., 1991; Pillay et al., 2000; Punyadeera et al., 1997). Therefore, between AD 625 and AD 675, there was a shift in design symmetry due to Msuluzi-producing farmers citing or indexing Mzonjani design styles. While contact between the two groups may have been a novel occurrence, by AD 675, a shift was noted in the design symmetry. Such citations to Mzonjani styles became less important, leading to an emergence of alternative design structures that remained consistent until AD 925. As farming communities progressively settled in the river valleys, they began referencing Mzonjani design styles and created new design structures to reflect their changing environment.

The second rupture requires thinking even further about the relationships between people and their physical and social environments. Design symmetries should be understood as an assemblage to conceptualize the variability of design symmetries at the end of the first millennium and early parts of the second. The stability and capriciousness of such an assemblage are determined by 'relations of exteriority' (DeLanda, 2006, pp. 10–11), meaning that assemblages are defined by their relations to their environment rather than their internal arrangements. Changes in design symmetries are best understood as assemblages shaped by territorialization, deterritorialization, coding, and decoding, involving innovative processes that indexed and cited new design symmetries (Jones, 2007, p. 132). However, an "understand[ding of the] relationships between artifacts in a historical framework of change" (Jones, 2007, p. 132) is required. In other words, what was happening in the Southeastern Lowlands that might have precipitated a change in the design symmetries during the latter periods of the first millennium and early parts of the second? How did these factors contribute to a drastic shift in design symmetries at the end of the first millennium?

The second significant change in design symmetry coincides with the Medieval Warm Epoch (AD 900 to AD 1200). The shift corresponds to a period of drought, increased population density, and the diminished capacity of arable soil, all of which contributed towards increased community mobility and eventual abandonment of the river valleys to the escarpment.

The continuity and variability in design symmetry at this time can be further understood through territorialization and deterritorialization. Throughout most of the Msuluzi Sequence, the design symmetry was stabilized through territorialization and coding. The favourable environmental and climatic conditions and settlements as persistent places coincide with a stable design symmetry assemblage through territorialization. At the same time, the coding occurred through citation and indexing of design structures as part of a stabilized assemblage. The continuity can be understood as an iconic sign. Iconic signs are linked through resemblance. Therefore, the continuity in the design symmetry signals stability through the region. However, during the latter part of the first millennium, drought, population increases, mobility and ephemerality of settlements are linked to the deterritorialization of the design symmetry assemblage and the establishment of alternative new assemblages. This process is evident in the change of design symmetry noted at the end of the first millennium. The unstable conditions that led to the eventual abandonment of the region by EIA farmers are indicated in the change in design symmetries. The

fact that specific symmetry types became more popular during this time frame points to the instability and situations people faced.

7.4.3 The Msuluzi Sequence: Time and Space

What still needs to be added to this analysis are the relational aspects of the design symmetries through time and across the entire study area. Beginning in the seventh century, more bridging ties characterized the networks among sites throughout the study region, with design symmetries dispersing freely amongst communities. The eigenvector scores for the seventh century support this conclusion, as most of the sites were equally central. Ntshekane and Mamba II were the only conspicuous sites. Interestingly, the betweenness centrality scores of both Wosi and KwaGandaganda show that design symmetries during the seventh century were able to move more freely; these two sites played a more central position in the network, perhaps due to their role in exchange networks involving trade goods such as ivory and talc schist. Ntshekane and Mamba II also had a similar place, as these sites were also involved in the distribution of ivory and metalworking to some degree. The greater social interactions facilitated by the economic transactions at these settlements would have led to indexing and citations of pottery designs to and from less central sites.

The eighth century was characterized by more bounded ties than the seventh century. During this period, the maximum k-cores increased to k=10, with a more bounded central cluster of settlements. A high betweenness centrality characterized Wosi, suggesting that potters there were integral in disseminating and spreading design symmetries between communities. Interestingly, the walk trap community detection identified a shift in the connections with the coastal (and uMngeni Valley) and further inland sites that splits the large eight-century cluster. Thus, the interaction with coastal sites during the eighth century was less prominent.

During the ninth century the network shifted from bounded to more bridging, with interaction occurring more freely amongst settlements. The central role of Wosi noted during the eighth century was absent, which could point to Wosi losing its prominent position in the region. Interestingly, Emberton Way, a coastal site, had the network's highest eigenvector and betweenness centrality scores. Thus, Emberton Way was central in disseminating and indexing design symmetries to the more inland sites. A possible reason for this could be explained by annual gatherings for shellfish harvesting that would have brought together people from different

communities, encouraging the selective borrowing and copying of designs, which entered the design repertoire at inland settlements.

The maximum *k*-core decreased significantly during the tenth century to *k*=2, with the four cutpoints suggesting even more bridging nodes. The overall structure of the network also shifted, with no real central cluster and sites connected by one or a few edges. However, similar patterns were noted during the eleventh century, with sites becoming more disconnected, suggesting free-flowing design symmetry moving between the dwindling sites in the region. The tenth and eleventh-century networks point to diverging regional symmetry preferences, far inland and along the coast, with only a few places connecting them. During this period, there were fewer sites across the region as communities moved out of the uMngeni and Thukela Valley onto the escarpment (O. Davies, 1971; Whitelaw, 2008, 2019a; Whitelaw & Mazel, 2023). Moving from bounded to bridging networks amongst communities could have been due to social, political and environmental challenges people left in the valley faced. The role of coastal sites at this time is unclear, as there are few available data from settlements there.

7.5 Which stylistic methods distinguish identity at the communal level?

A central theme in this dissertation is whether small-scale communal identities are detectable through the study of ceramic style. However, there is no analytical panacea to achieve this. I argue here that it is possible to understand more nuanced aspects of social identity only through the amalgamation of several methods and methodologies. Only by combining design symmetry analysis with Bayesian modelling of radiocarbon dates and a statistical approach to the ceramic material was it possible to understand alternative aspects of social identities. Thus, the use of Bayesian modelling and the application of an apportioning method will be discussed below.

7.5.1 Design symmetries and ceramic facies

The first stage in this analysis was to see if ceramic facies, in this case, three specific ceramic facies within the Msuluzi Branch – Msuluzi, Ndondondwane, and Ntshekane – have identifiable design symmetry (DS) combinations. Thus, can specific or distinct symmetry types within and amongst each facies be identified? Are certain design symmetries or combinations of design symmetries associated with specific ceramic facies? The results highlighted that substantial interconnectedness was present throughout all three ceramic facies, and no apparent, distinct design symmetry (DS) repertoire distinguished each ceramic facies.

7.5.2 Design symmetries and ceramic phases

Having looked at the DS across space, the aim was to determine if the conventional temporal framework, which sees the Msuluzi Sequence parsed into three phases, namely the Msuluzi phase (AD 650 to AD 750), Ndondondwane phase (AD 750 to AD 950), and Ntshekane phase (AD 950 to AD 1050), accurately reflects the DS through time. The likelihood of design symmetries being unique to each phase was low because the ceramic facies (space) also define the symmetries for each phase (time). As such, it was necessary to construct an alternative chronological model. The Bayesian model (Model #16) used in this dissertation and discussed in Chapter 6 was chosen over the other models, as it displayed the highest A_{model} value of all Bayesian Models tested, with an A_{model} value of 103.5. An acceptable Bayesian model should have a value larger than 60, and a model with a score below 60 could indicate issues with the validity of the overall model (Bronk Ramsey, 2009). Not only were all other models tested consistent with lower A_{model} values, but they also stayed consistent with the primary model discussed here and in Chapter 6.

The Bayesian chronology upheld the boundaries of the Msuluzi phase, pushing the start date back by approximately 25 years. However, the model indicated an overlap between the end of the Msuluzi and the start of the Ndondondwane phases and an overlap between the end of the Ndondondwane and Ntshekane phases. Furthermore, the Ntshekane phase started earlier than proposed in the current chronology and possibly had a longer occupational span (198 years) (at 95% confidence).

The results from the Bayesian model showed that the existing chronological framework prevented a nuanced understanding of change. The boundaries of each phase collapse over considerable time and force the design symmetry into one or another phase. Above, it was shown that significant overlap occurred in design symmetries across the facies. An apportioned sequence rooted in a Bayesian model of radiocarbon dates provides an alternative temporal framework and a more nuanced understanding of change in the past.

While the core concept approach used to develop a periodization of the Msuluzi Sequence has provided a valuable heuristic tool in situating the material and expressing broad-scale changes in ceramic styles (see Holland-Lulewicz, 2021), it cannot be used to understand the relational aspects of the communities within these reified ceramic types. A Bayesian Model of radiocarbon dates allows for absolute dates to be treated similarly to all other material cultures and assessed in

relation to other information about those dates (Holland-Lulewicz, 2021, p. 26). Similarly, Crellin (2020, p. 178) argues that radiocarbon dating is a process interested in the continual, consistent change of material, and in doing so, these burnt seeds, charcoal, or faunal remains are elevated to an integral role in understanding past events. Therefore, there is a central relational aspect to Bayesian Models.

The Bayesian chronological model applied in this study has provided several important insights into the ceramic chronology of the Msuluzi Sequence. The possibility of substantial overlap between the three ceramic phases raises several important questions on the tempo and timing of change in the region. The possibility of overlap between the facies means a shift in how we view and identify change. The traditional block-time approach, which sees change occurring at the beginning and end of a period while the epicentre of the period remains constant (Crellin, 2020), will not assist in helping to address this alternative chronology. Such an alternative approach sees change as tracking the continuity of everyday life. Collingwood (1927) makes an interesting point when he argues that a period is not defined by its edges, its beginning and end and where one period bleeds over into the next. Instead, for Collingwood, a period is determined from its epicentre and moving outward from there.

Periodization in this instance of the ceramic styles based on decoration type, placement and vessel shape means that change/transition between the phases/facies is marked by large-scale change, where change is drastic enough that it can be noted moving from one to the next phase. However, "[t]he reality of life in a changing world is messy-communities did not spend one-day being Neolithic, go to bed and then wake up the next day being Bronze Age" (Crellin, 2020, p. 7). Similarly, the transition from Msuluzi to Ndondondwane, for instance, was not quick, straightforward, and without ruptures. The blurring boundaries between the phases and the ceramic facies of the Msuluzi Sequence have been alluded to in past studies. For instance, Horwitz et al., 1991 established a transitional phase, the 'Msuluzi/Ndondondwane phase' at Emberton Way (see Chapter 5). They noted that "the differences between these phases are not as marked as those separating the preceding and following typological changes. Furthermore, several characteristics are shared by the two phases" (pp. 9-12).

Similarly, at KwaGandaganda, Whitelaw (1994a, p. 17) noted that Msuluzi and Ndondondwane sherds were challenging to separate, as all of the ceramic vessel classes from Ndondondwane were also found in the Msuluzi classes. Thus, the Bayesian Model applied here

confirms that the boundaries between the Msuluzi and Ndondondwane phases and possibly the Ntshekane phase were most likely substantially blurred. The Bayesian Model allows for a collapse of the ceramic facies and forgoing a successive model of change. However, forgoing the ceramic phases and facies which constitute the Msuluzi Sequence still leaves the problem of identifying change within the design symmetries of the ceramic material. This was overcome with a statistical ceramic apportion model that considered site occupation dates based on the Bayesian Model, ceramic production dates, and popularity distribution curves. The aim was to apportion the ceramics within established discrete statistical models. The ceramics were parsed into these periods based on stratigraphy, the morphology of deposits, and the Bayesian radiocarbon dates, regardless of which facies they were initially placed into. "Arbitrary" apportioned models were used due to the significant overlap between the ceramics of each facies.

7.6 Which aspects of identity are indicated through pottery decorative style?

As discussed in this study, the correlation between identity and pottery decorative style is multifaceted and depends significantly on the analytical approach used. In this study, several key aspects of identity have been identified through the application of design symmetry analysis, Bayesian modelling, and a statistical apportioning model of the ceramic sample.

As highlighted in Chapter Two, the link between pottery decorative styles and language groups has been crucial in understanding larger-scale social identity in southern African archaeology. Geographical and chronological data support this link, demonstrating that specific pottery styles are associated with particular language groups. However, this study examined smaller-scale concepts of identity beyond this broad association.

This study has demonstrated that applying various analytical approaches can uncover alternative, smaller-scale identities. For example, design symmetry analysis can highlight variability and track continuity across different scales, including intra-site levels. This method is attuned to the temporal and spatial distribution of design structures among multiple groups, enabling the identification of communal, regional, and inter-regional identities.

Examples from the study illustrate how different shapes of networks or geographical settings influence the identities expressed through pottery styles. For instance, the continuity in design symmetry at Ndondondwane suggests stable learning networks and ongoing engagement with past decorative techniques, indicating a strong communal identity. In contrast, the variability

in design symmetry at sites like Ntshekane and KwaGandaganda points to interactions with various communities and shifting social dynamics, reflecting more complex and fluid identities.

Geographical and ecological settings also play an important role in shaping the identities indicated by pottery styles. The study found that coastal sites like Emberton Way and Mhlanga Lagoon exhibited significant variability in design symmetries due to interactions among various inland communities. This suggests that potters incorporated elements from different social contexts into their designs, indicating a dynamic and interconnected identity.

The aspects of identity indicated through pottery decorative style are diverse and context-specific. They may include broad language group identities, smaller-scale communal, economic, political, and generational identities, and the influence of geographical and ecological settings. The study highlights the importance of using multiple analytical approaches to capture the complexity of social identities in Early Iron Age communities. By integrating design symmetry analysis with Bayesian modelling and other methods, this research provides a nuanced understanding of how pottery styles reflect and communicate various aspects of identity.

7.7 Human Mobility and Design Symmetries

This research provided indirect evidence for human mobility during the first millennium in the study area. Direct evidence of human mobility, such as human remains, is lacking for many of the sites in the region (however, see Huffman & Whitelaw, 2019; Owens et al., 2023). Evidence from EIA sites in the Lower Thukela Valley suggests that domesticated stock was not moved in and out of the valley seasonally (Arnold et al., 2013). However, the distribution of design symmetries in the study region provides valuableidirect insights into the movement of people and ideas.

The clustering of symmetries in certain areas and their spread in others can be attributed to several factors. Firstly, the movement of people, facilitated by trade networks and periodic gatherings, likely played a significant role. For example, sites like Ntshekane and KwaGandaganda, which were occupied for extended periods, suggest stable communities that supported human movement and the exchange of ideas. The presence of imported glass beads and worked ivory at these sites indicates involvement in broader trade networks, which would require the movement of people (see Coutu et al., 2016). Additionally, the concept of persistent places, such as those identified at the Coastal sites, Emberton Way and Mhlanga Lagoon, where

communities revisited specific loci for social, political, or environmental reasons, signifies mobility. These coastal sites were periodically revisited for activities such as shellfish harvesting, fostering cultural exchange and the spread of design symmetries.

Secondly, the transmission of ideas through learning networks and apprenticeships is crucial. Potters could have shared and adapted design concepts through interactions at coastal sites like Emberton Way and Mhlanga Lagoon, where different communities would have interacted. These interactions would have facilitated the spread of design symmetries across regions, contributing to both the clustering and spread of these symmetries. For instance, the collaboration among potters at these coastal sites resulted in the adoption of new decorative techniques, such as the rocker-stamping decoration method identified at Mhlanga Lagoon, which was likely accomplished by rolling the edge of a mollusc shell to adorn pottery (see Horwitz et al., 1991). Despite its limitations, the settlement chronology reveals temporal overlap between ceramic phases identified through Bayesian modelling. This overlap indicates continuous interaction and movement between communities.

Alternative explanations for human connections include cultural transmission through apprenticeships and learning networks, as well as periodic gatherings for activities like shellfish harvesting. These gatherings facilitated cultural exchange and the spread of design symmetries. Environmental and climatic changes, particularly the Medieval Warm Epoch (see Huffman, 1996), also influenced community mobility and the dissemination of design symmetries. The Medieval Warm Epoch led to increased community mobility and the abandonment of river valleys, which affected the transmission of design symmetries as communities moved and interacted with new groups.

The Social Network Analysis provides additional insights into the movement of people during the first millennium across the study region. The central nodes, such as Ntshekane and KwaGandaganda, played crucial roles in facilitating the movement of people and ideas. Their central positions in the network indicate their significance in human mobility. The presence of bridging nodes and cutpoints further highlights the connections between different communities and the movement of individuals. For example, the key role of Wosi in disseminating design symmetries during the eighth century underscores its importance in aiding in the movement of people and ideas.

Thus, the observed symmetries stem from both the movement of people and the transmission of ideas. Trade networks, learning networks, environmental factors, and social interactions influence the clustering and spread of design symmetries. By considering these factors and reframing the network analysis in terms of human mobility, a more comprehensive understanding of the connections between communities is identified.

7.8 Research contributions, limitations, and future directions

This research has made significant theoretical and analytical contributions to southern African archaeology. While the core concept approach has linked ceramic style with linguistic identities, it has not been proven effective for identifying smaller-scale identities. By integrating a design symmetry approach with Bayesian modelling and appropriate statistical analyses within assemblage theory and Peircean Semeiotics frameworks, this study offers a more nuanced understanding of how social identities are expressed through ceramic objects. Social identity is not inherent in objects but is created through the relationship between people and objects. In this context, pottery production and consumption stabilize these relationships within an assemblage through processes of territorialization, deterritorialization, coding, and decoding. Pottery at a specific settlement is thus territorialized through its production and consumption and coded through its design symmetry. However, these vessels are also part of larger and alternative assemblages, constantly evolving and connecting to different assemblages. Consequently, design symmetry often reflects smaller-scale settlement identities while also linking to broader regional or inter-regional identities. The theoretical approach in this thesis explains the continuity and change in design symmetries among early farming settlements in the southeastern lowlands over four centuries. This framework transcends dualistic models that separate cultural and material culture into distinct ontologies. Notably, the alternative analytical approaches, applied for the first time in a southern African context, offer the sensitivity needed to detect social identity at a scale smaller than a language group.

This research study offers valuable insights into the design symmetries of ceramic assemblages across various sites and periods during the first millennium in the Southeastern Lowlands of South Africa. However, it is essential to acknowledge several limitations and weaknesses to fully understand the scope and implications of these findings. One significant limitation is sample bias, particularly the high proportion of undecorated vessels from Ndondondwane, which skews the results and necessitates the exclusion of undecorated vessels in

many analyses. This exclusion limits the comprehensiveness of the findings and may overlook important aspects of the ceramic assemblages. Additionally, the fragmented nature of the ceramic assemblages presents challenges in accurately identifying and analyzing design symmetries, leading to gaps in the data and complicating a full understanding of the design structures and their variations across different sites and periods.

The Bayesian model revealed significant temporal overlap among the three ceramic facies (Msuluzi, Ndondondwane, and Ntshekane), complicating the ability to distinguish distinct phases and leading to ambiguities in interpreting the chronological framework. Conventional phasing might not adequately capture the nuances of changes in design symmetry over time (see Roberts et al., 2012). Additionally, some sites, such as Sinkwazi, featured limited ceramic assemblages and yielded no C^{14} dates, restricting the ability to infer meaningful patterns. The small sample size can result in less reliable outcomes and may not accurately reflect broader trends in design symmetries.

While the apportioned framework provided a more nuanced understanding of changes in design symmetries, substantial variability was noted across different sites and periods. This variability can make it challenging to identify consistent patterns. It may indicate that the design symmetries are influenced by a wide range of factors, including social, political, and environmental conditions. The results also highlighted discontinuity in design symmetries at certain sites, such as Ntshekane and ShuShu Hotsprings, suggesting that the design repertoires were not stable over time and may reflect disruptions in pottery production and learning networks. Such discontinuities complicate the interpretation of social identities and interactions.

The network analysis revealed complex patterns of connectivity and interaction between sites. While this provides valuable insights, the complexity of the network structures can make it difficult to draw clear conclusions about the relationships between design symmetries and social identities. The presence of cutpoints and bridges in the networks indicates potential vulnerabilities in the connectivity between sites. Additionally, the influence of geographical and ecological settings on design symmetries was noted, particularly in the Coastal Belt, where heterogeneous design repertoires suggest that interactions between inland and coastal communities played a significant role in shaping the design symmetries. However, the specific impact of these interactions remains unclear and requires further investigation.

The reliance on legacy radiocarbon dates for establishing the chronological framework presents another limitation. These dates may not offer the most accurate or comprehensive

understanding of the temporal changes in design symmetries. The 'old wood' effect (Kim et al., 2019; Schiffer, 1986; Shott, 1992) and other discrepancies (see Bayliss, 2007, 2015) associated with radiocarbon dating complicate the interpretation of the results even further. Lastly, the under-theorization of symmetry patterns within the context of African archaeology (see Evers, 1988) can hinder the effectiveness of symmetry analysis. While the structured nomenclature establishes a framework for comparison, the conceptualization and interpretation of symmetry patterns require a more detailed understanding to fully capture their significance.

This study also underscores several significant limitations for future research. Firstly, I relied on legacy radiocarbon dates to track stylistic continuity and change, but there are still very few C^{14} dates from this region. Many more radiocarbon samples are needed to gain a more nuanced understanding of past societies here. Secondly, excavation strategies must provide a much finer detailed understanding of individual households and activity areas in relation to other aspects of the occupations. This requires a shift towards collecting data that aligns with research questions framing excavations of Early Iron Age (EIA) sites, moving beyond cognitive models aimed at understanding the cosmological aspects of these communities. Instead, excavations should aim to extrapolate detailed information about daily life and social organization.

7.9 Conclusion

The relationship between social identity and decorative style in pottery is messy, complex, and context-specific. Current analytical approaches cannot entirely account for all that influence style. This study has highlighted that while conventional analytical methods, such as the core-concept approach, have provided significant insights into large-scale regional patterns of these early farming communities, they are insufficient to detect smaller-scale variability in ceramic style. Specifically, within a southern African context, these conventional approaches have struggled to capture the subtle shifts and permanencies in the temporality of ceramic design that occur within and between different ceramic facies. In applying design symmetry analysis, this research offered a novel way of approaching how decorative design structures, as part of the *chaîne opératoire*, reflect both continuity and discontinuity in various aspects of social identity. This study has shown that ceramic facies do not exhibit distinct design repertoires. However, the design symmetries were able to assist in revealing nuanced social dynamics amongst and between these early farming communities. This is only achievable if the analyses are grounded in an alternative temporal framework proposed by the Bayesian model. This model challenges the conventional block-time

approach because it emphasizes continuity and relational change over rigid transitions between distinct phases. As seen at settlements like Ndondondwane and Wosi, continuity in pottery design suggests stable learning networks and a persistent engagement with past decorative techniques. On the other hand, ruptures and discontinuity in design symmetry at the settlements of Ntshekane, Emberton Way, and Mhlanga Lagoon likely result from turbulent socio-environmental conditions, changes and disruptions in pottery learning networks due to continual interaction with different communities or cyclical movement from and back to persistent places.

This research highlighted the importance of understanding design symmetry as part of a broader assemblage, reflecting dynamic social processes connected with and folded into alternate assemblages rather than static cultural markers based on ideal mental templates. Through a Peircean analysis of meaning-making, this study has shown meaning associated with objects in an archaeological context is seldom symbolic, as it is understood in a Saussurerian sense (Chapter 3; Knappett, 2002) or is only communicative. Instead, objects have multiple meanings and can 'escape from the intentions of their creators, as they are open to further manipulation, reuse, and reinterpretation" (Filipowicz, 2017, p. 52). Through understanding design symmetries as continually in the process of becoming part of an assemblage while also shifting and connecting to larger assemblages, this study has shown how design symmetries are linked across multiple scales, from individual sites to within specific ecozones and across the Southeastern Lowlands of South Africa, without having to rely on reified notions of scale or types.

This research project further showed that while it is possible to identify distinct stylistic patterns across different ecozones, what emerges more clearly is the existence of "design networks" rather than specific communities of potters. These networks, shaped by learning processes and apprenticeships, suggest that design symmetries are linked across several "scales."

On a regional scale, the design symmetries reflected continuity and change in design symmetries, with shifts around the early seventh century AD and again at the end of the tenth century AD. These changes align with broader social and environmental shifts, such as increased mobility out of the Thukela Basin, population pressures, and climate changes like the Medieval Warm Epoch. Social network analysis of the Msuluzi Sequence underscores how a limited number of settlements, such as Ntshekane, Wosi, and Emberton Way, played more central roles in facilitating the spread of design symmetries across the region, which further illustrated how design networks were integrated into larger regional assemblages.

Importantly, this study has highlighted the need for several combined approaches to capture the complexity of social identities in Early Iron Age communities. This study offers a more nuanced appreciation of these identities by integrating design symmetry analysis, Bayesian modelling, and a statistical apportioning model to ceramic material. The results indicate substantial design symmetries overlapping across the Msuluzi Sequence, challenging the traditional periodization framework. The introduction of Bayesian modelling demonstrates that the conventional temporal framework oversimplifies the process of change. The block-time periodization has fulfilled its role, helping to make sense of new archaeological data from innovative research on farming communities in southern Africa.

Similarly, the core concept approach to analyzing ceramic style has effectively identified large-scale linguistic identities associated with the region's advent and development of farming societies. However, neither method is useful for understanding smaller-scale social entities or dynamics. Though unconventional for this region, the approach proposed in this dissertation helps explain the origins of style by focusing on the transmission of design concepts among early farming communities over time. It integrates style with society, providing a framework to understand stylistic continuity and change as influenced by social and environmental factors affecting potters' lives.

Reference List

Alt, S. M. (2019). From weeping hills to lost caves: A search for vibrant matter in greater Cahokia. In S. M. Alt & T. R. Pauketat (Eds.), *New Materialisms: New Urbanisms* (pp. 19–39). Routledge.

Amsden, C. A. (1936). *An Analysis of Hohokam Pottery Design*. Medallion Papers 23.

Anderson, B. (2004). Time-stilled space-slowed: How boredom matters. *Geoforum*, *35*(2004), 739–754. https://doi.org/10.1016/j.geoforum.2004.02.005

Anderson, B., & Harrison, P. (2016). The Promise of non-Representational Theories. In B. Anderson & P. Harrison (Eds.), *Taking-Place: Non-Representational Theories and Geography* (pp. 1–34). Routledge.

Andersson, J. C. M., Zehnder, A. J. B., Rockström, J., & Yang, H. (2011). Potential impacts of water harvesting and ecological sanitation on crop yield, evaporation and river flow regimes in the Thukela River basin, South Africa. *Agricultural Water Management*, *98*(7), 1113–1124. https://doi.org/10.1016/j.agwat.2011.02.004

Antonites, A. (2024). Overview of the Early Iron Age in the Letaba region of the Kruger National Park. *Koedoe*, *66*(2). https://doi.org/10.4102/koedoe.v66i2.1805

Armstrong, J., & Calder, I. (1996). Traditional Zulu pottery. In *Zulu treasures: of kings and commoners. A celebration of the material culture of the Zulu People* (pp. 107–114). KwaZulu Cultural Museum and the Local History Museums.

Arnold, D. E. (1972). Native pottery making in Quinua, Peru. *Anthropos*, *67*, 858–872.

Arnold, D. E. (1983). Design structure and community organization in Quinua, Peru. In D. K. Washburn (Ed.), *Structure and cognition in art* (pp. 56–73). Cambridge University Press.

Arnold, D. E. (1984a). Social interaction and ceramic design: community-wide correlates in Quinua, Peru. In P. M. Rice (Ed.), *Pots and potters: current approaches in ceramic archaeology* (Issue 24, pp. 133–161). University of California.

Arnold, D. E. (1984b). The ethnoarchaeology of pottery production. *Reviews in Anthropology*, *11*(1), 12–19.

Arnold, D. E. (1991). Ethnoarchaeology and Investigations of Ceramic Production and Exchange: Can We Go Beyond Cautionary Tales. *The Legacy of Anna O. Shepard*, *January 1991*, 321–345.

Arnold, D. E. (2006). The threshold model for ceramic resources: A refinement. In D. Gheorghiu (Ed.), *Ceramic studies: Papers on the social and cultural significance of ceramics and Europe and Eurasia from prehistoric to historic times* (Issue 1553, pp. 3–9). BAR International Series.

Arnold, D. E. (2015). The Evolution of Ceramic Production Organization in a Maya Community. In *The Evolution of Ceramic Production Organization in a Maya Community*. University of Colorado. https://doi.org/10.5876/9781607323143

Arnold, E., Greenfield, H., & Creaser, R. (2013). Domestic cattle mobility in early farming villages in southern Africa: Harvest profiles and strontium (87Sr/86Sr) isotope analyses from Early Iron Age sites in the lower Thukela River Valley of South Africa. *Archaeological and Anthropological Sciences*, *5*(5), 129–144. https://doi.org/10.1007/s12520-013-0121-z

Ashley, C. (2010). Towards a Socialised Archaeology of Ceramics in Great Lakes Africa. *African Archaeological Review*, *27*(2), 135–163. https://doi.org/10.1007/s10437-010-9074-0

Ashley, C., Antonites, A., & Fredriksen, P. D. (2016). *Mobility and African archaeology: an introduction*. *5534*(November). https://doi.org/10.1080/0067270X.2016.1245017

Athenst, J. C., Mills, B. J., & Brandes, U. (2018). Social networks and similarity of site assemblages. *Journal of Archaeological Science*, *92*, 63–72. https://doi.org/10.1016/j.jas.2017.11.002

Audouze, F. (2002). Leroi-Gourhan, a Philosopher of Technique and Evolution. *Journal of Archaeological Research*, *10*(4), 277–306. https://doi.org/10.1023/A:1020599009172

Bandama, F. (2013). *The Archaeology and Technology of Metal Production in the Late Iron Age of the Southern Waterberg, Limpopo Province, South Africa* [Doctoral dissertation, University of Cape Town]. https://doi.org/10.1080/0067270x.2014.891873

Barbalet, J. M. (1999). Boredom and social meaning. *British Journal of Sociology*, *50*(4), 631–646. https://doi.org/10.1111/j.1468-4446.1999.00631.x

Baron, J. P. (2016). Patron Gods and Patron Lords: The Semiotics of Classic Maya Community Cults. In *Patron Gods and Patron Lords: The Semiotics of Classic Maya Community Cults*. University Press of Colorado. https://doi.org/10.5876/9781607325185.c001

Baron, J. P. (2021). Peirce and Archaeology: Recent Approaches. *Annual Review of Anthropology*, *50*, 187–202. https://doi.org/10.1146/annurev-anthro-101819

Barthélemy, M. (2011). Spatial networks. *Physics Reports*, *499*, 1–101. https://doi.org/10.1016/j.physrep.2010.11.002

Bauer, A. A. (2013). Objects and Their Glassy Essence: Semiotics of Self in the Early Bronze Age Black Sea. *Signs and Society*, *1*(1), 1–31. https://doi.org/10.1086/670166

Bayliss, A. (2007). Bayesian Buildings: An Introduction for the Numerically Challenged. *Vernacular Architecture*, *38*(1), 75–86. https://doi.org/10.1179/174962907X248074

Bayliss, A. (2009). Rolling Out Revolution: Using Radiocarbon Dating in Archaeology. *Radiocarbon*, *51*(1), 123–147. https://doi.org/10.1017/S0033822200033750

Bayliss, A. (2015). Quality in Bayesian chronological models in archaeology. *World Archaeology*, *47*(4), 677–700. https://doi.org/10.1080/00438243.2015.1067640

Bayliss, A., Bronk Ramsey, C., Van Der Plicht, J., & Whittle, A. (2007). Bradshaw and bayes: Towards a timetable for the neolithic. *Cambridge Archaeological Journal*, *17*(SUPPL.1), 1–28. https://doi.org/10.1017/S0959774307000145

Bebber, M. R., Buchanan, B., & Holland-Lulewicz, J. (2022). Refining the chronology of North America's copper using traditions: A macroscalar approach via Bayesian modeling. *PLOS ONE*, *17*(4), e0266908. https://doi.org/10.1371/journal.pone.0266908

Beck, A. S. (2018). Revisiting the Trelleborg House: A Discussion of House Types and Assemblages. *Norwegian Archaeological Review*, *51*(1–2), 142–161. https://doi.org/10.1080/00293652.2018.1503324

Beinart, W. (2010). FYI workshop: Some comparative comments. *African Studies*, *69*(2), 219–227. https://doi.org/10.1080/00020184.2010.499198

Bennett, J. (2010). *Vibrant Matter: A Political Ecology of Things*. Duke University Press.

Berglund, A.-I. I. (1976). *Zulu thought-patterns and symbolism*. David Phillip.

Berry, P. (1978). Reproduction, growth and production in the mussel Perna perna (Linnaeus), on the east coast of South Africa. *Oceanographic Research Institute Investigational Report*, *48*, 1–28.

Berry, P., & Schleyer, M. (1983). The brown mussel Perna perna on the Natal coast, South Africa: utilization of available food and energy budget. *Marine Ecology Progress Series*, *13*, 201–210. https://doi.org/10.3354/meps013201

Bertacchini, F., Pantano, P. S., & Bilotta, E. (2024). From science to art forms: exploring design, creativity and innovation through chaos physicalization. *International Journal of Design Creativity and Innovation*, *12*(1), 23–60. https://doi.org/10.1080/21650349.2023.2285485

Beukes, C. F. (2000). *KwaGandaganda: An archaeozoological case study of the exploitation of animal resources during the Early Iron Age in KwaZulu-Natal* [Master's thesis], University of South Africa. UNISA, Institutional Repository.

Bigalke, E. H., & Voigt, E. A. (1973). The inter-disciplinary aspect of a study of shell-fish-exploitation by indigenous coastal communities. *Museums Association of Southern Africa*, 256–261.

Binford, L. R., & Sabloff, J. A. (1982). Paradigms, Systematics, and Archaeology. In *Source: Journal of Anthropological Research* (Vol. 38, Issue 2). https://www.jstor.org/stable/3629594

Birch, J., & Hart, J. P. (2018). Social networks and northern Iroquoian confederacy dynamics. *American Antiquity*, *83*(1), 13–33. https://doi.org/10.1017/aaq.2017.59

Birch, J., Manning, S. W., Sanft, S., & Conger, M. A. (2021). Refined Radiocarbon Chronologies for Northern Iroquoian Site Sequences: Implications for Coalescence,

Conflict, and the Reception of European Goods. *American Antiquity*, *86*(1), 61–89. https://doi.org/10.1017/aaq.2020.73

Bissell, D. (2007). Animating suspension: Waiting for mobilities. *Mobilities*, *2*(2), 277–298. https://doi.org/10.1080/17450100701381581

Biyela, N. G. (2015). Women and the Art of Speaking with the Beads: The Traditional ‘ Zulu Love Letter.*’*. *Journal of Sociology and Social Anthropology 6*(4), 469–473.

Blair, E. H. (2015). *Making Mission Communities: Population Aggregation, Social Networks, and Communities of Practice at 17th Century Mission Santa Catalina de Guale* [Doctoral Dissertation, University of California, Berkeley]. eScholarship. University of California

Bodin, Ö., & Crona, B. I. (2009). The role of social networks in natural resource governance: What relational patterns make a difference? In *Global Environmental Change* (Vol. 19, Issue 3, pp. 366–374). https://doi.org/10.1016/j.gloenvcha.2009.05.002

Bonner, P., Esterhuysen, A., Schoeman, M. H., Swanepoel, N., Wright, J. B., & Esterhuysen, A. (2008). Introduction. In N. Swanepoel, A. Esterhuysen, & P. Bonner (Eds.), *Five Hundred Years Rediscovered: Southern African Precedents and Prospects* (pp. 1–19). Wits University Press.

Boozer, A. L. (2015). The tyranny of typologies: Evidential reasoning in Romano-Egyptian domestic archaeology. In R. Chapman & A. Wylie (Eds.), *Material Evidence: Learning from the archaeological practice* (pp. 92–110). Routledge.

Boram-Hays, C. (2005). Borders of Beads: Questions of identity in the beadwork of the Zulu-Speaking people. *African Arts*, *Summer*(2005), 38–49.

Boram-Hays, C. (2018). Between the body and the ancestors: expressions of religious thought in the clothing of Zulu-speaking women in the Nongoma region of KwaZulu-Natal, South Africa. *Southern African Humanities*, *31*(September), 31–54.

Borck, L. (2018). Sophisticated Rebels: Meaning maps and settlement structure as evidence for a social movement in the Gallina Region of the North American Southwest. In *Life Beyond the Boundaries: Constructing Identity in Edge Regions of the North American Southwest* (pp. 88–121). University Press of Colorado. https://doi.org/10.5876/9781607326960.c004

Borck, L., Mills, B. J., Peeples, M. A., & Clark, J. J. (2015). Are Social Networks Survival Networks? An Example from the Late Pre-Hispanic US Southwest. *Journal of Archaeological Method and Theory*, *22*(1), 33–57. https://doi.org/10.1007/s10816-014-9236-5

Borgatti, S. P. (2005). Centrality and network flow. *Social Networks*, *27*(1), 55–71. https://doi.org/10.1016/j.socnet.2004.11.008

Borgatti, S. P., & Everett, M. G. (2006). A Graph-theoretic perspective on centrality. *Social Networks*, *28*(4), 466–484. https://doi.org/10.1016/j.socnet.2005.11.005

Borgatti, S. P., Everett, M., & Johnson, J. C. (2018). *Analyzing social networks* (Second Edition). Sage.

Borgatti, Stephen, P., Everett, Martin, G., & Johnson, Jeffrey, C. (2013). *Analyzing Social Networks*. SAGE Publications.

Bostoen, K. (2020). The Bantu Expansion. In *Language Dispersal, Diversification, and Contact* (pp. 227–239). https://doi.org/10.1093/oso/9780198723813.003.0013

Bostoen, K., Clist, B., Doumenge, C., Grollemund, R., Hombert, J. M., Muluwa, J. K., & Maley, J. (2015). Middle to late Holocene paleoclimatic change and the early Bantu expansion in

the rain forests of Western Central Africa. *Current Anthropology*, *56*(3), 354–384. https://doi.org/10.1086/681436

Bourdieu, P. (1977). Outline of a theory of practice. In *Outline of a theory of practice* (Vol. 2). Cambridge University Press. https://doi.org/10.1017/CBO9781107415324.004

Bowser, B. J. (2000). From Pottery to Politics : An Ethnoarchaeological Study of Political Factionalism , Ethnicity , and Domestic Pottery Style in the Ecuadorian Amazon. *Journal of Archaeological Method and Theory*, *7*(3), 219–248. https://doi.org/10.1023/A:1026510620824

Brainerd, G. W. (1942). Symmetry in Primitive Conventional Design. *American Antiquity*, *8*(2), 164–166.

Brandes, U., Robins, G., Anif, A. M., & Wasserman, S. (2013). What is network science? *Network Science*, *1*(1), 1–15. https://doi.org/10.1017/nws.2013.2

Braun, D. P. (1991). Why decorate a pot? Midwestern household pottery, 200 B.C.-A.D.600. *Journal of Anthropological Archaeology* (Vol. 10, Issue 4). https://doi.org/10.1016/0278-4165(91)90007-K

Brew. (1946). The use and abuse of taxonomy. In *Archaeology of Alkali Ridge, southeastern Utah, with a Review of the Prehistory of the Mesa Verde Division of the San Juan and Some Observations on Archaeological Systematics* (pp. 44–66).

Brittain, M., & Harris, O. (2010). Enchaining arguments and fragmenting assumptions: Reconsidering the fragmentation debate in archaeology. *World Archaeology*, *42*(4), 581–594. https://doi.org/10.1080/00438243.2010.518415

Brown, K. M. (2018). Crafting identity: Acquisition, production, use, and recycling of soapstone during the mission period in Alta California. In *American Antiquity* (Vol. 83, Issue 2, pp. 244–262). Cambridge University Press. https://doi.org/10.1017/aaq.2018.2

Brughmans, T. (2010). Connecting the dots: towards archaeological network analysis. *Oxford Journal of Archaeology*, *29*(3), 277–303. https://doi.org/10.1111/j.1468-0092.2010.00349.x

Brughmans, T., Collar, A., & Coward, F. (2016). Network Perspectives on the Past: Tackling the Challenges. In T. Brughmans, A. Collar, & F. Coward (Eds.), *The Connected Past Challenges to Network Studies in Archaeology and History* (pp. 3–20). Oxford University Press.

Brughmans, T., Keay, S., Earl, G., Keay, S., Earl, G., & Brughmans, T. (2015). Understanding Inter-settlement Visibility in Iron Age and Roman Southern Spain with Exponential Random Graph Models for Visibility Networks. *J Archaeol Method Theory*, *22*, 58–143. https://doi.org/10.1007/s10816-014-9231-x

Brughmans, T., Mills, B. J., Munson, J., & Peeples, M. A. (2024). Introduction. In T. Brughmans, B. J. Mills, J. Munson, & M. A. Peeples (Eds.), *The Oxford Handbook of Archaeological Network Research* (pp. 1–11). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198854265.001.0001

Brughmans, T., & Peeples, M. A. (2017). Trends in archaeological network research: a bibliometric analysis. *Journal of Historical Network Research*, *1*(2017), 1–24.

Brughmans, T., & Peeples, M. A. (2023). *Network Science in Archaeology*. Cambridge University Press. https://lccn.loc.gov/

Buchanan, B., Kilby, J. D., Labelle, J. M., Surovell, T. A., Holland-Lulewicz, J., & Hamilton, M. J. (2022). Bayesian Modeling of the Clovis and Folsom Radiocarbon Records Indicates a

200-Year Multigenerational Transition. *American Antiquity*. https://doi.org/10.1017/aaq.2021.153

Buck, C. E., Cavanagh, W. G., & Litton, C. D. (1996). Bayesian Approach to Interpreting Archaeological Data. In *Statistics in Practice*. John Wiley & Sons.

Bunzel, R. (1929). *The Pueblo potter*. Columbia University Press.

Burrett, R. S. (2007). The Garonga ceramic assemblage. *Southern African Humanities Journal*, *19*, 153–166.

Butler, A. A., & Sutcliffe, M. (1977). *Multidimensional Scaling analysis of Ntshekane ceramics.* Unpublished report. KwaZulu-Natal Museum

Butler, J. (2011). *Bodies That Matter: On the discursive limits of "sex."* Routledge.

Calabrese, J. A. (2000). Interregional Interaction in Southern Africa: Zhizo and Leopard's Kopje Relations in Northern South Africa, Southwestern Zimbabwe, and Eastern Botswana, AD 1000 to 1200. *African Archaeological Review*, *17*(4), 183–210. https://doi.org/10.1023/A:1006796925891

Calabrese, J. A. (2005). *Ethnicity, class, and polity: The emergence of social and political complexity in the Shashi-Limpopo valley of southern Africa, AD 900 to 1300* [Doctoral dissertation, University of the Witwatersrand].

Capone, P. W., & Preucel, R. W. (2002). Ceramic Semiotics: Women, Pottery, and Social Meanings at Kotyiti Pueblo. In R. W. Preucel (Ed.), *Archaeologies of the Pueblo Revolt: Identity, Meaning, and Renewal in the Pueblo World* (pp. 99–113). University of New Mexico Press.

Carlson, D. L. (1983). Computer analysis of dated ceramics: estimating dates and occupational ranges. *Southeastern Archaeology*, *2*(1), 8–20.

Carlson, M. (1996). *Performance: A critical introduction*. Routledge.

Carr, C. (1995). A unified middle-range theory of artifact design. In C. Carr & J. E. Neitzel (Eds.), *Style, society and person: archaeological and ethnological perspectives*. Plenum Publishing Corporation.

Carr, C., & Neitzel, J. E. J. E. (1995). Style, society and person: archaeological and ethnological perspectives. In *Interdisciplinary contributions to archaeology.* (Vol. 61, Issue 3). Plenum Publishing Corporation. https://doi.org/10.2307/281846

Carrington, P., & Scott, J. (2014). Introduction. In *The SAGE Handbook of Social Network Analysis* (pp. 1–8). SAGE Publications Ltd. https://doi.org/10.4135/9781446294413

Caton-Thompson, G. (1930a). Early Rhodesian gold. *Nature*, *1*, 163.

Caton-Thompson, G. (1930b). Recent Excavations at Zimbabwe and Other Ruins in Rhodesia. *Journal of the Royal African Society*, *29*(114), 132–138.

Caton-Thompson, G. (1931). The Zimbabwe Culture : Guesses and Facts . *Man*, *31*, 235.

Chahine, I., & Kinuthia, W. (2013). Juxtaposing Form, Function, and Social Symbolism: An ethnomathematical analysis of Indigenous Technologies in the Zulu Culture. *Journal of Mathematics & Culture*, *7*(1), 1–30. http://dx.doi.org/10.1016/j.cirp.2016.06.001%0Ahttp://dx.doi.org/10.1016/j.powtec.2016.12.055%0Ahttps://doi.org/10.1016/j.ijfatigue.2019.02.006%0Ahttps://doi.org/10.1016/j.matlet.2019.04.024%0Ahttps://doi.org/10.1016/j.matlet.2019.127252%0Ahttp://dx.doi.o

Chan, T. O., Xia, L., Chen, Y., Lang, W., Chen, T., Sun, Y., Wang, J., Li, Q., & Du, R. (2021). Symmetry analysis of oriental polygonal pagodas using 3D point clouds for cultural heritage. *Sensors (Switzerland)*, *21*(4), 1–20. https://doi.org/10.3390/s21041228

Chapman, J., & Gaydarska, B. (2007). *Parts and Wholes: Fragmentation in a Prehistoric Context*. Oxbow Books.

Chase, A. S. Z., Kamp-Whittaker, A., & Peeples, M. A. (2024). Archaeologies of people and space: Social network analysis of communities and neighborhoods in spatial context. *Journal of Anthropological Archaeology*, *75*. https://doi.org/10.1016/j.jaa.2024.101607

Chirikure, S., Fredriksen, P. D., & Manyanga, M. (2018). Adaptation, craftscapes and knowledge networks: introductory remarks on historical ecology and state formation in southern Africa. *Azania: Archaeological Research in Africa*, *53*(4), 425–438. https://doi.org/10.1080/0067270X.2018.1533696

Chirikure, S., & Nyamushosho, R. (2018). Elites and commoners at Great Zimbabwe: archaeological and ethnographic insights on social power. *Antiquity*, *92*(364), 1056–1075. https://doi.org/10.15184/aqy.2018.137

Chudasri, D., Sukantamala, N., & Mcintyre, G. J. (2023). Design research with the use of visual and symmetry analysis in indigenous woven textiles. *Journal of Applied Crystallography*, *56*, 81–94. https://doi.org/10.1107/S1600576722011153

Cipolla, C. N. (2008). Signs of identity, signs of memory. *Archaeological Dialogues*, *15*(2), 196–215. https://doi.org/10.1017/S1380203808002675

Cipolla, C. N. (2018). Earth Flows and Lively Stone. What Difference Does 'Vibrant' Matter Make? *Archaeological Dialogues*, *25*, 49–70.

Cipolla, C. N. (2019). Taming the Ontological Wolves: Learning from Iroquoian Effigy Objects. *American Anthropologist*, *121*, 613–627.

Cipolla, C. N. (2021). In search of different pasts. In R. J. Crellin, C. N. Cipolla, O. J. T. Harris, & S. V. Moore (Eds.), *Archaeological Theory in Dialogue: Situating Relationality, Ontology, Posthumanism, and Indigenous Paradigms* (pp. 151–167). Routledge.

Cipolla, C. N., Crellin, R. J., & Harris, O. J. T. (2024). *Archaeology for Today and Tomorrow*. Routledge.

Clark, J. J., & Gilman, P. A. (2012). Persistent and Permanent Pithouse Places in the Basin and Range Province of Southeastern Arizona. In L. C. Young & S. A. Herr (Eds.), *Southwestern Pithouse Communities AD 200-900* (pp. 61–77). University of Arizona Press.

Clist, B., de Maret, P., & Bostoen, K. (2018). Les débuts de la céramique, de la sédentarisation et de la métallurgie du fer. In B. Clist, P. de Maret, & K. Bostoen (Eds.), *Une Archéologie des Provinces Septentrionales du Royaume Kongo* (pp. 45–50). Archaeopress.

Clist, B., Hubau, W., Tshibamba, J. M., Beeckman, H., & Bostoen, K. (2019). The earliest iron-producing communities in the Lower Congo region of Central Africa: new insights from the Bu, Kindu and Mantsetsi sites. *Azania*, *54*(2), 221–244. https://doi.org/10.1080/0067270X.2019.1619282

Clist, B., Kaumba, M., Matonda, I., & Bostoen, K. (2019). Kitala Ware: A New Early Iron Age Pottery Group from the Lower Congo Region in Central Africa. *African Archaeological Review*, *36*(4), 455–477. https://doi.org/10.1007/s10437-019-09356-8

Cobley, P., & Jansz, L. (1999). *Introducing semiotics*. Icon Books.

Collar, A., Coward, F., Brughmans, T., & Mills, B. J. (2015). Networks in Archaeology: Phenomena, Abstraction, Representation. *Journal of Archaeological Method and Theory* (Vol. 22, Issue 1). https://doi.org/10.1007/s10816-014-9235-6

Collingwood, R. G. (1927). Oswald Spengler and the Theory of Historical Cycles. *Antiquity*, *1*(3), 311–325. https://doi.org/10.1017/S0003598X00000685

Colton, H. S., & Hargrave, L. L. (1937). *Handbook of Northern Arizona Pottery Wares*. Museum of Northern Arizona Bulletin No. 11.

Conkey, M. W. (1990). Experimenting with style in archaeology: some historical and theoretical issues. In M. W. Conkey & C. A. Hastorf (Eds.), *The uses of style in archaeology* (pp. 5–17). Cambridge University Press

Conkey, M. W., & Hastorf, C. A. (1990). Introduction. In M. W. Conkey & C. A. Hastorf (Eds.), *The uses of style in archaeology* (pp. 1–4). Cambridge University Press.

Connerton, P. (1989). *How societies remember*. Cambridge University Press.

Coole, D., & Frost, S. (2010). Introduction to New Materialisms. In D. Coole & S. Frost (Eds.), *New Materialisms Ontology, Agency, and Politics* (pp. 1–43). Duke University Press.

Coutu, A., Whitelaw, G., le Roux, P., & Sealy, J. (2016). Earliest Evidence for the Ivory Trade in Southern Africa: Isotopic and ZooMS Analysis of Seventh–Tenth Century ad Ivory from KwaZulu-Natal. *African Archaeological Review*, *33*(4), 411–435. https://doi.org/10.1007/s10437-016-9232-0

Cowgill, G. L. (1990). Why Pearson's r is Not a Good Similarity Coefficient for Comparing Collections. In *American Antiquity* (Vol. 55, Issue 3). https://about.jstor.org/terms

Peirce, C.S. (1988). *Writings of Charles S. Peirce: A Chronological Edition. Vol. 4: 1879–1884*. Indiana University Press.

Crabtree, S., & Lewis, B. (2019). Social Networks for Archaeological Research. In *Encyclopedia of Global Archaeology* (pp. 9870–9881). Springer International Publishing.

Crellin, R. J. (2020a). Change and Archaeology. In *Change and archaeology*. Routledge.

Crellin, R. J., Cipolla, C. N., Montgomery, L. M., Harris, O. J. T., & Morre, S. V. (2021). *Archaeological Theory in Dialogue: Situating relationality, ontology, posthumanism, and indigenous paradigms*. Routledge.

Crellin, R. J., & Harris, O. J. T. (2021). What Difference Does Posthumanism Make? *Cambridge Archaeological Journal*, *31*(3), 469–475. https://doi.org/10.1017/S0959774321000159

Cromwell, P. R. (2021, July 29). Looking at Islamic Patterns I: The Perception of Order. https://doi.org/10.31234/osf.io/qhg3f

Cronin, M. (1982). Radiocarbon dates for the Early Iron Age in Transkei. *South African Journal of Science 78(1): 38-39*, *78*(1), 38–39.

Crossland, Z. (2009). Of clues and signs: The dead body and its evidential traces. *American Anthropologist*, *111*(1), 69–80. https://doi.org/10.1111/j.1548-1433.2009.01078.x

Crossland, Z. (2013). Signs of Mission: Material Semeiosis and Nineteenth-Century Tswana Architecture. *Signs and Society*, *1*(1), 79–113. https://doi.org/10.1086/670168

Crossland, Z. (2021). "Contextual archaeology" revisited: reflections on archaeology, assemblages and semiotics. In J. Boyd & R. C. Doonan (Eds.), *Far From Equilibrium: An Archaeology of Energy, Life and Humanity: A Response to the Archaeology of John C. Barrett* (pp. 85–102). Oxbow Books. https://www.ebsco.com/terms-of-use

Crossland, Z., & Bauer, A. A. (2017). Im/materialities: things and signs. *Semiotic Review*, *4*, 1–18. https://semioticreview.com/ojs/index.php/sr/article/view/9

Crowe, D. W. (2001). Symmetries of Culture. Bridges: Mathematical Connections in Art, Music, and Science,1–20.

Crowe, D. W. (2004). Introduction to the plane symmetries. In D. K. Washburn & D. W. Crowe (Eds.), *Symmetry comes of age: The role of Pattern in Culture* (pp. 3–17). University of Washington Press.

Crowe, D. W., & Washburn, D. K. (1985). Groups and geometry in the ceramic art of San Ildefonso. *Algebras, Groups and Geometries*, *3*(July), 263–277.

Crowe, D. W., & Washburn, D. K. (1987). Flowchart as an aid to the symmetry classification of patterned design. In R. G. Reynolds & M. A. Stott (Eds.), *Material Anthropology: Contemporary approaches to material culture* (pp. 69–101). University Press of America.

Crowe, J. A. (2007). In search of a happy medium: How the structure of interorganizational networks influence community economic development strategies. *Soc Networks*, *29*(4), 469–488. https://doi.org/10.1016/j.socnet.2007.02.002

Crown, P. L. (2014). The archaeology of crafts learning: Becoming a potter in the Puebloan Southwest. *Annual Review of Anthropology*, *43*, 71–88.

Crown, P. L. (2016). Secrecy, Production Rights, and Practice Within Communities of Potters in the Prehispanic American Southwest. In A. P. Roddick & A. B. Stahl (Eds.), *Knowledge in Motion: Constellations of Learning Across Time and Place* (pp. 67–96). University of Arizona Press. https://doi.org/10.4324/9781315821894

Cunnar, G., Schindler, W., Underhill, A., Luan, F., & Fang, H. (2009). Hunting with Talc? *Ethnoarchaeology*, *1*(2), 185–212. https://doi.org/10.1179/eth.2009.1.2.185

Curtis, F. (1962). The Utility Pottery Industry of Bailén, Southern Spain. In *Source: American Anthropologist* (Vol. 64, Issue 3).

D'Andrade, R. G. (1984). Cultural Meaning Systems. In R. A. Shweder & R. A. LeVine (Eds.), *Culture Theory: Essays on Mind, Self and Emotion* (pp. 88–127). Cambridge University Press.

Daniel, G. (1950). *A hundred years of archaeology*. Gerald Duckworth & Co.Ltd.

Dart, R. A., & Beaumont, P. B. (1969). Iron Age Radiocarbon Dates from Western Swaziland. *The South African Archaeological Bullet*, *24*(94), 71.

Daubney, A. J. (2016). *Portable Antiquities, Palimpsests, and Persistent Places: A multi-period approach to portable antiquities scheme data in Lincolnshire.* Sidestone Press.

David, N. (1972). On the Life Span of Pottery, Type Frequencies, and Archaeological Inference. *American Antiquity*, *37*(1), 141–142. http://www.jstor.org/stable/278897

David, N. (1992a). Integrating ethnoarchaeology: A subtle realist perspective. *Journal of Anthropological Archaeology*, *11*(4), 330–359. https://doi.org/10.1016/0278-4165(92)90012-Z

David, N. (1992b). The archaeology of ideology: mortuary practices in the central Mandara highlands, northern Cameroon. In *An African commitment: papers in honour of Peter Lewis Shinnie* (pp. 181–210).

David, N., Gavua, K., MacEachern, S., & Sterner, J. (1991). Ethnicity and material culture in North Cameroon. *Canadian Journal of Archaeology*, *15*(Martin 1970), 171–177.

David, N., Sterner, J., & Gavua, K. (1988). *Why Pots are Decorated*. *29*(3), 365–389. https://www.jstor.org/stable/2743453

Davies, M. (2010). A view from the east: An interdisciplinary "Historical Ecology" approach to a contemporary agricultural landscape in Northwest Kenya. *African Studies*, *69*(2), 2779–297. https://doi.org/10.1080/00020184.2010.499202

Davies, O. (1971). Excavations at Blackburn. *South African Archaeological Bulletin*, *26*(130/104), 165–178.

Dawson, H. (2020). Networks in Archaeology: An Introduction. *Journal of Ancient Studies*, *7(2020)*, 77–86. https://doi.org/10.17169/refubium-28211

De Villiers, S. (2005). *The hydrochemistry of rivers in KwaZulu-Natal*. http://www.wrc.org.za

DeBoer, W. R. (1975). The ontogeny of Shipibo art: variations on a cross. *74th Annual Meeting of the American Anthropological Association*.

Deetz, J. (1965). *The Dynamics of Stylistic Change in Arikara Ceramics*. University of Illinois Press.

DeLanda, M. (2000). *A Thousand Years of Non-linear History*. Zone Books.

DeLanda, M. (2002). *Intensive Science and Virtual Philosophy*. Contnuum.

DeLanda, M. (2006). *A New Philosophy of Society: Assemblage Theory and Social Complexity*. Continuum.

DeLanda, M. (2016). *Assemblage Theory. Speculative Realism*. Edinburgh University Press.

Deleuze, G. (1988). *Spinoza: Practical Philosophy*. City Lights Books.

Deleuze, G. (1991). *Bergsonism*. Zone Books.

Deleuze, G. (2004). *Difference and Repetition*. Bloomsbury.

Deleuze, G. (2007). *Two Regimes of Madness: Texts and Interviews, 1975-1995*. Semiotext(e).

Deleuze, G., & Guatarri, F. (2004). *A Thousand Plateaus: Capitalism and Schizophrenia*. Continuum.

Delius, P., & Schoeman, M. H. (2008). Revisiting Bokoni: populating the stone ruins of the Mpumalanga Escarpment. In N. Swanepoel, A. Esterhuysen, & P. Bonner (Eds.), *Five*

Hundred Years Rediscovered: Southern African Precedents and Prospects (pp. 135–167). Wits University Press.

Delius, P., & Schoeman, M. (2010a). Introduction. *African Studies*, *69*(2), 207–212. https://doi.org/10.1080/00020184.2010.499194

Delius, P., & Schoeman, M. H. (2010b). Reading the rocks and reviewing red herrings. *African Studies*, *69*(2), 235–254. https://doi.org/10.1080/00020184.2010.499200

Denbow, J. R. (1981). Broadhurst: A 14th Century A.D. Expression of the Early Iron Age in South-Eastern Botswana. *The South African Archaeological Bulletin*, *36*(134), 66–74. https://about.jstor.org/terms

Denbow, J. R. (1982). The Toutswe Tradition: A study in socio-economic change. In R. R. Hitchcock & M. R. Smith (Eds.), *Settlement in Botswana* (pp. 73–86). Heinneman.

Denbow, J. R. (1986). A new look at the later prehistory of the Kalahari. *Journal of African History*, *27*(1), 3–29. https://doi.org/10.1017/S0021853700029170

Derricourt, R. M. (1972). Ware analysis of ceramic assemblages. *The South African Archaeological Bulletin*, *27*(107), 144–149.

Derricourt, R. M. (1977). *Prehistoric Man in the Ciskei & Transkei*. C. Struik.

Derrida, J. (1982). Signature, event, context. In J. Derrida (Ed.), *The margins of philosophy* (pp. 307–330). Harvester Press.

Derrida, Jacques. (1988). *Limited Inc*. Northwestern University Press.

Desmond Clark, J. (1962). The Spread of Food Production in Sub-Saharan Africa. *The Journal of African History*, *3*(2), 211–228.

Desmond Clark, J. (1965). Changing trends and developing values in African prehistory. *African Affairs: Special Number*, *64*(1965), 76–98.

Desmond Clark, J. (1970). *The Prehistory of Africa*. Praeger.

Desmond Clark, J. (1974). *The Kalambo Falls Prehistoric Site, I*. Cambridge University Press.

Desmond Clark, J., & Fagan, B. (1965). Charcoals, sands, and Channel decorated pottery from Northern Rhodesia. *American Anthropologist*, *67*(2), 354–371.

Dewsbury, J. D. (2011). The Deleuze-Guattarian assemblage: Plastic habits. *Area*, *43*(2), 148–153. https://doi.org/10.1111/j.1475-4762.2011.01006.x

Díaz-Guardamino, M., García-Sanjuán, L., Wheatley, D., Lozano-Rodríguez, J. A., Rogerio-Candelera, M. Á., & Casado-Ariza, M. (2020). Late Prehistoric Stelae, Persistent Places and Connected Worlds: A Multi-disciplinary Review of the Evidence at Almargen (Lands of Antequera, Spain). *Cambridge Archaeological Journal* (Vol. 30, Issue 1, pp. 69–96). Cambridge University Press. https://doi.org/10.1017/S0959774319000490

Dietler, M., & Herbich, I. (1994a). Ceramics and ethnic identity: ethnoarchaeological observations on the distribution of pottery styles and the relationship between the social contexts of production and consumption. In D. Binder & F. Audouze (Eds.), *Terre cuite et société: la céramique, document technique, économique, culturel* (Issue 12, pp. 459–472). Éditions APDCA.

Dietler, M., & Herbich, I. (1994b). Habitus et reproduction sociale des techniques: l'intelligence du style en archéologie et en ethno-archéologie. In B. Latour & P. Lemonnier (Eds.), *De la préhistoire aux missiles balistiques: l'intelligence sociale des techniques* (pp. 202–227). Éditions La Découverte.

Dietler, M., & Herbich, I. (1998). Habitus, techniques, style: an integrated approach to the social understanding of material culture and boundaries. In M. T. Stark (Ed.), *The Archaeology of Social Boundaries* (pp. 232–269). Smithsonian Institution Press.

Dietler, M., & Herbich, I. (2008). The long arm of the mother-in law: Learning, Postmarital resocialization of women, and. In *Cultural Transmission and Material Culture: Breaking Down Boundaries* (pp. 221–244). http://www.economist.com/node/9725749

Donnay, J. D. H., & Donnay, G. (1985). Symmetry and Antisymmetry in Maori Rafter Designs. *Empirical Studies of the Arts*, *3*(1), 23–45. https://doi.org/10.2190/GKRH-MXP2-3BN1-F6VP

Donnellan, L. (2020). Archaeological networks and social interaction. In L. Donnellan (Ed.), *Routledge studies in archaeology*. Routledge. https://doi.org/10.4324/9781351003063-1

Due, R. (2002). *Deleuze*. Polity.

Dunnell, R. C. (1971). *Systematics in Prehistory*.Free Press. https://doi.org/10.2307/279449

Dziedzic, E. M. (2019). Reading Between the Lines: a Symmetry Analysis of Late Intermediate Period Chiribaya Mortuary Ceramics From the Osmore Drainage,. *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699.

Eco, U. (1984). Horns, Hooves and Insteps: Some hypotheses on three types of abduction. In U. Eco & T. A. Sebeok (Eds.), *The sign of three: Dupin, Holmes, Peirce* (pp. 198–220). Indiana University Press.

Edwards, D. (1967). *A plant Ecology Survey of the Tugela River Basin, Natal* (Vol. 10, Issue 36).

Eggert, M. K. (2005). The Bantu Problem and African archaeology. In A. B. Stahl (Ed.), *African Archaeology: A Critical Introduction* (pp. 301–326). Blackwell.

Etherington, N. (2010). Historians, archaeologists and the legacy of the discredited short Iron-Age chronology. *African Studies*, *69*(2), 261–375. https://doi.org/10.1080/00020184.2010.499206

Evers, T. M. (1973). Iron Age Research in the Eastern Transvaal, South Africa, 1971. *Current Anthropology*, *14*(4), 485–487.

Evers, T. M. (1974). Iron Age Trade in the Eastern Transvaal, South Africa. *The South African Archaeological Bulletin*, *29*(113/114), 33–37.

Evers, T. M. (1975). Recent Iron Age Research in the Eastern Transvaal, South Africa. *The South African Archaeological Bulletin*, *30*(119/120), 71–83. https://doi.org/10.2307/3888096

Evers, T. M. (1977). Plaston Early Iron Age site, White River district, eastern Transvaal, South Africa. *The South African Archaeological Bulletin*, *32*(126), 170–178. http://www.jstor.org/stable/10.2307/3888664

Evers, T. M. (1979). Salt and Soapstone Bowl Factories at Harmony , Letaba District , Northeast Transvaal. *Goodwin Series*, *3*, 94–107.

Evers, T. M. (1980). Klingbeil Early Iron Age Sites, Lydenburg, East Transvaal, South Africa. *The South African Archaeological Bulletin*, *35*(131), 46–57.

Evers, T. M. (1988). *The Regocnition of Groups in the Iron Age of Southern Africa* [Doctoral dissertation, University of the Witwatersrand].

Evers, T. M., Voigt, E. A., & de Villiers, H. (1982). Excavations at the Lydenburg Heads Site, Eastern Transvaal, South Africa. *The South African Archaeological Bulletin*, *37*(135), 16. https://doi.org/10.2307/3888577

Fagan, B. (1963). The Kalomo/Choma Iron Age project (1960-1963): Preliminary report. *South African Archaeological Bulletin*, *18*, 3–19.

Fagan, B. (1966). The Iron Age of Zambia. *Current Anthropology*, *7*(4), 453–462.

Fagan, B. (1967). *Iron Age cultures in Zambia: Vol. Vol. 1*. Chatto and Windus.

Faris, J. (1972). Nuba personal art. In *Art and society series*.

Feely, J. M. (1980). Did Iron Age man have a role in the history of Zululand's wilderness landscape? *South African Journal of Science*, *76*(April), 150–152.

Feely, J. M. (1987). *The early farmers of Transkei, Southern Africa before A.D. 1870*. British Archaeological Reports.

Field, W., & Mills, B. J. (2013). Indentity communities and memory practices: Relational logics in the US Southwest. In C. Watts (Ed.), *Relational Archaeologies: Humans, animals, things*.

Filipowicz, P. (2017). Semiotics in Action: Neolithic Imagery on the Move. In *Framing Archaeology in the Near East:The Application of Social Theory to Fieldwork* (pp. 51–62).

Ford, J. (1954). The Type concept Revisited. *American Anthropologist*, *56*(1), 42–57.

Ford, J. (1952). *Measurements of Some Prehistoric Design Developments in the Southeastern States*. Anthropological Papers of the American Museum of Natural History.

Forni, S. (2007). Containers of Life Pottery and Social Relations in the Grassfields (Cameroon). *African Arts*, *Spring*, 42–53.

Forni, S. (2013). Masters, trend-makers and producers. The village of Nsei as a multisited pottery workshop. In T. Förster & S. L. Kasfir (Eds.), *African Art and Agency in the Workshop* (pp. 91–110). Indiana University Press.

Forni, S. (2016). Masks on the Move: Defying Genres, Styles, and Traditions in the Cameroonian Grassfields. *African Arts*, 38–3. https://www.jstor.org/stable/24720739

Forni, S. (2018). Of Patterns and Markets: The Making and Unmaking of Asafo Flags. *Critical Interventions*, *12*(1), 22–35. https://doi.org/10.1080/19301944.2018.1421806

Fouche, L. (1937). *Mapungubwe: Ancient Bantu civilization on the Limpopo*. Cambridge University Press.

Fowler, C. (2017). Relational typologies, assemblage theory and early bronze age burials. *Cambridge Archaeological Journal*, *27*(1), 95–109. https://doi.org/10.1017/S0959774316000615

Fowler, K. (2002). Early Iron Age community organization in southern Africa: Social and symbolic dimensions of ceramic production, use and discard at Ndondondwane [Doctoral Dissertation, University of Alberta].

Fowler, K. (2006). Classification and collapse: the ethnohistory of Zulu ceramic use, South Africa. *Southern African Humanities*, *18*(2), 93–117.

Fowler, K. (2008a). Social memory and the antiquity of snake and crocodile symbolism in Southern Africa. In S. Badenhorst, P. Mitchell, & J. Driver (Eds.), *Animals and people: Archaeozoological papers in honour of Ina Plug* (Issue 1849, pp. 169–185). Archaeopress.

Fowler, K. (2008b). Zulu pottery production in the Lower Thukela Basin, KwaZulu-Natal, South Africa. *Southern African Humanities*, *20*, 477–511.

Fowler, K. (2009). Materialising gender: pottery style, costume, and bodily adornment amongst the Zulu of South Africa. In S. Terendy, N. Lyons, & M. Janse-Smekal (Eds.), *Que(e)rying archaeology: Proceedings of the Thirty-Seventh Annual Chacmool conference, University of Calgary* (Issue May, pp. 136–144). Chacmool Archaeology Association, The University of Calgary.

Fowler, K. (2011a). Ceramic discard and the use of space at Early Iron Age Ndondondwane, South Africa. *Journal of Field Archaeology*, *36*(2), 151–166. https://doi.org/10.1179/009346911X12991472411286

Fowler, K. (2011b). The Zulu ceramic tradition in Msinga, South Africa. *Southern African Humanities*, *23*(September), 173–202.

Fowler, K. (2014). Ceramic production in Swaziland. *Anthropos*, *109* (January 2014), 411–428.

Fowler, K. (2015a). Zulu pottery technology and group identity in the Phongolo Basin, South Africa. *Southern African Humanities*, *27*, 81–111.

Fowler, K. (2017, March 12). The Zulu way: Confronting the ethnographic reality of pottery style, technology, and communities of practice. *Earth to Fire: Pottery Technologies Around the World*.

Fowler, K., Fayek, M., & Middleton, E. (2011). Clay acquisition and processing strategies during the first millennium A.D. in the Thukela River basin, South Africa: An ethnoarchaeological approach. *Geoarchaeology*, *26*(5), 762–785. https://doi.org/10.1002/gea.20372

Fowler, K., Middleton, E., & Fayek, M. (2017). The human element: discerning the effects of potter's behavior on the chemical composition of ceramics. *Archaeological and Anthropological Sciences*. https://doi.org/10.1007/s12520-017-0535-0

Fowler, K., & Greenfield, H. (2009). Unravelling settlement history at Ndondondwane, South Africa: a microchronological analysis. *Southern African Humanities*, *21*, 345–393.

Fowler, K., Greenfield, H., & van Schalkwyk, L. (2000). The identification and signficance of ceramic ecofacts from Ndondondwane, South Africa. *Southern African Field Archaeology*, *9*, 32–42.

Fowler, K., Greenfield, H., & van Schalkwyk, L. (2004). The effects of burrowing activity on archaeological sites: Ndondondwane, South Africa. *Geoarchaeology*, *19*(5), 441–470. https://doi.org/10.1002/gea.20005

Fowler, K., Sandred, Ö., & Whiteway, A. (2017). Acoustic perceptions of vessel fitness in southern Africa. *Journal of Material Culture*, *22*(3), 261–280. https://doi.org/10.1177/1359183517701301

Fowler, K., Yang, P., & Halden, N. (2020). The provisioning of nineteenth century Zulu capitals, South Africa: Insights from strontium isotope analysis of cattle remains. *Journal of Archaeological Science: Reports*, *31*. https://doi.org/10.1016/j.jasrep.2020.102306

Fread, E. (2007). Taphonomy and subsistence strategies at Ndondondwane: A zooarchaeological perspective on an Early Iron Age Village in the Thukela Valley, Republic of South Africa [Master's thesis, University of Manitoba]

Fredriksen, P. D. (2007). Approaching intimacy: interpretations of changes in Moloko household space. *South African Archaeological Bulletin*, *62*(186), 126–139.

Fredriksen, P. D. (2009). Material Knowledges, Thermodynamic Spaces and the Moloko Sequence of the Late Iron Age (AD 1300-1840) in Southern Africa. In L. Smith & T. Insoll (Eds.), *Cambridge Monographs in Archaeology* (Issue 80). University of Bergen.

Fredriksen, P. D. (2011). When knowledges meet: Engagements with clay and soil in Southern Africa. *Journal of Social Archaeology*, *11*(3), 283–310. https://doi.org/10.1177/1469605311403852

Fredriksen, P. D. (2015). What kind of science is archaeology? Iron Age studies in southern Africa. In S. Wynne-Jones & J. B. Fleisher (Eds.), *Theory in Africa, Africa in Theory: Locating meaning in archaeology* (Vol. 19, Issue 2, pp. 156–172). Routledge. https://doi.org/10.5840/newscholas19451928

Fredriksen, P. D. (2020). Relocated: potting and translocality in terminal Iron Age towns and beyond. In C. Wingfield, J. Giblin, & R. King (Eds.), *The pasts and presence of art in South*

Africa: Technologies, ontologies and agents (pp. 41–50). McDonald Institute for Archaeological Research University of Cambridge.

Fredriksen, P. D. (2023a). Ceramic Ethnoarchaeology in Africa: Status and Scope. In *Oxford Research Encyclopedia of Anthropology*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190854584.013.67

Fredriksen, P. D. (2023b). Ceramics and Archaeology in Southern Africa. In *Oxford Research Encyclopedia of African History*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190277734.013.811

Fredriksen, P. D., & Bandama, F. (2016). The mobility of memory: space/knowledge dynamics in rural potting workshops in Limpopo Province, South Africa. *Azania*, *51*(4), 489–506. https://doi.org/10.1080/0067270X.2016.1220056

Fredriksen, P. D., & Chirikure, S. (2015). Beyond Static Models: An Evaluation of Present Status and Future Prospects for Iron Age Research in Southern Africa. *Cambridge Archaeological Journal*, *25*(03), 597–614. https://doi.org/10.1017/S0959774314001115

Fredriksen, P. D., & Lindahl, A. (2023). Making in turbulent times: new insights into late 18 th- and early 19 th-century ceramic crafts and connectivity in the Magaliesberg region. *Southern African Humanities*, *36*, 89–124.

Friedrich, P. (1970). *Proto-Indo-European Trees: The Arboreal System of a Prehistoric People*. Univeristy of Chicago Press.

Fulminante, F., Prignano, L., Morer, I., & Lozano, S. (2017). Coordinated Decisions and Unbalanced Power. How Latin Cities Shaped Their Terrestrial Transportation Network. *Frontiers in Digital Humanities*, *4*. https://doi.org/10.3389/FDIGH.2017.00004

Galmés-Alba, A., & Calvo-Trias, M. (2022). Connecting Architectures across the Landscape: A Visibility and Network Analysis in the Island of Mallorca during the Late Bronze Age and Early Iron Age. *Cambridge Archaeological Journal*. https://doi.org/10.1017/S0959774321000627

Gamble, C. (1998). Palaeolithic Society and the Release from Proximity: A Network Approach to Intimate Relations. *World Archaeology*, *29*(3), 426–449.

Gamble, L. H. (2017). Feasting, Ritual Practices, Social Memory, and Persistent Places: New Interpretations of Shell Mounds in Southern California. *American Antiquity*, *82*(3), 427–451. https://doi.org/10.1017/aaq.2017.5

Garlake, P. S. (1978). Pastoralism and Zimbabwe. *Journal of African History*, *19*(04), 479–494. https://doi.org/10.1017/S0021853700016431

Garlake, P. S. (1982). *Great Zimbabwe Described and Explained*. Zimbabwe Publishing House.

Garrett, I. (1997). Nesta Nala: Ceramics 1985-1995 [Master's thesis, University of KwaZulu-Natal].

Geertz, C. (1973). Religion As a Cultural System. *The Interpretation of Cultures: Selected Essays by Clifford Geertz*, *4*, 87–125.

Gifford, J. C. (1960). The Type-Variety Method of Ceramic Classification as an Indicator of Cultural Phenomena. *American Antiquity*, *25*(3), 341–347.

Girvan, M., & Newman, M. E. J. (2002). Community structure in social and biological networks. *PNAS*, *99*(12), 7821–7826.

Giustetto, R., Berruto, G., Diana, E., & Costa, E. (2013). Decorated prehistoric pottery from Castello di Annone (Piedmont, Italy): Archaeometric study and pilot comparison with

coeval analogous finds. *Journal of Archaeological Science*, *40*(12), 4249–4263. https://doi.org/10.1016/j.jas.2013.06.012

Gleiser, P. M., & Danon, L. (2003). Community Structure in Jazz. *Advances in Complex Systems,* 6(04), 565-573

Gokee, C. (2015). Shapen Signs: Pottery Techniques, Indexicality, and Ethnic Identity in the Saalum, Senegambia (ca. 1700–1950). In F. G. Richard & K. C. MacDonald (Eds.), *Ethnic Ambiguity and the African Past* (pp. 55–86). Left Coast Press.

Golitko, M., & Feinman, G. M. (2015). Procurement and Distribution of Pre-Hispanic Mesoamerican Obsidian 900 BC-AD 1520: a Social Network Analysis. *Journal of Archaeological Method and Theory*, *22*, 206–247. https://doi.org/10.1007/s10816-014-9211-1

Goodblatt, C., & Glicksohn, J. (2022). The gestalts of mind and text. In *The Gestalts of Mind and Text*. Taylor and Francis. https://doi.org/10.4324/9780429329531

Gosden, C. (2004). Making and display: our aesthetic appreciation of things and objects. In C. Renfrew, C. Gosden, & E. DeMarrais (Eds.), *Substance, memory, Display: Archaeology and Art* (pp. 35–46). McDonald Institute for Archaeological Research University of Cambridge.

Gosselain, O. P. (1992). Technology and style: potters and pottery among Bafia of Cameroon. *Man*, *27*(3), 559–586. https://doi.org/10.2307/2803929

Gosselain, O. P. (1998a). A potful of stories: comparative ethnography, archaeological inference and the African potter. *63rd Annual Meeting, Society for American Archaeology*.

Gosselain, O. P. (1998b). Social and technical identity in a clay crystal ball. In M. Stark (Ed.), *The archaeology of social boundaries* (pp. 78–106). Smithsonian Institution.

Gosselain, O. P. (2000a). Materializing Identities : An African Perspective. *Journal of Archaeological Method and Theory*, *7*(3), 187–217. https://doi.org/10.1023/A

Gosselain, O. P. (2008). Mother Bella was not a Bella: Inherited and transformed traditions in southwestern Niger. In M. T. Stark, B. J. Bowser, & L. Horne (Eds.), *Cultural transmission and material culture: Breaking down boundaries* (pp. 151–177). The University of Arizona Press.

Gosselain, O. P. (2010). Ethnographie comparée des trousses à outils de potiers au sud du Niger. *Bulletin de La Société Préhistorique Française*, *107*(4), 667–689. https://doi.org/10.3406/bspf.2010.13972

Gosselain, O. P. (2011a). Fine if I Do, Fine if I Don't. Dynamics of Technical Knowledge in Sub-Saharan Africa. In B. W. Roberts & M. Vander Linden (Eds.), *Investigating Archaeological Cultures: Material Culture, Variability, and Transmission* (pp. 211–227). Springer: New York. https://doi.org/10.1007/978-1-4419-6970-5_11

Gosselain, O. P. (2011b). Why decorate? Some observations on the ceramic decorations in Africa. *Azania*, *46*(1), 3–19. https://doi.org/10.1080/0067270X.2011.553356

Gosselain, O. P. (2016). The World is like a beanstalk: Historicizing potting practices and social relations in the Niger River Area. In A. P. Roddick & A. B. Stahl (Eds.), *Knowledge in Motion: Constellations of Learning Across Time and Place* (pp. 36–66). University of Arizona Press. https://doi.org/10.4324/9781315821894

Gosselain, O. P. (2017). A tradition in nine maps. Un-layering Niger River polychrome water jars. In *Balkan Dialogues. Negotiating Identity Between Prehistory and the Present.* https://doi.org/10.4324/9781315673875

Gosselain, O. P. (2018). Pottery chaînes opératoires as historical documents. In *Oxford Research Encyclopedia of African History* (Issue December, pp. 1–41). https://doi.org/10.1093/acrefore/9780190277734.013.208

Gosselain, O. P., & Livingstone Smith, A. (2013). A Century of ceramic studies in Africa. In P. J. Mitchell & P. Lane (Eds.), *The Oxford Handbook of African Archaeology* (pp. 117–130). Oxford University Press.

Govier, E., & Steel, L. (2021). Beyond the 'thingification' of worlds: Archaeology and the New Materialisms. *Journal of Material Culture*, *26*(3), 298–317. https://doi.org/10.1177/13591835211025559

Graham, S. (2006). Networks, Agent-Based Models and the Antonine Itineraries: Implications for Roman Archaeology. *Journal of Mediterranean Archaeology*, *19.1(2006)*, 4564.

Greenfield, H. (1996). Report on activities during the summer of 1995. *University of Manitoba Newsletter*, *6*(2 (Winter1996), 9–11.

Greenfield, H. (1997). Research report on activities during the summer of 1996. *University of Manitoba Newsletter*, *7*(2 (Winter 1997), 11–12.

Greenfield, H. (1998). 1998 preliminary report on the 1997 summer field season at Ndondondwane. *University of Manitoba Newsletter*, *9*(1 (Fall 1998), 6–8.

Greenfield, H. (1999). Summary of the 1998-1999 University of Manitoba research on the Early Iron Age site of Ndondondwane. *University of Manitoba Newsletter*, *10*(1 (Fall 1999).

Greenfield, H., Fowler, K., & van Schalkwyk, L. (2005). Where are the gardens? Early Iron Age horticulture in the Thukela River Basin of South Africa. *World Archaeology*, *37*(2), 307–328. https://doi.org/10.1080/00438240500095496

Greenfield, H., & Miller, D. (2004). Spatial patterning of Early Iron Age metal production at Ndondondwane, South Africa: A question of cultural continuity between the Early and Late Iron Ages. *Journal of Archaeological Science*, *31*, 1511–1532. https://doi.org/10.1016/j.jas.2004.03.014

Greenfield, H., & van Schalkwyk, L. (2003). Intra-settlement social and economic organization of Early Iron Age farming communities in southern Africa: A view from Ndondondwane. *Azania*, *38*, 123–137.

Greenfield, H., & Schalkwyk, L. (2006). Spatial models of intra settlement spatial organization in the EIA of Southern Africa: A view from Ndondondwane on the Central Cattle Pattern. In C. Robertson, Elizabeth, D. Seibert, Jeffrey, D. Farnandez, & Marc. U. Zender (Eds.), *Space and Spatial analysis in archaeology* (pp. 61–68). University of Calgary Press.

Greenfield, H., & van Schalkwyk, L. (2008). Early Iron Age Regional Settlement and Demographic Patterns along the Eastern Seaboard of South Africa: A View from the Lower Thukela River Valley. In S. Badenhorst, P. J. Mitchell, & J. C. Driver (Eds.), *Animals and People Archaeozoological Papers in Honour of Ina Plug* (Vol. 26, Issue 1, pp. 73–74). Archaeopress. https://doi.org/10.1007/s10437-009-9048-2

Greenfield, H., van Schalkwyk, L., & Jongsma, T. (1997a). Ndondondwane: preliminary report on the 1995 survey and excavations. *Nyame Akuma*, *47*(June), 42–52.

Greenfield, H., van Schalkwyk, L., & Jongsma, T. (1997b). Preliminary Results of the 1995 Research at the Early Iron Age Site of Ndondondwane, KwaZulu-Natal, …. *Nyame Akuma*.

Greenfield, H., van Schalkwyk, L., & Jongsma, T. (2000). Surface and subsurface reconnaissance at Ndondondwane: Preliminary results of the 1995-97 Field Seasons. *Southern African Field Archaeology*, *9*, 5–16.

Griffiths, S. (2017). We're all cultural historians now: revolutions in understanding archaeological theory and scientific dating. *Radiocarbon*, *59*(6), 1347–1357.

Grody, E. (2016). Of Buffalo and Butchers: Coupling Traditional Procurement Studies with Taphonomic Analyses to Explore Intensive Wild Animal Processing Patterns at Two Early Iron Age Sites in the Kruger National Park. *African Archaeological Review*, 1–25. https://doi.org/10.1007/s10437-016-9236-9

Grossert, J. W. (1978). *Zulu crafts*. Shuter & Shooter.

Guy, J. (1979). *Destruction of the Zulu Kingdom: The Civil War in Zululand, 1879–1884.* (3rd ed.). University of Natal Press.

Hall, M. (1980). Enkwazini, an Iron Age site on the Zululand coast. *Annals of the Natal Museum*, *24*(1), 97–109. http://usir.salford.ac.uk/7496/

Hall, M. (1981). Settlement Patterns in the Iron Age of Zululand: An ecological Interpretation. In *British Archaeological Research International Series* (BAR Intern, Vol. 119). Cambridge Monographs in African Archaeology.

Hall, M. (1983). Tribes, traditions and numbers: the American model in southern African Iron Age ceramic studies. *The South African Archaeological Bulletin*, *38*(138), 51–57.

Hall, M. (1984a). Pots and politics: ceramic interpretations in southern Africa. *World Archaeology*, *15*(3), 264–273.

Hall, M. (1984b). The Burden of Tribalism: The Social Context of Southern African Iron Age Studies. *American Antiquity*, *49*(3), 455–467.

Hall, M. (1984c). The myth of the Zulu homestead: archaeology and ethnography. *Africa*, *54*(1), 65–79.

Hall, M. (1990a). *Farmers, kings and traders: the people of Southern Africa, 200-1860*. University of Chicago Press.

Hall, M. (1990b). 'Hidden history': Iron Age archaeology in southern Africa. In *A history of African archaeology* (pp. 59–77).

Hall, M. (2002). Timeless time: Africa and the world. In B. Cunliffe, W. Davies, & C. Renfrew (Eds.), *Archaeology: The widening debate* (pp. 439–464). Oxford University Press.

Hall, M. (2008). The Burden of Tribalism: The Social Context of Southern African Iron Age Studies. In Tim. Murray & Christopher. Evans (Eds.), *Histories of Archaeology : A Reader in the History of Archaeology* (pp. 72–92). Oxford University Press. http://ebookcentral.proquest.com/lib/uwinnipeg/deta

Hall, M., & Maggs, T. (1979). Nqabeni, a Later Iron Age site in Zululand. *Goodwin Series*, *3*, 159–176.

Hall, M., & Vogel, J. C. (1980). Some recent radiocarbon dates from southern Africa. *Journal of African History*, *21*(4), 431–455. https://doi.org/10.1017/S0021853700018673

Hall, R. N. (1905). *Great Zimbabwe*. Methuen.

Hall, R. N. (1909). *Prehistoric Rhodesia*. Unwin.

Hall, R. N., & Neal, W. G. (1902). *The Ancient Ruins of Rhodesia*. Methuen.

Hall, S. (1998). A consideration of gender relations in the Late Iron Age "Sotho" sequence of the Western Highveld, South Africa. In S. Kent (Ed.), *Gender in African prehistory* (pp. 235–258). AltaMira Press.

Hall, S. (2009). Farming communities of the second millennium: Internal frontiers, identity, continuity and change. In *The Cambridge History of South Africa: Volume 1 from Early*

Times to 1885 (pp. 112–167). Cambridge University Press. https://doi.org/10.1017/CHOL9780521517942.004

Hall, S. (2012). Identity and political centralisation in the western regions of highveld, c.1770-c.1830: An archaeological perspective. In *Journal of Southern African Studies* (Vol. 38, Issue 2, pp. 301–318). https://doi.org/10.1080/03057070.2012.682839

Hamilton, C. (1982). The Study of Southern African Precolonial History: "Bantustan Propaganda"? *Reality*, *May*, 6–9. https://www.researchgate.net/publication/344449869

Hammond-Tooke, W. D. (2000). "Ethnicity" and "ethnic group" in Iron Age southern Africa. *Southern African Journal of Science*, *96*(August), 421–422.

Hardin Friedrich, M. (1970). Design Structure and Social Integration: Archaeology Implications of an Ethnographic Analysis. *American Antiquity*, *35*(3), 332–343. https://doi.org/10.2307/278343

Hardin, M. A. (1977). Individual style in San Jose pottery painting: the role of deliberate choice. In J. N. Hill & J. Gunn (Eds.), *The individual in prehistory* (pp. 109–136). Academic Press.

Hardin, M. A. (1979). The cognitive basis of productivity in a decorative art style: implications of an ethnographic study for archaeologists' taxonomies. In C. Kramer (Ed.), *Ethnoarchaeology: implications of ethnography for archaeology* (pp. 75–101). Columbia University Press.

Hardin, M. A. (1983a). Applying linguistic models to the decorative arts: A preliminary consideration of the limits of analogy. *Semiotica*, *46*(2–4), 309–322. https://doi.org/10.1515/semi.1983.46.2-4.309

Hardin, M. A. (1983b). The structure of Tarascan pottery painting. In D. K. Washburn (Ed.), *Structure and cognition in art* (pp. 8–24). Cambridge University Press.

Hardin, M. A. (1984). Models of decoration. In S. E. van der Leeuw & C. Pritchard, Alison (Eds.), *The many dimensions of pottery: ceramics in archaeology and anthropology* (pp. 573–607). University of Amsterdam.

Hardin, M.A. (1991). Sources of ceramic variability at Zuni Pueblo. In *Ethnoarchaeology*.

Harris, O. J. T. (2009). Making places matter in Early Neolithic Dorset. *Oxford Journal of Archaeology*, *28*(2), 111–123. https://doi.org/10.1111/j.1468-0092.2009.00321.x

Harris, O. J. T. (2010). Emotional and Mnemonic Geographies at Hambledon Hill: Texturing Neolithic Places with Bodies and Bones. *Cambridge Archaeological Journal*, *20*(3), 357–371. https://doi.org/10.1017/S0959774310000466

Harris, O. J. T. (2012). Relational communities in Prehistoric Britain. In C. Watts (Ed.), *Relational archaeologies*. Routledge.

Harris, O. J. T. (2016). Becoming Post-Human: Identity and the Ontological Turn. In L. Campbell (Ed.), *Creating Material Worlds: The Uses of Identity in Archaeology* (pp. 17–37). Oxbow.

Harris, O. J. T. (2017). Assemblages and scale in archaeology. *Cambridge Archaeological Journal*, *27*(1), 127–139. https://doi.org/10.1017/S0959774316000597

Harris, O. J. T. (2018a). More than representation: Multiscalar assemblages and the Deleuzian challenge to archaeology. *History of the Human Sciences*, *31*(3), 83–104. https://doi.org/10.1177/0952695117752016

Harris, O. J. T. (2018b). Towards Virtual Typologies. *Norwegian Archaeological Review*, *51*(1–2), 162–165. https://doi.org/10.1080/00293652.2018.1531917

Harris, O. J. T. (2020). Commentary: The City and The City. In S. M. Alt & T. R. Pauketat (Eds.), *New Materialisms: New Urbanisims* (pp. 245–259). Routledge.

Harris, O. J. T. (2021a). *Assembling Past Worlds: Materials, Bodies and Architecture in Neolithic Britain*. Taylor & Francis.

Harris, O. J. T. (2021b). What do we mean by relational anyway? In R. J. Crellin, C. N. Cipolla, L. M. Montgomery, O. J. T. Harris, & S. V. Moore (Eds.), *Archaeological Theory in Dialogue: Situating relationality, ontology, posthumanism, and indigenous paradigms*. Taylor & Francis.

Harris, O. J. T., & Cipolla, C. N. (2017). *Archaeological theory in the new millennium: Introducing current perspectives*. Routledge.

Harrison-Buck, E. (2018). Relational Matters of Being: Personhood and Agency in Archaeology. In *Relational Identities and Other-than-Human Agency in Archaeology* (pp. 263–282). University Press of Colorado. https://doi.org/10.5876/9781607327479.c011

Harrison-Buck, E., & Hendon, J. A. (2018). An Introduction to Relational Personhood and Other-than-Human Agency in Archaeology. In *Relational Identities and Other-than-Human Agency in Archaeology* (pp. 3–28). University Press of Colorado. https://doi.org/10.5876/9781607327479.c001

Harrison-Buck, E., & Pugh, T. W. (2020). Boundary things in the eastern Maya lowlands: negotiating allied relations from terminal classic to postclassic times. *Ancient Mesoamerica*, *31*(3), 507–525. https://doi.org/10.1017/S0956536120000334

Hart, J. P. (2012). The effects of geographical distances on pottery assemblage similarities: A case study from Northern Iroquoia. *Journal of Archaeological Science*, *39*(1), 128–134. https://doi.org/10.1016/j.jas.2011.09.010

Hart, J. P., Birch, J., & St-Pierre, C. G. (2017). Effects of population dispersal on regional signaling networks: An example from northern Iroquoia. *Science Advances*, *3*(8), e1700497–e1700497. https://doi.org/10.1126/sciadv.1700497

Hart, J. P., & Engelbrecht, W. (2012). Northern Iroquoian Ethnic Evolution: A Social Network Analysis. *Journal of Archaeological Method and Theory*, *19*(2), 322–349. https://doi.org/10.1007/s10816-011-9116-1

Hart, J. P., Shafie, T., Birch, J., Dermarkar, S., & Williamson, R. F. (2016). Nation Building and Social Signaling in Southern Ontario: A.D. 1350-1650. *PLoS ONE*, *11*(5). https://doi.org/10.1371/journal.pone.0156178

Hasaki, E. (2012). Craft apprenticeship in ancient Greece: Reaching beyond the masters. In W. Wendrich (Ed.), *Archaeology and Apprenticeship: Body knowledge, identity, and communities of practice* (pp. 171–202). The University of Arizona Press.

Hegmon, M. (1992). Archaeological Research on Style. *Annual Review of Anthropology*, *21*(1), 517–536. https://doi.org/10.1146/annurev.anthro.21.1.517

Hegmon, M. (1998). Technology, style, and social practices: archaeological approaches. In M. T. Stark (Ed.), *The Archaeology of Social Boundaries* (pp. 264–279). Smithsonian Institution Press.

Hegmon, M., Freeman, J., Kintigh, K. W., Nelson, M. C., Oas, S., Peeples, M. A., & Torvinen, A. (2016). Marking and Making Differences: Representational Diversity in the U.S. Southwest. *American Antiquity*, *81*(2), 253–272. https://doi.org/10.7183/0002-7316.81.2.253

Hegmon, M., & Peeples, M. A. (2018). The human experience of social transformation: Insights from comparative archaeology. *PLoS ONE*, *13*(11). https://doi.org/10.1371/journal.pone.0208060

Hegmon, M., Russell, W. G., Baller, K., Peeples, M. A., & Striker, S. (2021). The Social Significance of Mimbres Painted Pottery in the U.S. Southwest. *American Antiquity*, *86*(1), 23–42. https://doi.org/10.1017/aaq.2020.63

Herbert, R. K., & Huffman, T. N. (1993). Linguistic and Archaeological Evidence Fifty Years after Doke. *African Studies*, *52*(2), 53–76. https://doi.org/10.1080/00020189308707778

Herbich, I., & Dietler, M. (1994). Space, time and symbolic structure in the Luo homestead: an ethnoarchaeological study of "settlement biography" in Africa. In *Proceedings of the 12th International Congress of the International Union of Pre- and Protohistoric Sciences*.

Hill, N. J., & Hill, J. N. (1970). Broken K Pueblo: Prehistoric Social Organization in the American Southwest. In *Anthropological Papers of the University of Arizona* (Vol. 18). University of Arizona Anthropological Papers, 18. https://doi.org/10.1525/aa.1975.77.2.02a01150

Hill, N. James., & Evans, R. (1972). A model for classification and typology. In Metheun (Ed.), *Models in archaeology* (pp. 231–273).

Hobsbawm, E., & Ranger, T. (1983). *The Inventions of Traditions* (E. Hobsbawm & T. Ranger, Eds.). Cambridge University Press.

Hodder, I. (1982). Symbols in Action. Ethnoarchaeological studies of material culture. In *Symbols in Action. Ethnoarchaeological studies of material culture*. https://doi.org/10.1017/CBO9781107415324.004

Hodder, I. (1990). Style as historical quality. *The Uses of Style in Archaeology*, 44–51. http://www.nyu.edu/classes/bkg/objects/hodder.pdf

Hodder, I. (1992). Material practice, symbolism and social reality. *Theoretical Archaeology Conference*.

Hodder, I. (1995). Symbolic and cognitive studies in archaeology. *Semiotica*, *107*.

Hodder, I. (2024). *Entangled: A New Archaeology of the Relationships between Humans and Things* (Second Edition). Wiley Blackwell.

Hodder, I., & Lucas, G. (2017). The symmetries and asymmetries of human-thing relations. A dialogue. *Archaeological Dialogues*, *24*(2), 119–137. https://doi.org/10.1017/S1380203817000137

Hodder, I., & Mol, A. (2016). Network Analysis and Entanglement. *Journal of Archaeological Method and Theory*, *23*(4), 1066–1094. https://doi.org/10.1007/s10816-015-9259-6

Hofman, C. L., Borck, L., Laffoon, J. E., Slayton, E. R., Scott, R. B., Breukel, T. W., Guzzo Falci, C., Favre, M., & Hoogland, M. L. P. (2021). Island networks: Transformations of inter-community social relationships in the Lesser Antilles at the advent of European colonialism. *Journal of Island and Coastal Archaeology*, *16*(2–4), 290–316. https://doi.org/10.1080/15564894.2020.1748770

Holland-Lulewicz, J. (2021). From Categories to Connections in the Archaeology of Eastern North America. *Journal of Archaeological Research*, *29*(4), 537–579. https://doi.org/10.1007/s10814-020-09154-w

Holland-Lulewicz, J. (2023). The Heterogeneity of Social Network and Institutional Covariance in the American Southeast. *American Antiquity*. https://doi.org/10.1017/aaq.2023.52

Holland-Lulewicz, J., & Roberts Thompson, A. D. (2021). Incomplete Histories and Hidden Lives: The Case for Social Network Analysis in Historical Archaeology. *International Journal of Historical Archaeology*. https://doi.org/10.1007/s10761-021-00638-z

Horwitz, L., Maggs, T., & Ward, V. (1991). Two shell middens as indicators of shellfish exploitation patterns during the first millennium AD on the Natal north coast. *Natal Museum Journal of Humanities*, *3*(October 1991), 1–28.

House, A., Bamford, M., Greenfield, H., & van Schalkwyk, L. (2023). Furnaces, hearths, rituals, and construction: investigating the utilisation of woody plant species at the Early Iron Age site of Ndondondwane by means of identifying archaeological charcoal. *Archaeological and Anthropological Sciences*, *15*(9), 130. https://doi.org/10.1007/s12520-023-01825-1

House, A., & Bamford, M. K. (2019). Investigating the utilisation of woody plant species at an Early Iron Age site in KwaZulu-Natal, South Africa, by means of identifying archaeological charcoal. *Archaeological and Anthropological Sciences*, *11*(12), 6737–6750. https://doi.org/10.1007/s12520-019-00939-9

Houser, N. (1998). *Selected Philosophical Writings (1893-1913)* the P. E. Project, A. De Tienne, J. R. Eller, A. C. Lewis, C. L. Clark, & D. B. Davis, Eds.). Indiana University Press. http://www.jstor.org/stable/j.ctt16gz4vr

Huffman, T. N. (1970). The Early Iron Age and the spread of Bantu. *Southern African Archaeology Bulletin*, *25*(97), 3–21.

Huffman, T. N. (1974). *The Leopard's Kopje Tradition* (Vol. 6). Memoirs of the National Museum of Rhodesia.

Huffman, T. N. (1978a). The Iron Age of the Buhwa District, Rhodesia. *The National Museums and Monuments of Rhodesia*, *4*(3), 81–100.

Huffman, T. N. (1978b). The origins of Leopard's Kopje: an 11th century Difaquane. *Arnoldia*, *8*(23), 1–23.

Huffman, T. N. (1979a). African origins. *Southern African Journal of Science*, *75*, 233–237.

Huffman, T. N. (1979b). Test Excavations at Naba and Lanlory, Northern Mashonaland. *Goodwin Series*, *3*, 14–46.

Huffman, T. N. (1980). Ceramics Classification and Iron Age Entities. *African Studies*, *29*(2), 123–174. https://doi.org/10.1080/00020188008707556

Huffman, T. N. (1982). Archaeology and ethnohistory of the African Iron Age. *Annual Review of Anthropology*, *11*(1982), 133–150. http://www.jstor.org/stable/2155778

Huffman, T. N. (1986). Archaeological evidence and conventional explanations of Southern Bantu settlement patterns. *Africa*, *56*, 280–298.

Huffman, T. N. (1989a). Ceramics, settlements and Late Iron Age migrations. *The African Archaeological Review*, *7*(1989), 155–182. https://doi.org/10.1007/BF01116842

Huffman, T. N. (1989b). *Iron Age migrations. The ceramic sequence in southern Zambia: excavations at Gundu and Ndondonde*. Witwatersrand University Press.

Huffman, T. N. (1990). Broederstroom and the origins of cattle-Keeping in southern africa. *African Studies*, *49*(2), 1–12. https://doi.org/10.1080/00020189008707724

Huffman, T. N. (1993). Broederstroom and the central cattle pattern. *South African Journal of Science*, *89*(5), 220–226.

Huffman, T. N. (1994). Toteng pottery and the origins of Bambata. *Southern African Field Archaeology*, *3*, 3–9. https://www.researchgate.net/publication/303134497

Huffman, T. N. (1998). Presidential Address: The Antiquity of Lobola. *The South African Archaeological Bulletin*, *53*(168), 57–62.

Huffman, T. N. (2001). The Central Cattle Pattern and interpreting the past. *Southern African Humanities Journal*, *13*(1), 19–35.

Huffman, T. N. (2002). Regionality in the Iron Age: the case of the Sotho-Tswana. *Southern African Humanities*, *14*, 1–22.

Huffman, T. N. (2004). The archaeology of the Nguni past. *Southern African Humanities*, *16*, 79–111.

Huffman, T. N. (2006). Bantu migrations in southern Africa. In H. Soodyall (Ed.), *The Prehistory of Africa*. Jonathan Ball Publishers.

Huffman, T. N. (2007). *A handbook to the Iron Age: The archaeology of pre-colonial farming societies in southern Africa*. University of KwaZulu-Natal Press.

Huffman, T. N. (2012). Debating the 500 Year Initiative: History, anthropology or both? *South African Archaeological Bulletin*, *67*(196), 231.

Huffman, T. N. (2019). Ethnoarchaeological fieldwork in Zimbabwe: people, pots, structures and scientific mementoes. *Southern African Humanities*, *32*, 217–274.

Huffman, T. N. (2021). Bambata pottery and Western Bantu: re-interpreting the Early Iron Age in southern Africa. In *Southern African Humanities* (Vol. 34).

Huffman, T. N. (2022). Harare burial pottery in North-East Zimbabwe. *South African Archaeological Bulletin*, *77*(216), 17–30.

Huffman, T. N., & Herbert, R. K. (1994). New Perspectives on Eastern Bantu. *Azania: Archaeological Research in Africa*, *29–30*(1), 27–36. https://doi.org/10.1080/00672709409511659

Huffman, T. N., & Whitelaw, G. (2019). Ntshekane and the Central Cattle Pattern Reconstructing settlement history. In D. S. Whitley, J. H. N. Loubser, & G. Whitelaw

(Eds.), *Cognitive Archaeology Mind, Ethnography, and the Past in South Africa and Beyond* (pp. 135–151). Routledge.

Huffman, T. N., Whitelaw, G., Tarduno, J., Watkeys, M., & Woodborne, S. (2020). The Rhino Early Iron Age site, Thabazimbi, South Africa. *Azania*, *55*(3), 360–388. https://doi.org/10.1080/0067270X.2020.1792196

Ingold, T. (2010). The textility of making. *Cambridge Journal of Economics*, *34*(1), 91–102. https://doi.org/10.1093/cje/bep042

Ingold, T. (2011). *Being Alive; Essays on Movement, Knowledge and Description*.

Ingold, T., & Hallam, E. (2007). Creativity and Cultural Improvisation: An Introduction. In E. Hallam & T. Ingold (Eds.), *Creativity and Cultural Improvisation* (pp. 1–24). Routledge.

Inskeep, R., & Maggs, T. (1975). Unique Art Objects in the Iron Age of the Transvaal. *Southern African Archaeological Bulletin*, *30*, 114–138.

Inskeep, R. R. (1961a). Editorial. *South African Archaeological Bulletin*, *17*, 119–121.

Inskeep, R. R. (1961b). Editorial Notes and News. *The South African Archaeological Bulletin*, *16*(64), 119–121.

Inskeep, R. R. (1961c). The present state of archaeology in South Africa. *The Present State of Archaeology in South Africa*, *7*, 225–229.

Inskeep, R. R. (1962a). Editorial Notes. *The South African Archaeological Bulletin*, *17*(66), 85–86. https://about.jstor.org/terms

Inskeep, R. R. (1962b). Recent developments in Iron Age studies in Northern Rhodesia and Nyasaland. *Annales Du Musee Royal de i'Afrique Centrale, Science Humaine*, *40*(III).

Inskeep, R. R. (1962c). Some Iron Age Sites in Northern Rhodesia. *The South African Archaeological Bulletin*, *17*(67), 136–180.

Inskeep, R. R. (1971). South Africa. In P. L. Shinnie (Ed.), *The African Iron Age* (pp. 245–273). Clarendon.

Inskeep, R. R., & Maggs, T. (1975). Unique Art Objects in the Iron Age of the Transvaal, South Africa. *The South African Archaeological Bulletin*, *30*(119/120), 114–138.

Jervis, B. (2019). *Assemblage thought and archaeology*. Routledge.

Jolles, F. (1994). *Messages in fixed colour sequences? Another look at Msinga Beadwork*.

Jolles, F. (1997). Zulu Earplugs: A Study in Transformation. *African Arts*, *30*(2), 46. https://doi.org/10.2307/3337421

Jolles, F. (2001). Tradition and innovation: woodcarvers at the confluence of the Umzinyathi and Umngeni rivers, KwaZulu-Natal, South Africa. *Southern African Humanities*, *13*, 97–124.

Jolles, F. (2004). Continuity and change in Zulu beadwork conventions: the interaction of color and pattern. In D. K. Washburn & D. W. Crowe (Eds.), *Symmetry comes of age* (pp. 100–134). University of Washington Press.

Jolles, F. (2005). The origins of the twentieth century Zulu beer vessel styles. *Southern African Humanities*, *17*(June 2002), 101–151.

Jolles, F. (2006). Negotiating relationships: village to city, beadwork to SMS. *Southern Afrian Humanities*, *18*(2), 119–138.

Jolles, F. (2012). Zulu ceramics in transition: Siphiwe MaS'Khakhane Nala and her daughter Nesta Landeleni Nala. *Southern African Humanities*, 25, 1-25

Jones, A.M. (2007). *Memory and material culture*. Cambridge University Press.

Jones, A. M. (2012). *Prehistoric Materialities: Becoming Material in Prehistoric Britain and Ireland*. Oxford University Press.

Jones, M. B., Kapumha, R., Chirikure, S., & Marshall, F. (2023). Hunting and the Social Lives of Southern Africa's First Farmers. *Journal of Archaeological Research*. https://doi.org/10.1007/s10814-023-09194-y

Jones, S. (1997). The archaeology of ethnicity: constructing identities in the past and the present. In *SAAarchaeologicalrecord*. Routledge. https://doi.org/10.2307/506583

Jordaan, G.F. (2016). *An archaeological study of two Early Farming sites in the southern Kruger National Park , South Africa* [Master's thesis, University of Pretoria].

Joyce, R. A. (2007). Figurines, Meaning and Meaning-making in early Mesoamerica. In C. Renfrew & I. Morley (Eds.), *Material Beginnings: A Global Prehistory of Figurative Representation* (pp. 101–110). McDonald Institute for Archaeological Research.

Kaiser, T. (1989). Steatite Tempered Pottery from Selevac, Yugoslavia: A Neolithic Experiment in Ceramic Design. *Archeomaterials* (Vol. 3, Issue I), 1-10.

Kamp-Whittaker, A. (2021). Diaspora and Social Networks in a World War II Japanese American Incarceration Center. *International Journal of Historical Archaeology*, *25*(3), 828–850. https://doi.org/10.1007/s10761-020-00573-5

Keane, W. (2003). Semiotics and the social analysis of material things. *Language and Communication*, *23*(3–4), 409–425. https://doi.org/10.1016/S0271-5309(03)00010-7

Kennedy, C. G. (1993). *Art, Architecture and Material Culture of the Zulu Kingdom* [Doctoral dissertation, University of California, Los Angeles]. ProQuest Dissertation & Thesis.

Kierkegaard, S. (1963). *Either/Or* (D. Swenson & L. Swenson, Trans.). Princeton University Press.

Kim, J., Wright, D. K., Hwang, J., Kim, J., & Oh, Y. (2019). The old wood effect revisited: a comparison of radiocarbon dates of wood charcoal and short-lived taxa from Korea.

Archaeological and Anthropological Sciences, *11*(7), 3435–3448. https://doi.org/10.1007/s12520-018-0766-8

King, G. B., & Chubb, E. C. (1932). Remarks on some stone implements and strandloper middens of Natal and Zululand. Part II. *South African Journal of Science*, *29*, 768–769.

Kintigh, K. W., & Peeples, M. A. (2020). Estimating population growth rates and instantaneous population from periodized settlement data. *Journal of Computer Applications in Archaeology*, *3*(1), 197–209. https://doi.org/10.5334/jcaa.58

Kirakosian, K. (2015). Mapping the Social Worlds of Shell Midden Archaeology in Massachusetts. *Bulletin of the History of Archaeology*, *25*(2), 6. https://doi.org/10.5334/bha.260

Klapwijk, M. (1973). An Early Iron Age site near Tzaneen, N. E. Transvaal. *South African Journal of Science*, *29*, 19–23.

Klapwijk, M. (1974). A Preliminary Report on Pottery from the North-Eastern Transvaal, South Africa. *The South African Archaeological Bulletin*, *29*(113/114), 19–23.

Klapwijk, M., & Huffman, T. N. (1996). Excavations at Silver Leaves: A Final Report. *The South African Archaeological Bulletin*, *51*(164), 84. https://doi.org/10.2307/3888843

Kluckhohn, C. (1940). The conceptual structure in Middle American studies. In C. L. Hay, R. Linton, S. Lathrap, & H. Shapiro (Eds.), *The Maya and their neighbors* (pp. 41–51). Appleton-Century Company.

Knappett, C. (2002). Photograps, skeumorphs and marionettes: Some Thoughts on Mind, Agency and Object. *Journal of Material Culture*, *7*(1), 97–117.

Knappett, C. (2011). *An archaeology of interaction: Network Perspectives on Material Culture& Society*.

Knappett, C. (2013). *Network Analysis in Archaeology: New Approaches to Regional Interaction*. *March 2014*, 1–17. https://doi.org/10.1093/acprof

Knappett, C. (2020a). *Aegean Bronze Age Art" meaning in the Making*. Cambridge University Press.

Knappett, C. (2020b). Relational concepts and challenges to network analysis in social archaeology. In L. Donnellan (Ed.), *Archaeological Networks and Social Interaction* (pp. 20–38). Routledge.

Knappett, C. (2021). Networks in Archaeology. In R. Light & J. Moddy (Eds.), *The Oxford handbook of social networks* (pp. 1–26). Oxford University Press.

Kopytoff, I. (1989). The internal African frontier: the making of African political structure. In I. Kopytoff (Ed.), *The African Frontier: The Reproduction of Traditional African Societies* (pp. 3–84). Indiana University Press.

Kosiba, S. (2019). New Digs: Networks, Assemblages, and the Dissolution of Binary Categories in Anthropological Archaeology. *American Anthropologist*, *121*(2), 447–463. https://doi.org/10.1111/aman.13261

Krause, R. A. (1978). Toward a formal account of Bantu ceramic manufacture. In R. A. Dunnell & E. S. Hall (Eds.), *Archaeological essays in honor of Irving B. Rouse* (pp. 87–120). The Hague.

Krause, R. A. (1984). Modeling the making of pots: an ethnoarchaeological approach. In S. E. van der Leeuw & A. C. Pritchard (Eds.), *Many Dimensions of Pottery: Ceramics in Archaeology and Anthropology* (pp. 171–197). Universiteit van Amsterdam. Albert Egges Van Giffen Instituut voor Prae-en Protohistorie, Cingvla VII.

Krause, R. A. (1985). *The Clay Sleeps: An Ethnoarchaeological Study of Three African Potters*. University of Alabama Press. https://doi.org/10.2307/281073

Krause, R. A. (1990). Ceramic practice and semantic space: an ethnoarchaeological inquiry into the logic of Bantu potting. *Antiqutiy*, *64*(245), 711–726. https://doi.org/10.1017/S0003598X00078820

Kunkhet, A., & Chudasri, D. (2022). Developing Design Approaches for Tile Pattern Designs Inspired by Traditional Textile Patterns. *Processes*, *10*(12). https://doi.org/10.3390/pr10122744

Kuper, A. (1972). The Language of Sites in the Politics of Space. *American Anthropologist*, *74*, 411–425.

Kuper, A. (1980). Symbolic dimensions of the southern Bantu homestead. *Africa*, *50*(1), 8–23.

Kuper, A. (1982). *Wives for Cattle*. Routledge and Kegan Paul.

Labi, K. A. (2023). Enjoy the Dance and Look for the Flag Meaning: Asafo Flag Dancers' Choreography of Concealing and Revealing. *Ghana Studies*, *25*(1), 134–143. https://doi.org/10.3368/gs.25.1.134

Lane, P. (1994). The Use and Abuse of Ethnography in the Study of the Southern African Iron Age. *Azania: Archaeological Research in Africa*, *29–30*(1), 51–64. https://doi.org/10.1080/00672709409511661

Lane, P. (1998). Engendered spaces and bodily practices in the Iron Age of Southern Africa. *Gender in African Prehistory*, *Chapter 10*, 179–203.

Lane, P. (2010a). Review: Conversations between archaeologists and historians on South Africa. *Journal of African History*, 251–253. https://doi.org/doi:10.1017/S0021853710000307

Lane, P. (2010b). Developing landscape historical ecologies in eastern africa: An outline of current research and potential future directions. *African Studies*, *69*(2), 299–322. https://doi.org/10.1080/00020184.2010.499203

Lane, P. (2011). Possibilities for a postcolonial archaeology in sub-Saharan Africa: Indigenous and usable pasts. *World Archaeology*, *43*(1), 7–25. https://doi.org/10.1080/00438243.2011.544886

Leach, E. (1991). *Culture and Communication: The Logic by which Symbols Are Connected. An Introduction to the Use of Structuralist Analysis in Social Anthropology*. University of Cambridge.

Leakey, M. D., Owen, W. E., & Leakey, L. S. B. (1948). *Dimple-based Pottery from Central Kavirondo, Kenya Colony* (Vol. 2). Coryndon Memorial Mueseum Occasional Papers.

Lee, B. (1997). *Talking Heads: Language, Metalanguage and the Semiotics of Subjectivity.* Duke University Press.

Lele, V. P. (2006). Material habits, identity, semeiotic. *Journal of Social Archaeology*, *6*(1), 48–70. https://doi.org/10.1177/1469605306060561

Lemonnier, P. (1986). The study of material culture today: toward an anthropology of technical systems. *Journal of Anthropological Archaeology*, *5*(2), 147–186.

Lemonnier, P. (1993). Technological choices : transformation in material cultures since the neolithic. In *Material cultures*. http://helka.linneanet.fi/cgi-bin/Pwebrecon.cgi?BBID=556987

Leroi-Gourhan, A. (1993). Gesture and speech. In *Translated by: Anna Bostock Berger*. MIT Press.

Livingston Smith, A., Gosselain, O. P., Mayor, A., & Guéye, N. S. (2015). Modern roulettes in sub-Saharan Africa. In A. C. Haour, K. M. Manning, N. Arazi, O. P. Gosselain, N. S. Guèye, D. Keita, A. Livingston Smith, K. MacDonald, A. Mayor, S. McIntosh, & R. Vernet (Eds.), *African pottery roulettes past and present: Techniques, identification and distribution* (pp. 37–114). Oxbow Books.

Logan, A. L., & Stahl, A. B. (2017). Genealogies of Practice in and of the Environment in Banda, Ghana. *Journal of Archaeological Method and Theory*, 24, 1356-1399 https://doi.org/10.1007/s10816-017-9315-5

Longacre, W. A. (1968). Some aspects of prehistoric society in East-Central Arizona. In L. R. Binford & S. Binford (Eds.), *New Perspectives in Archaeology* (pp. 89–102). Aldine.

Longacre, W. A. (1970). Archaeology as Anthropology: A Case Study. In *Anthropological Papers of the University of Arizona, 17*. Anthropological Papers of the University of Arizona, 17.

Loubser, J. (1984). Excavations at Ndondondwane on the Tugela River. *Natal Museum Journal of Humanities*, 5, 109-151.

Loubser, J. (1989). Archaeology and early Venda history. *Goodwin Series*, *6*, 54–61.

Loubser, J. (1991). The Ethnoarchaeology of Venda-speakers in Southern Africa. In *Navorsing van die Nasionale Museum Bloemfontein* (Vol. 7, Issue 8). National Museum.

Loubser, J. (1993). Ndondondwane: the significance of features and finds from a ninth-century site on the lower Thukela River, Natal. *Natal Musuem Journal of Humanities*, *5*, 109–151.

Loubser, J. (1994). Ndebele archaeology of the Pietersburg area. *Navorsinge van Die Nasionale Museum, Bloemfontein*, *10*(2), 61–147.

Loxley, J. (2000). *Performativity*. Routledge

Lucas, G. (2012). *Understanding the Archaeological Record*. Cambridge University Press.

Lucas, G. (2021). *Making Time; The Archaeology of Time Revisited*. Routledge. https://doi.org/10.4324/9781003089445

Lucy, S. (2005). Ethnic and cultural identities. In M. Diaz-Andreu, S. Lucy, S. Babic, & D. N. Edwards (Eds.), *The archaeology of Identity: approaches to gender, age, status, ethnicity and religion* (pp. 86–109).

Lulewicz, J. (2018a). *Networks histories of Southern Appalachia, AD 600-1600* [PhD Dissertation]. University of Georgia.

Lulewicz, J. (2018b). Radiocarbon Data, Bayesian Modeling, and Alternative Historical Frameworks. *Advances in Archaeological Practice*, *6*(1), 58–71.

Lulewicz, J. (2019). A Bayesian approach to regional ceramic seriation and political history in the Southern Appalachian region (Northern Georgia) of the Southeastern United States. *Journal of Archaeological Science*, *105*, 1–10. https://doi.org/10.1016/j.jas.2019.02.005

MacEachern, S. (1992). Ethnicity and stylistic variation around Mayo Plata, northern Cameroon. In J. A. Sterner & N. David (Eds.), *An African commitment: papers in honour of Peter Lewis Shinnie* (pp. 211–230). University of Calgary Press.

MacEachern, S. (1994). "Symbolic reservoirs" and cultural relations between ethnic groups: West African examples. *African Archaeological Review*, *12*, 203–222.

MacEachern, S. (1998). Scale, style, and cultural variation: Technological traditions in the northern Mandara mountains. In M. T. Stark (Ed.), *The Archaeology of Social Boundaries* (Issue October, pp. 107–131). Smithsonian Institution Press.

MacIver, D. R. (1906). *Medieval Rhodesia*. MacMillan and Co. Limited. https://archive.org/details/medivalrhodesiaOOrand

Maggs, T. (1973a). *Ntshekane Excavation Fieldnotes. Unpublished report*. KwaZulu-Natal Museum

Maggs, T. (1973b). *Ntshekane Pottery Fieldnotes. Unpublished report.* KwaZulu-Natal Museum

Maggs, T. (1976a). *Iron age communities of the southern Highveld*. Council of the Natal Museum.

Maggs, T. (1976b). *Iron Age communities of the southern highveld*. Natal Museum.

Maggs, T. (1977). *Msuluzi fieldnotes. Unpublished report*. KwaZulu-Natal Museum

Maggs, T. (1979). *Magogo and Mhlopeni fieldnotes. Unpublished records*. KwaZulu-Natal Museum

Maggs, T. (1980a). Msuluzi Confluence: a seventh century Early Iron Age site on the Tugela River. *Annals of the Natal Museum*, *24*(1), 111–145.

Maggs, T. (1980b). Mzonjani and the beginning of the Iron Age in Natal. *Annals of the Natal Museum*, *24*(1), 71–96.

Maggs, T. (1980c). The Iron Age sequence south of the Vaal and Pongola rivers: some historical implications. *Journal of African History*, *21*(1), 1–45. https://doi.org/10.2307/181480

Maggs, T. (1982). Mgoduyanuka : terminal Iron Age settlement in the Natal grasslands. *Annals of the National Museum*, *25*(1), 83–113.

Maggs, T. (1984a). Iron Age Settlements and subsistence patterns in the Tugela River Basin, Natal. In M. Hall, G. Avery, D. M. Avery, M. L. Wilson, & A. J. B. Humphreys (Eds.), *Frontiers: Southern African Archaeology Today* (BAR (BAR I, pp. 194–206). Cambridge Monographs in African Archaeology 10.

Maggs, T. (1984b). Ndondondwane: a preliminary report on an Early Iron Age site on the lower Tugela River. *Annals of the Natal Museum*, *26*(1), 71–93.

Maggs, T. (1984c). The Iron Age south of the Zambezi. In R. G. Klein (Ed.), *Southern African prehistory and paleoenvironments* (pp. 329–360). Balkema.

Maggs, T. (1989). The Iron Age farming communities. *Natal and Zululand from Earliest Times to 1910: A New History*, *Chapter 2*, 28–48.

Maggs, T. (1992). Name Calling in the Iron Age. *The South African Archaeological Bulletin*, *47*(156), 46–47.

Maggs, T. (1993). Three Decades of Iron Age Research in South Africa: Some Personal Reflections. *The South African Archaeological Bulletin*, *48*, 70–76. https://about.jstor.org/terms

Maggs, T. (1994). The South-East: The Early Iron Age in the extreme south: Some patterns and problems. *Azania: Archaeological Research in Africa*, *29–30*(1), 168–178. https://doi.org/10.1080/00672709409511669

Maggs, T. (1995). Neglected Rock Art: The Rock Engravings of Agriculturist Communities in South Africa. *The South African Archaeological Bulletin*, *50*(162), 132–142. https://www.jstor.org/stable/3889062?seq=1&cid=pdf-

Maggs, T. (2018). Nkandla style: Zulu izinkamba beer pots with a distinct, local decorative mode. *Southern African Humanities*, *31*(November), 117–144.

Maggs, T. (2023). "It ain't necessarily so": Ntsuanatsatsi-Sotho or Nguni? *South African Archaeological Bulletin*, *78*(219), 75.

Maggs, T., Mazel, A. D., & Ward, V. (1984). *Report on the archaeological survey of the Inanda Dam site, Mngeni River, Natal*.

Maggs, T., & Michael, M. (1976). Ntshekane : an Early Iron Age site in the Tugela Basin, Natal. *Annals of the Natal Museum*, *22*(3), 705–740.

Maggs, T., & Ward, V. (1984). Early Iron Age sites in the Muden area of Natal. *Annals of the Natal Museum*, *26*(1), 105–140.

Maggs, T., & Ward, V. (1986a). *Report on rescue excavation at Inanda dam site uMngeni valley*. Unpublished Report. KwaZulu-Natal Museum

Malafouris, L. (2019). Mind and material engagement. *Phenomenology and the Cognitive Sciences*, *18*(1), 1–17. https://doi.org/10.1007/s11097-018-9606-7

Malainey, M. E. (2000). *Analysis of the Fatty Acid Composition of Pottery Vessel Residues from Ndondondwane, South Africa*. Technical report prepared for K. Fowler, Department of Anthropology, University of Alberta.

Manninen, M. A., Asheichyk, V., Jonuks, T., Kriiska, A., Osipowicz, G., Sorokin, A. N., Vashanau, A., Riede, F., & Persson, P. (2021). Using Radiocarbon Dates and Tool Design Principles to Assess the Role of Composite Slotted Bone Tool Technology at the Intersection of Adaptation and Culture-History. *Journal of Archaeological Method and Theory 2021 28:3*, *28*(3), 845–870. https://doi.org/10.1007/S10816-021-09517-7

Manning, S. W., & Hart, J. P. (2019). Radiocarbon, Bayesian chronological modeling and early European metal circulation in the sixteenth-century AD Mohawk River Valley, USA. In *PLoS ONE* (Vol. 14, Issue 12). https://doi.org/10.1371/journal.pone.0226334

Manyanga, Munyaradzi and Chirikure, S. (2019). The Mapungubwe-Great Zimbabwe relationship in history: Implications for the evolution of studies of socio-political complexity in Southern Africa [online]. *South African Archaeological Society Goodwin Series*, *Vol. 12*(June 2020), 72–84.

Maquet, E., & Hiernaux, J. (1960). *Cultures prehistoriques de l'age des metaux au Ruanda-Urundi et au Kivu (Congo-Belge)*. cade- mie Royale des Sciences d'Outre-Mer, Classe des Sciences Naturelles et Me'dical.

Marken, D. B., Guenter, S. P., & Freidel, D. A. (2017). He's Maya, but He's Not My Brother Exploring the Place of Ethnicity in Classic Maya Social Organization. In B. J. Beyyette & L. J. LeCount (Eds.), *"the only true people" Linking Maya Identities Past and Present* (pp. 187–218). University Press of Colorado.

Marker, M., & Evers, T. M. (1976). Iron Age settlement and soil erosion in the eastern Transvaal, South Africa. *South African Archaeological Bulletin*, *31*, 153–165.

Marks, S. (2011). New Paradigms in History and Archaeology in South Africa. *African Studies*, *70*(1), 123–143. https://doi.org/10.1080/00020184.2011.559384

Marsden, J., & Thomas, B. (n.d.). *Brand Values: Exploring the Associations of Symmetry within Financial Brand Marks*.

Martel, Á. R. (2020). Rock Art, Semiotics and Meaning of. In *Encyclopedia of Global Archaeology* (pp. 1–8). Springer International Publishing. https://doi.org/10.1007/978-3-319-51726-1_2831-1

Mason, R. (1952). South African Iron Age Pottery from the Southern Transvaal. *The South African Archaeological Bulletin*, *7*(26), 70–79.

Mason, R. (1981). Early Iron Age Settlement at Broederstroom 24/73, Transvaal, South Africa. *South African Journal of Science1*, *77*(September 1981).

Mason, R., Klapwijk, M., Evers, T. M., Welbourne, R. G., Sandelowsky, B. H., & Maggs, T. (1973). Early Iron Age settlement of southern Africa. *South African Journal of Science*, *69*(November), 324–326.

Mauss, M. (1935). Les techniques du corps. *Journal Du Psychologie*, *32*(3–4), 271–293.

Mauss, M. (1973). Techniques of the Body. *Economy and Society*, *2*(1), 70–88. https://doi.org/10.1080/03085147300000003

Meskell, L. (2005). Recognition, Restitution and the Potentials of Postcolonial Liberalism for South African Heritage. *The South African Archaeological Bulletin*, *60*(182), 72–78.

Miller, D., & Whitelaw, G. (1994). Early Iron Age metal working from the site of Kwagandaganda, Natal, South Africa. *South African Archaeological Bulletin*, *49*(160), 79–89.

Mills, B. J. (2002). Acts of Resistance: Zuni Ceramics, Social Identity, and the Pueblo Revolt. In R. W. Preucel (Ed.), *Archaeologies of the Pueblo Revolt: Identity, Meaning, and Renewal in the Pueblo World* (pp. 85–98). University of New Mexico Press.

Mills, B. J. (2017a). Intermarriage, Technological Diffusion, and Boundary Objects in the U.S. Southwest. *Journal of Archaeological Method and Theory*, *25*, 1051–1086. https://doi.org/10.1007/s10816-018-9392-0

Mills, B. J. (2017b). Social Network Analysis in Archaeology. *Annual Review of Anthropology*, *46*(1), 379–397. https://doi.org/10.1146/annurev-anthro-102116-041423

Mills, B. J. (2018). Intermarriage, Technological Diffusion, and Boundary Objects in the U.S. Southwest [Journal of Archaeological Method and Theory]. In *Journal of Archaeological Method and Theory* (Vol. 25, Issue 2018, pp. 1051–1086). https://doi.org/10.2307/3557104

Mills, B. J., Clark, J. J., & Peeples, M. A. (2016). Migration, skill, and the transformation of social networks in the pre-Hispanic Southwest. *Economic Anthropology*, *3*(2), 203–215. https://doi.org/10.1002/SEA2.12060

Mills, B. J., Clark, J. J., Peeples, M. A., Haas, W. R., Roberts, J. M., Brett Hill, J., Huntley, D. L., Borck, L., Breiger, R. L., Clauset, A., & Steven Shackley, M. (2013). Transformation of social networks in the late pre-Hispanic US Southwest. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(15), 5785–5790. https://doi.org/10.1073/pnas.1219966110

Mills, B. J., Peeples, M. A., Haas, W. R., Borck, L., Clark, J. J., & Roberts, J. M. (2015). Multiscalar Perspectives on Social Networks in the Late Prehispanic Southwest. *American Antiquity*, *80*(1), 3–24. https://doi.org/10.7183/0002-7316.79.4.3

Mills, B. J., Roberts, J. M., Clark, J. J., Haas, W. R., Huntley, D., Peeples, M. A., Borck, L., Ryan, S. C., Trowbridge, M., & Breiger, R. L. (2013). The Dynamics of Social Networks in the Late Prehispanic US Southwest', in Carl Knappett (ed.), *Network Analysis in Archaeology: New Approaches to Regional Interaction (Oxford, 2013, Oxford Academic, 23 May 2013)*, https://doi.org/10.1093/acprof:oso/9780199697090.003.0008

Mills, B. J., & Walker, W. H. (2008). Introduction: Memory, Materiality, and Depositional Practice. In B. J. Mills & W. H. Walker (Eds.), *Memory Work: Archaeologies of Material Practice* (pp. 3–24). School for Advanced Research Press.

Minch, Johanna., & Price, Jeff. (2018). The importance of symmetry in Defining Caddo Relationships: A Synthesis of perspectives. In Y. Park. Huntington, Dean. E. Arnold, & Johanna. Minich (Eds.), *Ceramics of Ancient America: Multidisciplinary Approaches* (pp. 249–272). University Press of Florida. https://doi.org/10.5744/florida/9780813056067.003.0009

Mitchell, P. (2002). *The Archaeology of Southern Africa*. Cambridge: Cambridge University Press.

Mitchell, P. (2013). A regional overview: space, time, and ceramics. In Peter. Mitchell & Paul. Lane (Eds.), *The Oxford Handbook of African Archaeology* (pp. 657–670). Oxford University Press. http://ebookcentral.proquest.com/lib/umanitoba/detail.action?docID=1336439.

Mitchell, P., & Whitelaw, G. (2005). The archaeology of southernmost Africa from 2000 BP to the early 1800s: a review of recent research. *The Journal of African History*, *46*(2), 209–241. http://www.jstor.org/stable/4100680

Moffett, A. J., & Chirikure, S. (2016). Exotica in Context: Reconfiguring Prestige, Power and Wealth in the Southern African Iron Age. *Journal of World Prehistory*, *29*(4), 337–382. https://doi.org/10.1007/s10963-016-9099-7

Moffett, A. J., Hall, S., & Chirikure, S. (2020). Crafting power: New perspectives on the political economy of southern Africa, AD 900–1300. *Journal of Anthropological Archaeology*, *59* (April). https://doi.org/10.1016/j.jaa.2020.101180

Moll, E. J. (1976). *The vegetation of the Three River Region, Natal*. Pietermaritzburg: Natal Town and Regional Planning Commission 1976

Mönnig, H. O. (1967). *The Pedi*. J. L. van Schaik Ltd.

Morris, A. G. (1993). Human remains from the Early Iron Age sites of Nanda and KwaGandaganda, Mngeni Valley, Natal, South Africa. *Natal Museum Journal of Humanities*, *5*, 83–98.

Mucina, L., & Rutherford, M. C. (2006). *The vegetation of South Africa, Lesotho and Swaziland*. South African National Biodiversity Institute.

Muller, J. (1966). Archaeological analysis of art styles. *Tennessee Archaeologist*, *XXII*(1), 25–39.

Murphy, M. L., Murphy, L., Campbell, A. C., & Robbins, L. H. (1994). Synopsis Prehistoric mining of mica schist at the Tsodilo Hills, Botswana. *The Journal of the South African Institute of Mining and Metallurgy*, *May*, 87–92.

Mutema, M., Figlan, S., & Chaplot, V. (2023). Scale Issue for Organic and Inorganic Carbon Exports to Oceans: Case Study in the Sub-Tropical Thukela River Basin, South Africa. *Land*, *12*(4). https://doi.org/10.3390/land12040815

Namugize, J. N., Jewitt, G., & Graham, M. (2018). Effects of land use and land cover changes on water quality in the uMngeni river catchment, South Africa. *Physics and Chemistry of the Earth*, *105*(June), 247–264.

Ndlovu, N., & Smith, B. (2019). The Past Is a Divided Country: Transforming Archaeology in South Africa. *African Archaeological Review*, *36*(2), 175–192. https://doi.org/10.1007/s10437-019-09336-y

Nettleton, A. (2010). Life in a Zulu Village: Craft and the Art of Modernity in South Africa. *The Journal of Modern Craft*, *3*(1), 55–77. https://doi.org/10.2752/174967810x12657245205189

Neumann, K., Bostoen, K., Höhn, A., Kahlheber, S., Ngomanda, A., & Tchiengué, B. (2012). First farmers in the Central African rainforest: A view from southern Cameroon. *Quaternary International*, *249*, 53–62. https://doi.org/10.1016/j.quaint.2011.03.024

Nicklin, Keith. (1971). Stability and innovation in pottery manufacture. *World Archaeology*, *3*(1), 13–48.

Normark, J. (2009). The Making of a Home: Assembling Houses at Nohcacab, Mexico. *World Archaeology*, *41*, 430–444.

Normark, J. (2010). Involutions of materiality: Operationalizing a neo-materialist perspective through the causeways at Ichmul and Yo'okop. *Journal of Archaeological Method and Theory*, *17*(2), 132–173. https://doi.org/10.1007/s10816-010-9079-7

Nyamushosho, R. T., & Chirikure, S. (2020). Archaeological implications of ethnographically grounded functional study of pottery from Nyanga, Zimbabwe. *Quaternary International*, *555*(August 2019), 150–164. https://doi.org/10.1016/j.quaint.2020.03.041

Olsen, B. (2003). Material culture after text: re-membering things. *Norwegian Archaeological Review*, *36*(2), 87–104. https://doi.org/10.1080/00293650310000650

Olsen, B. (2010). *In Defense of Things: Archaeology and the Ontology of Objects.* AltaMira Press.

Olsen, B. (2012). After Interpretation: Remembering Archaeology. *Current Swedish Archaeology*, *20*, 11–34.

Olsen, J., Heinemeier, J., Hornstrup, K. M., Bennike, P., & Thrane, H. (2013). "Old wood" effect in radiocarbon dating of prehistoric cremated bones? *Journal of Archaeological Science*, *40*(1), 30–34. https://doi.org/10.1016/j.jas.2012.05.034

Ortman, S. G. (2000). Conceptual Metaphor in the Archaeological Record: Methods and an Example from the American Southwest. In *Antiquity* (Vol. 65, Issue 4). https://www.jstor.org/stable/2694419?seq=1&cid=pdf-

Ortman, S. G., Varien, M. D., & Lee Gripp, T. (2007). Empirical Bayesian Methods for Archaeological Survey Data: An Application from the Mesa Verde Region. In *Antiquity* (Vol. 72, Issue 2). https://www.jstor.org/stable/40035813

Orton, C., & Hughes, M. (2013). Pottery in archaeology, second edition. In *Pottery in Archaeology, Second Edition*. https://doi.org/10.1017/CBO9780511920066

Owens, L. S., Thorp, C., & Whitelaw, G. (2023). Human remains from Ntshekane, an Early Iron Age site in central KwaZulu-Natal. *Southern African Humanities*, *36*, 201–243.

Ownby, Carolan. P. (1985). *Early Nguni History: The Linguistic evidence and its correlation with archaeological and oral tradition* [Doctoral dissertation, University of California, Los Angeles].

Pailes, M. C. (2016). Exchange economies of late prehistoric eastern Sonora, Mexico: A re-evaluation based on provenance data analyses. *Journal of Field Archaeology*, *41*(5), 587–602. https://doi.org/10.1080/00934690.2016.1207492

Papini, R. (1994). The stepped diamond of mid-century Zulu beadfabric aesthetic assimilation beyond the second Izwekufa. In E. R. Sienaert, M. Cowper-Lewis, & A. N. Bell (Eds.), *Oral tradition and its transmission: The many forms of message : papers given at the Fourth International Conference on Oral Tradition, University of Natal, Durban, 27-30 June 1994* (pp. 27–46). Campbell Collections and Centre for Oral Studies, University of Natal.

Parkington, J., & Hall, S. (2009). The appearance of food production in Southern Africa 1,000 to 2,000 years ago. In *The Cambridge History of South Africa: Volume 1 from Early Times to 1885* (pp. 63–111). https://doi.org/10.1017/CHOL9780521517942.003

Parmentier, R. J. (1985). Signs' Place in Medias Res: Peirce's Concept of Semiotic Mediation. In E. Mertz & R. J. Parmentier (Eds.), *Semiotic Mediation: Sociocultural and Psychological Perspectives* (pp. 24–47). Academic Press.

Parmentier, R. J. (1997). The pragmatic semiotics of cultures. *Semiotica*, *116*, 1–115.

Pauketat, T. R., & Alt, S. M. (2018). Water and Shells in Bodies and Pots: Mississippian Rhizome, Cahokian Poiesis. In *Relational Identities and Other-than-Human Agency in*

Archaeology (pp. 72–99). University Press of Colorado. https://doi.org/10.5876/9781607327479.c004

Pauketat, T. R., & Alt, S. M. (2019). *New materialisms ancient urbanisms* (T. R. Pauketat & S. M. Alt, Eds.). Routledge.

Peeples, M. A. (2011). *Identity and Social Transformation across the Identity and Social Transformation in the Prehispanic Cibola World: A.D. 1150-1325* [Doctoral dissertation, Arizona State University]

Peeples, M. A. (2017). Network Science and Statistical Techniques for Dealing with Uncertainties in Archaeological Datasets. [online]. Available: http://www.mattpeeples.net/netstats.html

Peeples, M. A. (2018). *Connected Communities: Networks, Identity, and Social Change in the Ancient Cibola World*. University of Arizona Press.

Peeples, M. A. (2019a). *A Brief Introduction to Archaeological Networks in R. [online]*. Http://www.Mattpeeples.Net/Netintro.Html.

Peeples, M. A. (2019b). Finding a Place for Networks in Archaeology. *Journal of Archaeological Research*, *27*(4), 451–499. https://doi.org/10.1007/s10814-019-09127-8

Peeples, M. A., & Haas, W. R. (2013). Brokerage and Social Capital in the Prehispanic U.S. Southwest. *American Anthropologist*, *115*(2), 232–247. https://doi.org/10.1111/AMAN.12006

Peeples, M. A., & Bischoff, R. J. (2023). Archaeological networks, community detection, and critical scales of interaction in the U.S. Southwest/Mexican Northwest. *Journal of Anthropological Archaeology*, *70*. https://doi.org/10.1016/j.jaa.2023.101511

Peeples, M. A., Mills, B. J., Haas Jr, R., Clark, J. J., & Robers Jr, J. M. (2016). Analytical Challenges for the Application of Social Network Analysis in Archaeology. In T. Brughmans, A. Collar, & F. Coward (Eds.), *The Connected Past Challenges to Network Studies in Archaeology and History* (pp. 59–84). Oxford University Press.

Peeples, M. A., & Roberts, J. M. (2013). To binarize or not to binarize: relational data and the construction of archaeological networks. *Journal of Archaeological Science*, *40*(7), 3001–3010. https://doi.org/10.1016/J.JAS.2013.03.014

Peirce, C. S. (1931). *The Collected Papers of Charles Sanders Peirce*. Harvard University Press.

Pelkey, J. (2022). Cultural Symmetry: From Group Theory to Semiotics. In *Handbook of Cognitive Mathematics* (pp. 1–22). Springer International Publishing. https://doi.org/10.1007/978-3-030-44982-7_46-1

Perez, D. M. (2023). *The Role of Style in Community Identity and Group Affiliation: An Archaeological Study of Virgin and Kayenta Branch Ceramics* [Doctor disseration, University of Nevada]. https://doi.org/10.34917/36114781

Perrill, E. (2005). Indigenous knowledge systems (IKS) & Zulu Ceramic Arts:Azolina MaMncube Ngema, One Woman's Story. *Interpreting Ceramics*, *10*, 1–23.

Perrill, E. (2007). Homage to Nesta Nala. *National Ceramics Quarterly*, *82*(Summer), 24–27.

Perrill, E. (2008). *Ukucwebezela: To shine – contemporary Zulu ceramics*. Indiana University Art Museum.

Perrill, E., & Garrett, I. (2011). In Surface and Form 25 Years of Zulu Ceramic Innovation. *Ceramics, Art and Perception, 85*, 55–59.

Phillipson, D. W. (1968a). The Early Iron Age in Zambia—Regional Variants and some Tentative Conclusions. *The Journal of African History*, *9*(02), 191. https://doi.org/10.1017/S0021853700008823

Phillipson, D. W. (1968b). The Early Iron Age Site at Kapwirimbwe, Lusaka. *Azania: Archaeological Research in Africa*, *3*(1), 87–105. https://doi.org/10.1080/00672706809511488

Phillipson, D. W. (1976a). Archaeology and Bantu linguistics. *World Archaeology*, *8*(1), 65–82. https://doi.org/10.1080/00438243.1976.9979653

Phillipson, D. W. (1976b). The Early Iron Age in Eastern and Southern Africa: A Critical Re-appraisal. *Azania: Archaeological Research in Africa*, *11*(1), 1–23. https://doi.org/10.1080/00672707609511229

Phillipson, D. W. (1977). *The later prehistory of Eastern and Southern Africa*. Heinemann.

Phillipson, D. W. (2005). *African Archaeology*.

Pikirayi, I. (1997). Pots, people and culture: An overview of ceramic studies in Zimbabwe. In G. Pwiti (Ed.), *Caves, monuments and texts: Zimbabwean archaeology today* (pp. 69–87). Studies in African Archaeology.

Pikirayi, I. (1999). Perspective Taking Southern African Ceramic. *The African Archaeological Review*, *16*(3), 185–189.

Pikirayi, I., & Chirikure, S. (2011). Debating Great Zimbabwe. *Azania: Archaeological Research in Africa*, *46*(2), 221–231. https://doi.org/10.1080/0067270X.2011.580149

Pikirayi, I., & Lindahl, A. (2013). Ceramics, Ethnohistory , and Ethnography : Locating Meaning in Southern African Iron Age Ceramic Assemblages. *African Archaeological Review*, 455–473. https://doi.org/10.1007/s10437-013-9145-0

Pillay, A. E., Punyadeera, C., Jacobson, L., & Eriksen, J. (2000). Analysis of ancient pottery and ceramic objects using x-ray fluorescence spectrometry. *X-Ray Spectrometry*, *29*(1), 53–62. https://doi.org/10.1002/(sici)1097-4539(200001/02)29:1<53:aid-xrs405>3.0.co;2-s

Plog, S. (1978). Social Interaction and Stylistic Similarity: A Reanalysis. *Advances in Archaeological Method and Theory*, *1*(1978), 143–182.

Plog, S. (1980). Stylistic Variation in Prehistoric Ceramics. In *Stylistic Variation in Prehistoric Ceramics*. Cambridge University Press. https://doi.org/10.1017/cbo9780511521171

Plog, S. (1983). Analysis of style in artifacts. *Annual Review of Anthropology*, *12*(1983), 125–142. https://doi.org/10.1146/annurev.an.12.100183.001013

Plug, I. (1989a). Aspects of Life in the Kruger National Park during the Early Iron Age. *South African Archaeological Society Goodwin Series*, *6*, 62–68. http://www.jstor.org/stable/3858133

Plug, I. (1989b). Notes on distribution and relative abundances of some animal species, and on climate in the Kruger National Park during prehistoric times. *KOEDOE*, *32*(1), 101–119.

Posnansky, M. (1961a). Dimple-Based pottery from Uganda. *Man*, *61*(Aug.), 141–142.

Posnansky, M. (1961b). Iron Age in East and Central Africa: Points of Comparison. *The South African Archaeological Bulletin*, *16*(64), 134–136. https://about.jstor.org/terms

Posnansky, M. (1961c). Pottery Types from Archaeological Sites in East Africa. *The Journal of African History*, *2*(2), 177–198. https://doi.org/10.1017/S0021853700002401

Posnansky, M. (1968). Bantu genesis: archaeological reflections. *Journal of African History*, *9*(1), 1–11. https://doi.org/10.1017/S002185370000832X

Powell, E., & Bamforth, D. (2020). *Design Divergence: A Comparative Study of Pottery Designs from Chaco Canyon and the Northern Rio Grande*.

Preucel, R. W. (2008). Archaeological Semiotics. In I. Hodder (Ed.), *Archaeological Semiotics*. Blackwell Publishing. https://doi.org/10.1002/9780470754962

Preucel, R. W. (2021). In defence of representation. *World Archaeology*, *00*(00), 1–17. https://doi.org/10.1080/00438243.2021.1924852

Preucel, R. W., & Hodder, I. (1996). *Contemporary Archaeology in Theory: A Reader* (R. W. Preucel & Ian. Hodder, Eds.). Blackwell.

Prins, F. E. (1993). *Aspects of Iron Age Ecology in Transkei* [Master's thesis, University of Stellenbosch]. https://scholar.sun.ac.za

Prins, F. E. (1994). Climate, Vegetation and Early Agriculturist Communities in Transkei and KwaZulu-Natal. *Azania: Journal of the British Institute in Eastern Africa*, *29*(October 2014), 179–186. https://doi.org/10.1080/00672709409511670

Prins, F. E., & Granger, J. E. (1993a). Early farming communities in northern Transkei: the evidence from Ntitsana and adjacent areas. *Natal Museum Journal of Humanities*, *5*(153–174), 153–174.

Prins, F., & Hall, S. (2013). *Cultural heritage impact assessment of the proposed Ngcebo water treatment works, located within the Maphumulo local municipality. Unpublished report*. www.activeheritage.webs.com

Prinsloo, H. P. (1974). Early iron Age site at Klein Africa near Wylliespoort, Soutpansberg Mountains, South Africa. *South African Journal of Science*, *70*, 271–273.

Punyadeera, C., Pillay, A. E., Jacobson, L., & Whitelaw, G. (1997). Application of XRF and Correspondence Analysis to Provenance Studies of Coastal and Inland Archaeological Pottery from the Mngeni River Area , South Africa. *X-Ray Spectrometry*, *26*(November 1995), 249–256.

Ramsey, C. B. (2009). Dealing with outliers and offsets in radiocarbon dating. *Radiocarbon*, *51*(3), 1023–1045. https://doi.org/10.1017/s0033822200034093

Reimer, P. J., Bard, E., Bayliss, A., Beck, J. W., Blackwell, P. G., Ramsey, C. B., Buck, C. E., Cheng, H., Edwards, R. L., Friedrich, M., Grootes, P. M., Guilderson, T. P., Haflidason, H., Hajdas, I., Hatté, C., Heaton, T. J., Hoffmann, D. L., Hogg, A. G., Hughen, K. A., Wacker, L. (2013). IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years cal BP. *Radiocarbon*, *55*(4), 1869–1887. https://doi.org/10.1017/S0033822200048864

Reinhardt, P. A., & Welters, L. (1999). Symmetry analysis of embroideries on Greek women's chemises. *Clothing and Textiles Research Journal*, *17*(4), 176–190. https://doi.org/10.1177/0887302X9901700402

Rice, P. M. (1982). Pottery production, classification, and the role of physicichemical analyses. In J. S. Olin & A. D. Franklin (Eds.), *Archaeological ceramics* (pp. 47–56). Smithsonian Institution.

Rice, P. M. (2013). Type-Variety What Works and What Doesn't. In J. J. Aimers (Ed.), *Ancient Maya Pottery : Classification, Analysis, and Interpretation* (pp. 11–28). https://www.ebsco.com/terms-of-use

Rice, P. M. (2015). Pottery analysis: A sourcebook. In *The University of Chicago Press* (Second Edi). University of Chicago Press. https://doi.org/10.2307/2804120

Rice, P. M., & Natt, W. L. (2014). Ceramic Spatialization: Southern Styles. In *Space-Time Perspectives on Early Colonial Moquegua* (pp. 281–309). University Press of Colorado. https://doi.org/10.5876/9781607322764:c13

Robb, J., & Pauketat, T. R. (2013). From moments to millennia: Theorizing scale and change in human history. In J. Robb & T. R. Pauketat (Eds.), *Big Histories, Human Lives: tackling Problems of Scale in Archaeology* (pp. 3–34). School for Advanced Research.

Roberts, J. M., Mills, B. J., Clark, J. J., Haas, W. R., Huntley, D. L., & Trowbridge, M. A. (2012). A method for chronological apportioning of ceramic assemblages. *Journal of Archaeological Science*, *39*(5), 1513–1520. https://doi.org/10.1016/j.jas.2011.12.022

Roberts, J. M., Yin, Y., Dorshorst, E., Peeples, M. A., & Mills, B. J. (2021). Assessing the performance of the bootstrap in simulated assemblage networks. *Social Networks*, *65*, 98–109. https://doi.org/10.1016/j.socnet.2020.11.005

Robertson, J. H., & Bradley, R. (2000). A New Paradigm: The African Early Iron Age without Bantu Migrations. *History in Africa*, *27*(2000), 287–323.

Robey, T. (1980). Mpambanyoni: a Late Iron Age site on the Natal south coast. *Annals of the Natal Museum*, *24*(1), 147–164.

Robinson, K. R. (1959). *Khami Ruins*. Cambridge University Press.

Robinson, K. R. (1961). An Early Iron-Age Site from the Chibi District, Southern Rhodesia. *The South African Archaeological Bulletin*, *16*(63), 75–102.

Robinson, K. R. (1966). The Leopard's Kopje Culture, ts Position in the Iron Age of Southern Rhodesia. *The South African Archaeological Bulletin*, *21*(81), 5–51.

Robinson, K. R. (1976). A Note on the Spread of Early Iron Age Ceramics in Malawi: Tentative Suggestions Based on Recent Evidence. *The South African Archaeological Bulletin*, *31*(123/124), 166–175.

Robinson, K. R., Shee, J. C., & Barnard, K. H. (1963). Further Excavations in the Iron Age Deposits at the Tunnel Site, Gokomere Hill, Southern Rhodesia. *The South African Archaeological Bulletin*, *18*(72), 155–171.

Roddick, A., & Stahl, A. B. (2016). Knowledge in Motion: Constellations of Learning Across Time and Place. In *Knowledge in Motion: Constellations of Learning Across Time and Place*. University of Arizona Press. https://doi.org/10.1017/CBO9781107415324.004

Roe, P. G. (1980). Art and residence among the Shipibo Indians of Peru: a study in microacculturation. *American Anthropologist*, *82*(1), 42–71. https://doi.org/10.1525/aa.1980.82.1.02a00030

Rosenstein, D. D. (2008). Sorting out ceramics: Correlating change in the technology of ceramic productin with the chronology of 18th and 19th century western BaTswana towns [Master's thesis, Department of Archaeology].

Ross, D. H. (2007). "Come and Try": Towards a History of Fante Military Shrines. *African Arts*, *40*(3), 12–35. www.mitpressjournals.org/loi/afar;

Rouse, I. (1939). *Prehistory in Haiti: A Study in Method*. Yale University Press.

Rouse, I. (1960). The classification of artifacts in archaeology. *American Antiquity*, *25*(3), 313–323. https://doi.org/10.2307/277514

Russell, T. (2022). Symbolic kraals: Subterranean food stores, hidden wealth and ethnographic errors. *Journal of Social Archaeology*, 146960532211174. https://doi.org/10.1177/14696053221117467

Sackett, J. R. (1977). The Meaning of Style in Archaeology. *American Antiquity*, *42*(3), 369–379.

Sackett, J. R. (1986). Isochrestism and style: A clarification. *Journal of Anthropological Archaeology*, *5*(3), 266–277. https://doi.org/10.1016/0278-4165(86)90008-5

Sadr, K. (2008). An Ageless View of First Millennium AD Southern African Ceramics. *Journal of African Archaeology*, *6*(1), 131–149. https://doi.org/10.3213/1612-1651-10

Sadr, K. (2020). The Archaeology of Highveld Farming Communities. In *Oxford Research Encyclopedia of African History*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190277734.013.731

Sanad, R., & Hanafy, I. M. (2017). *Pattern design preference based on symmetry*. *5*, 26–28. www.prosoc.eu

Sandelowsky, B. H. (1971). The Iron Age in Southwest Africa and Damara Pot Making. *African Studies Quarterly Journal*, *30*(1), 3–13. https://doi.org/10.1080/00020187108707343

Sandelowsky, B. H. (1974). Prehistoric metal-working in South West Africa. *Journal of the South African Inst. for Mining and Metallurgy*, *May 1974*, (?).

Sandelowsky, B. H. (1979). Kapako and Vungu Vungu: Iron Age Sites on the Kavango River. *Goodwin Series*, *3*, 52. https://doi.org/10.2307/3858112

Saussure, F. de. (1966). *Course in General Linguistics*. McGraw-Hill.

Schiffer, M. (1986). Radiocarbon Dating and the "Old Wood" Problem: The Case of the Hohokam Chronology. In *Journal of Archaeological Science* (Vol. 13).

Schlanger, S. H. (1992). Recognizing Persistent Places in anasazi Settlement Systems. In J. Rossignol & L.Wansnider (Eds.), *Space, Time, and Archaeological Landscapes* (pp. 91–112). Springer.

Schneider, C. (2022). Making a home in the world: Clothes as mnemonic devices through which refugees experience home in flight and resettlement. *Journal of Material Culture*, 135918352210885. https://doi.org/10.1177/13591835221088512

Schofield, J. F. (1926). Zimbabwe: a critical examination of the building methods employed. *South African Journal of Science*, *23*, 971–986.

Schofield, J. F. (1935). Natal Coastal Pottery from the Durban District: A preliminary survey. *South African Journal of Science*, *XXXll*, 508–527. https://doi.org/10.10520/AJA00382353_7997

Schofield, J. F. (1936). Natal Coastal pottery from the Durban District: A preliminary Survey: Part II. *South African Journal of Science*, *33*, 993–1009. https://doi.org/10.10520/AJA00382353_8204

Schofield, J. F. (1937). The pottery of the Mapungubwe district. In *Mapungubwe: Ancient Bantu civilization on the Limpopo* (pp. 32–60). Cambridge University Press.

Schofield, J. F. (1943). A Preliminary Study of the Pottery of the Bantu Tribes of the Union of South Africa. *South African Journal of Science*, *39*(1), 256–281.

Schofield, J. F. (1948). Primitive pottery: an introduction to South African ceramics, prehistoric and protohistoric. In *Handbook Series No. III*. South African Archaeological Society, Handbook Series No. 3.

Segobye, A. K. (2005). Weaving Fragments of the Past for a United Africa: Reflections on the Place of African Archaeology in the Development of the Continent in the 21st Century. *The South African Archaeological Bulletin*, *60*(182), 79–83.

Sekaquaptewa, E., & Washburn, D. K. (2004). They Go Along Singing: Reconstructing the Hopi Past from Ritual Metaphors in Song and Image. *American Antiquity*, *69*(3), 457–486. https://doi.org/10.2307/4128402

Sekaquaptewa, E., & Washburn, D. K. (2009). As a matter of practice. Hopi cosmology in Hopi life: Some considerations for theory and method in southwestern archaeology. *Time and Mind*, *2*(2), 195–214. https://doi.org/10.2752/175169709X423682

Shaw, A., Bates, M., Conneller, C., Gamble, C., Julien, M., McNabb, J., Pope, M., & Scott, B. (2016). The archaeology of persistent places: the Palaeolithic case of La Cotte de St Brelade, Jersey. *Antiquity*, *90*(354), 1437–1453. https://doi.org/10.15184/aqy.2016.212

Shaw, M. (1974). Material Culture. In *The Bantu-speaking Peoples of Southern Africa* (pp. 85–131). Taylor and Francis. https://doi.org/10.4324/9781032709499-5

Shennan, S. J. (1989). Introduction. In S. J. Shennan (Ed.), *Archaeological approaches to cultural identity* (pp. 1–32). Unwin Hyman.

Shepard, A. O. (1948). The symmetry of abstract design, with special reference to ceramic decoration. *Carnegie Institution of Washington: Contributions to American Anthropology and History*, *47*, 209–293.

Shepard, A. O. (1957). Ceramics for the Archaeologist. In *American Antiquity* (Vol. 23, Issue 1). Carnegie Intitution of Washington. https://doi.org/10.2307/277291

Shepherd, N. (2002). The Politics of Archaeology in Africa. *Annual Review of Anthropology*, *31*(1), 189–209. https://doi.org/10.1146/annurev.anthro.31.040402.085424

Shiner, J. (2009). Persistent places: An approach to the interpretation of assemblage variation in deflated surface stone artefact distributions from western New South Wales, Australia. In A.

Fairbairn, S. O. O'Connor, & B. Marwick (Eds.), *New Directions in Archaeological Science* (pp. 25–45). Anu E Press.

Shott, M. J. (1992). Radiocarbon Dating as a Probabilistic Technique: The Childers Site and Late Woodland Occupation in the Ohio Valley. In *Antiquity* (Vol. 57, Issue 2). https://about.jstor.org/terms

Shulze, R. E. (1982). *Agrohydrology and climatology of Natal*. Water Research Commission.

Silitoe, P. (1988). *Made in Niugini : technology in the Highlands of Papua New Guinea*. Published for the Trustees of the British Museum by British Museum Publications in association with the University of Durham Publications Board .

Singer, M. (2007). *Intra-settlement community organization at Ndondondwane: An Early Iron Age settlement in the Thukela Valley, South Africa*.

Singer, M. (2008). *Intra-settlement community organization at Ndondondwane: an Early Iron Age settlement in the Thukela Valley, South Africa* [Master's thesis, University of Manitoba].

Sinopoli, C. M. (1991). *Approaches to archaeological ceramics*. Plenum Press. https://doi.org/10.1007/978-1-4757-9274-4

Siteleki, M. J., & Fredriksen, P. D. (2024). Inequality or insecurity? The case of pre-colonial farming communities in southern Africa. *Antiquity*, *98*(397), 135–154. https://doi.org/10.15184/aqy.2023.194

Soper, R. (1967a). Iron Age Sites in North-Eastern Tanzania. *Azania: Archaeological Research in Africa*, *2*(1), 19–36. https://doi.org/10.1080/00672706709511438

Soper, R. (1967b). Kwale: An Early Iron Age Site in South-Eastern Kenya. *Azania: Archaeological Research in Africa*, *2*(1), 1–17. https://doi.org/10.1080/00672706709511437

Soper, R. (1971a). A General Review of the Early Iron Age of the Southern Half of Africa. *Azania: Archaeological Research in Africa*, *6*(1), 5–37. https://doi.org/10.1080/00672707109511545

Soper, R. (1971b). A General Review of the Early Iron Age of the Southern Half of Africa. *Azania: Archaeological Research in Africa*, *6*(1), 5–37. https://doi.org/10.1080/00672707109511545

Soper, R. (1971c). Early Iron Age Pottery Types from East Africa : Comparative Analysis. *Azania: Archaeological Research in Africa*, *6*(915727502), 39–52. https://doi.org/10.1080/00672707109511546

Sørensen, M. L. S. (2015). 'Paradigm lost' – on the state of typology within archaeological theory. In K. Kristiansen, L. Šmejda, & J. Turek (Eds.), *Paradigm Found: Archaeological theory past, present and future. Essays in honour of Evžen Neustupný* (pp. 84–94). Oxbow. https://www.ebsco.com/terms-of-use

Spaulding, A. C. (1953). Statistical Techniques for the Discovery of Artifact Types. *American Antiquity*, *18*(4), 305–313. https://doi.org/10.1525/aa.1961.63.5.02a00100

Stahl, A. B. (1993). Concepts of time and approaches to analogical reasoning in historical perspective. *American Antiquity*, *58*(2), 235–260.

Stahl, A. B. (2013). Archaeological Insights into aesthetic communities of practice in the Western Volta Basin. *African Arts*, *46*(3), 54–67. https://doi.org/10.1162/AFAR_a_00088

Stahl, A. B. (2016). Crafting Life in Turbulent Times: Communities of Practice in the Western Volta Basin from the 13th to the 17th Century A.D. In A. P. Roddick & A. B. Stahl (Eds.), *Knowledge in Motion* (pp. 2–22). University of Arizona Press. https://doi.org/10.4324/9781315821894

Stanislawski, M. B. (1978). If pots were mortal. In R. A. Gould (Ed.), *Explorations in ethnoarchaeology* (pp. 201–228). University of New Mexico Press.

Stanislawski, M. B., & Stanislawski, B. (1978). Hopi and Hopi-Tewa ceramic tradition networks. In I. R. Hodder (Ed.), *The spatial organization of culture* (pp. 61–76). University of Pittsburgh.

Stark, M. T. (1998a). Technical Choices and Social Boundaries in Material Culture Patterning: An Introduction. In M. T. Stark (Ed.), *The Archaeology of Social Boundaries* (pp. 1–11). Smithsonian Institution Press.

Stark, M. T. (1998b). *The archaeology of social boundaries* (Eds.). Smithsonian Institution Press.

Steele, J. (2001). Revisiting nomenclature: “Early Iron Age”, “First-Millennium Agriculturist”, or what? *Southern African Field Archaeology*, *10*, 35–45.

Steponaitis, V. P., & Kintigh, K. W. (1993). Estimating Site Occupation Spans from dated artifact types: Some new approaches. In *Archaeology of Eastern North America: Papers in honor of Stephen Williams* (pp. 349–361).

Stofberg, D.P., Loubser, J. (1984). SADF Early Iron Age excavations in the Tugela. *Scientia Militaria, South African Journal of Military Studies 14*(4), 27-39.

Stuiver, M., & Pearson, G. W. (1986). High-Precision Calibration of the Radiocarbon Time Scale, AD 1950–500 BC. *Radiocarbon*, *28*(2B), 805–838. https://doi.org/10.1017/S0033822200060161

Stuiver, M., & van der Merwe, N. J. (1968). Radiocarbon Chronology of the Iron Age in Sub-Saharan Africa. *Current Anthropology*, *9*(1), 54–58.

Stump, D. (2010). Intensification in context: Archaeological approaches to precolonial field systems in Eastern and Southern Africa. *African Studies*, *69*(2), 255–278. https://doi.org/10.1080/00020184.2010.499201

Summers, R. (1950). Iron Age Cultures in Southern Rhodesia. *South African Journal of Science*, *November*, 95–108.

Summers, R. (1958). *Inyanga. Prehistoric settlements in Southern Rhodesia*. Cambridge University Press.

Summers, R. (1960). The Sotho, Shona, and Venda: A Study in Cultural Continuity. *Proceedings of the American Philosophical Society*, *104*(3), 266–292.

Summers, R. (1961a). Excavations in the Great Enclosure. *Occasional Papers of the National Museums, Southern Rhodesia*, *23*, 236–288.

Summers, R. (1961b). The Southern Rhodesian Iron Age: (First Approximations to the History of the Last 2000 Years). In *Source: The Journal of African History* (Vol. 2, Issue 1). https://about.jstor.org/terms

Summers, R. (1967). Iron Age industries of southern Africa, with notes on their chronology, terminology and economic status. In W. W. Bishop & J. D. Clark (Eds.), *Background to Evolution in Africa* (pp. 687–700). University of Chicago Press.

Summers, R. (1970). Forty Years' Progress in Iron Age Studies in Rhodesia, 1929-69. *The South African Archaeological Bulletin*, *25*(99), 95–103.

Summers, R. (1971). Archaeology in southern Africa 1869-1970: bibliographical notes. *South African Museums Association Bulletin*, *10*, 20–28.

Thebe, P. C., & Sadr, K. (2016). Forming and shaping pottery boundaries in contemporary south-eastern Botswana. *African Archaeological Review*, *34*(1), 1–18. https://doi.org/10.1007/s10437-016-9238-7

Thebe, P. C., & Sadr, K. (2017a). Clay sources and contemporary potters in southeastern Botswana. *Southern African Humanities*, *30*(December), 287–304.

Thebe, P. C., & Sadr, K. (2017b). Firing pots in contemporary south-eastern Botswana. *Ethnoarchaeology*, *9*(2), 146–155. https://doi.org/10.1080/19442890.2017.1364488

Thebe, P. C., & Sadr, K. (2017c). Forming and Shaping Pottery Boundaries in Contemporary South-Eastern Botswana. *African Archaeological Review*, *34*(1), 75–92. https://doi.org/10.1007/s10437-016-9238-7

Thebe, P. C., & Sadr, K. (2017d). Pottery decoration in contemporary southeastern Botswana. *Azania: Archaeological Research in Africa*, *52*(3), 305–323. https://doi.org/10.1080/0067270X.2017.1339477org/10.1080/0067270X.2017.1339477

Thompson, V. D., & Krus, A. M. (2017). Contemplating the history and future of radiocarbon dating in the American Southeast. *Southeastern Archaeology*, *37*(1), 1–11. https://doi.org/10.1080/0734578X.2017.1364600

Todd, J. (2006). A Documentary Film on the Magwaza Potters: Production of Zulu Beer Ceramics. *MFA, UKZN*, 1–53.

Trigger, B. G. (1989). *A history of archaeological thought*. Cambridge University Press.

Tsoraki, C., Barton, H., Crellin, R. J., & Harris, O. J. T. (2020). Making marks meaningful: new materialism and the microwear assemblage. *World Archaeology*, *52*(3), 484–502. https://doi.org/10.1080/00438243.2021.1898462

Turnbull, D. (2000). *Masons, Tricksters and Cartographers: Comparative Studies in the Sociology of Scientific and Indigenous Knowledge*. Routledge.

Turner, V. (1967). The Forest of Symbols: Aspects of Ndembu ritual. In *Africa's potential for the ecological intensification of agriculture*. Cornell University.

Underwood, J. L. (2018). Art, Honor, and Ridicule: Asafo Flags from Southern Ghana (review). *African Arts*, *51*(2), 89–92. https://muse.jhu.edu/article/695407

Vadala, J., & Duffy, L. (2021). Using Actor-Network Theory to Characterize the Production of Ancient Maya Caching Events at Cerro Maya (Cerros, Belize). *Journal of Archaeological Method and Theory*, *28*(4), 1027–1057. https://doi.org/10.1007/S10816-020-09485-4/TABLES/2

Valdeyron, N., & da Silva Domingos, S. L. (2012). Coquillages (beaucoup) et crustacés (un peu): l'économie des populations littorales de la baie de Luanda (Angola), du début de notre ère jusqu'à la période actuelle. In Fr. X. Fauvelle-Aymar (Ed.), *Palethnologie de l'Afrique, P@lethnologie* (Vol. 4, pp. 111–142).

van der Klei, A. (2002). Repeating the Rhizome. *The American Production of French Theory*, *31*(1), 48–55.

van der Merwe, N. J., & Killick, D. J. (1979). Square: An iron smelting site near Phalaborwa. *Goodwin Series*, *3*(3), 86–93.

van der Merwe, N. J., & Scully, R. T. K. (1971). The Phalaborwa story: Archaeological and Ethnographic investigation of a South African Iron Age group. *World Archaeology*, *3*(2), 178–196. https://doi.org/10.2307/124071

Van Der Zel, D. W. (1975). Umgeni River Catchment Analysis. *Water SA*, *1*(2), 70–75.

Van Dyke, R. M. (2019). Chaco gathers: Experience and assemblage in the ancient Southwest. In S. M. Alt & T. R. Pauketat (Eds.), *New Materialisms: New Urbanisms* (pp. 40–64). Routledge.

Van Esterik, P. (1979). Symmetry and Symbolism in Ban Chiang Painted Pottery. *Journal of Anthropological Research*, *35*(4), 495–508.

van Esterik, P. (1981). *Cognition and design production in Ban Chiang Painted Pottery*. Ohio University Center for International Studies South Asia Program.

Van Esterik, P. (2023). Designs on Pots Ban Chiang and the Politics of Heritage in Thailand. In *Designs on Pots*. Amsterdam University Press. https://doi.org/10.5117/9789463728461

Van Oyen, A. (2015). Actor-Network Theory ’s Take on Archaeological Types: Becoming , Material Agency and Historical Explanation. *Cambridge Archaeological Journal*, *March*, 63–78. https://doi.org/10.1017/S0959774314000705

Van Oyen, A. (2016). Networks or Work-nets? Actor-Network Theory and Multiple Social Topologies in the Production of Roman Terra Sigillata. In T. Brughmans, A. Collar, & F. Coward (Eds.), *The Connected Past Challenges to Network Studies in Archaeology and History* (pp. 35–58). Oxford University Press.

van Schalkwyk, L. (1991). *Society in transformation: Early Iron Age mixed farming communities in the lower Thukela Basin, Zululand*.

van Schalkwyk, L. (1994a). Mamba confluence: a preliminary report on an Early Iron Age industrial centre in the lower Thukela Basin, Natal. *Natal Musuem Journal of Humanities*, *6*, 119–152.

van Schalkwyk, L. (1994b). Settlement Shifts and Socio-Economic Transformations in Early Agriculturist Communities in the lower Thukela Basin. *Azania: Archaeological Research in Africa*, *29–30*(1), 187–198. https://doi.org/10.1080/00672709409511671

van Schalkwyk, L. (1994c). Wosi: an Early Iron age village in the lower Thukela Basin, Natal. *Natal Museum Journal of Humanities*, *6*, 65–117.

van Schalkwyk, L., Greenfield, H., & Jongsma, T. (1997). The Early Iron Age site of Ndondondwane, KwaZulu-Natal, South Africa: Preliminary Report on the 1995 Excavations. *Southern African Field Archaeology*, *6*(2), 61–77.

Vogel, C. (1983). *The traditional wall art of the Pedi of Sekhukhune Land.* [Master's thesis, University of the Witwatersrand.

Vogel, C. (1984). Traditional mural art of the Pedi of Sekhukhuneland. *Africa Insight*, *14*(4), 283–285.

Vogel, J. (1970). Early Iron Age tools from Chundu Farm,Zambia. . *Azania*, 173–178.

Voigt, E. A., & Peters, J. (1994). The faunal assemblage from Wosi in the Thukela Valley. *Natal Museum Journal of Humanities*, 105–117.

Voigt, E. A., & Von Den Driesch, A. (1984). Preliminary report on the faunal assemblage from Ndondondwane, Natal. *Annals of the Natal Museum*, *26* (1), 95–104.

Wallaert, H. (2008). The Way of the Potter's Mother: Apprenticeship Strategies among the Dii Potters of Cameroon, West Africa. In *Cultural Transmission and Material Culture: Breaking Down Boundaries* (pp. 178–198).

Wallaert, H. (2012). Apprenticeship and the Confirmation of Social Boundaries. In *Archaeology and Apprenticeship: body knowledge, identity, and communities of practice* (pp. 20–42).

Wallaert-Pêtre, H. (2001). Learning How to Make the Right Pots: Apprenticeship Strategies and Material Culture, a Case Study in Handmade Pottery from Cameroon. *Journal of Anthropological Research*, *57*(4), 471–493. https://doi.org/10.2307/3631356

Wallis, N. J. (2013). The Materiality of Signs: Enchainment and Animacy in Woodland Southeastern North American Pottery. *American Antiquity*, *78*(2), 207–226. https://doi.org/10.7183/0002-7316.78.2.207

Warnier, J.P. (1993). The King as a Container in the Cameroon Grassfields. *Paideuma: Mitteilungen Zur Kulturkunde*, 303–319.

Washburn, D. K. (1977). A symmetry analysis of Upper Gila area ceramic design. In *Papers of the Peabody Museum of Archaeology and Ethnology* (Issue 68). Harvard University Press.

Washburn, D. K. (1978). A symmetry classification of Pueblo ceramic design. In Paul. Grebinger (Ed.), *Discovering past behavior: experiments in the archaeology of the American southwest* (pp. 101–121). Gordon and Breach.

Washburn, D. K. (1983a). Structure and cognition in art (D. K. Washburn Ed.). Cambridge University Press. https://doi.org/10.2307/2802270

Washburn, D. K. (1983b). Symmetry analysis of ceramic design: two tests of the method on Neolithic material from Greece and the Aegean. In *Structure and cognition in art* (pp. 138–164). Cambridge University Press. https://doi.org/10.2307/2802270

Washburn, D. K. (1984a). A Study of the Red on Cream and Cream on Red Designs on Early Neolithic Ceramics from Nea Nikomedeia. *American Journal of Archaeology*, *88*(3), 305. https://doi.org/10.2307/504554

Washburn, D. K. (1984b). The Usefulness of Typological Analysis for understanding aspects of Southwestern Prehistory: Some Conflicting Returns from Design Analysis. In *Regional Analysis of Prehistoric Ceramic Variation: Contemporary Studies of the Cibola Whitewares* (pp. 120–134).

Washburn, D. K. (1987). The Neighbor Factor: Basket Designs in Northern and Central California. *Journal of California and Great Basin Anthropology*, *9*(2), 146–173. http://www.jstor.org/stable/10.2307/27825304

Washburn, D. K. (1988). Analysis of Pattern structure by geometric symmetries. In *Textiles as Primary Sources: Proceedings of the First Symposium of the Textile Society of America, Minneapolis Institute of Art, September 16-18, 1988* (Issue Figure Id, pp. 40–49). Minneapolis: University of Minnesota Press.

Washburn, D. K. (1992). The structure of Black-on-White ceramic design from the Mimbres Valley. In David. T. Kirkpatrick & S. Duran, Meliha (Eds.), *Archaeology, art and anthropology: Papers in honor of J.J. Brody* (pp. 213–223). The Archaeological Society of New Mexico.

Washburn, D. K. (1993). Structural Analysis of Design on Navajo Sarapes from the Nineteenth Century. *ASNM*, *19*, 225–237.

Washburn, D. K. (1995). *Style, Perception, and Geometry* (pp. 101–122). https://doi.org/10.1007/978-1-4899-1097-4_4

Washburn, D. K. (1996). Social messages and Cultural Information in the Clothing of Southern Lao Women. *Expedition*, *38*(3), 19–23.

Washburn, D. K. (1998). Patterns at the Edge: Strategies of Looking at Nonrepresentational Art. In *Proceedings of the 20th Annual Conference of the Cognitive Science Society*.

Washburn, D. K. (2000). An Interactive Test of Color and Contour Perception by Artists and Non-Artists. *Leonardo*, *33*(3), 197–202. https://doi.org/10.1162/002409400552504

Washburn, D. K. (2001) Remembering things seen: experimental approaches to the process of information transmittal. *Journal of Archaeological Method and Theory*, *8*(1), 67–99. https://doi.org/10.1023/A:1009573932096

Washburn, D. K. (2003). The property of symmetry and the concept of ethnic style. In *Archaeological Approaches to Cultural Identity* (pp. 157–173). https://doi.org/10.4324/9780203111147

Washburn, D. K. (2004a). Symmetry Analysis of Ica Valley Ceramics: Insights into Ica-Inca Interactions. In *Symmetry Comes of Age: The Role of Pattern in Culture* (pp. 215–231).

Washburn, D. K. (2004b). The genesis of realistic and patterned representations. In D. K. Washburn (Ed.), *Embedded Symmetries: Natural and Cultural* (pp. 47–57). University of Nex Mexico Press. http://www.mi.sanu.ac.rs/vismath/bridges2005/crowe/index.html

Washburn, D. K. (2013). Symmetry Analysis of Hopi Yellow Wares: Regional, Temporal and Interpretive Studies. *Kiva*, *79*(2), 228–251. https://doi.org/10.1179/0023194014Z.00000000021

Washburn, D. K. (2018a). Cognitive archaeology: a symmetry/symmetry-breaking model for the analysis of societies. *Time and Mind*, *11*(2), 121–161. https://doi.org/10.1080/1751696X.2018.1468673

Washburn, D. K. (2018b). Symmetry Analysis of Step Fret Patterns on Ceramics and Other Media from Mesoamerican and the America Southwest: Continuities and Changes in a Shared Pattern System. In Y. P. Huntington, D. E. Arnold, & J. Minch (Eds.), *Ceramics of*

Ancient America : Multidisciplinary Approaches. (pp. 217–248). University of Florida Press.

Washburn, D. K. (2019). Mesoamerican Antecedents of Sikyatki-Style Geometric Patterns on Textiles Depicted in Murals from the American Southwest. *Latin American Antiquity*, *30*(1), 17–34. https://doi.org/10.1017/laq.2018.73

Washburn, D. K. (2021). Comparative Analysis of Three Analytical Methodologies for Polychrome Design: Ceramic Typology, Design Elements/Styles, and Design Symmetries on Chihuahuan Polychromes. *Journal of Archaeological Method and Theory*, 902–938. https://doi.org/10.1007/s10816-021-09542-6

Washburn, D. K., & Crowe, D. W. (1988). *Symmetries of Culture: Theory and Practice of Plane Pattern Analysis*. https://doi.org/umkc nichols qNK1570 .W34 1988

Washburn, D. K., Crowe, D. W., & Ahlstrom, R. (2010). A Symmetry Analysis of Design Structure: 1,000 Years of Continuity and Change in Puebloan Ceramic Design. *American Antiquity*, *75*(4), 743–772. https://doi.org/10.7183/0002-7316.75.4.743

Washburn, D. K., & Humphrey, D. (2001). Symmetries in the Mind: Production, Perception, and Preference for Seven One-Dimensional Patterns. *Visual Arts Research*, *27*(2), 57–68.

Washburn, D. K., & Matson, R. G. (1984). Use of Multidimensional Scaling to Display Sensitivity of Symmetry Analysis of Patterned Design to Spatial and Chronological Change: Examples from Anasazi Prehistory. In *Decoding Prehistoric Ceramics* (pp. 75–101).

Washburn, D. K., & Petitto, A. (1993). An ethnoarchaeological perspective on textile categories of identification and function. *Journal of Anthropological Archaeology*, *12*, 150–172.

Washburn, D. K., Vance, L., Gregovich, S., & Badawi, Z. (2023). Antecedents, Continuities, and Experimental Stages in a Design System: A Symmetry Analysis of Geometric Designs of the Mimbres Tradition. *KIVA*, *89*(1), 26–50. https://doi.org/10.1080/00231940.2022.2116537

Washburn, D. K., Vetter, K., Zhu, T., Korzh, N., & Knowles-Kellett, W. (2022). Visualizing Insights from Symmetry Analysis with Interactive ArcGIS Maps: Examples from the North American Southwest. *The SAA Archaeological Record*, *January 2022*, 10–16.

Wasserman, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications (Structural Analysis in the Social Sciences*. Cambridge University Press. https://doi.org/10.2307/2077235

Watson, P. J. (1977). Design Analysis of Painted Pottery. *American Antiquity*, *42*(3), 381–393. https://doi.org/10.2307/279063

Watt, R. (2020). *A contextual history of South African ceramics of the Twentieth and Twenty-First Centuries* [Doctorol dissertation, University of South Africa].

Watt, W. C. (1967). *Morphology of the Nevada cattlebrands and their blazons*.U.S. Department of Commerce, National Bureau of Standards

Watts, C. (2008). On Mediation and Material Agency in the Peircean Semeiotic. In *Material Agency* (pp. 187–207). Springer US. https://doi.org/10.1007/978-0-387-74711-8_10

Weidele, D., & Brughmans, T. (n.d.). *Introduction to Exploratory Network Analysis for Archaeologists using visone*. http://visone.info/html/download.html

Wenger, E. (2011). *Communities of Practices: A Brief Introduction*. 1–7. National Science Foundation (U.S.)

Wertheimer, M. (2010). A Gestalt Perspective on the Psychology of Thinking. *In: Glatzeder, B., Goel, V., Müller, A. (eds) Towards a Theory of Thinking. On Thinking. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-03129-8_4*

Whallon, R. (1968). Investigations of late prehistoric social organization in New York State. In L. Binford & S. Binford (Eds.), *New perspectives in archaeology* (pp. 223–244). Aldine.

Whallon, R. (1969). Reflections of social interaction in Owasco ceramic decoration. *Eastern States Archaeological Federation Bulletins*, *26/27*.

Whitelaw, G. (1993). Customs and settlement patterns in the first millennium AD: evidence from Nanda, an Early Iron Age site in the Mngeni Valley, Natal. *Natal Museum Journal of Humanities*, *5*, 47–81.

Whitelaw, G. (1994a). KwaGandaganda: settlement patterns in the Natal Early Iron Age. *Southern African Humanities*, *6*, 1–64. http://159.253.129.250/~africani/ojs/index.php/SAH/article/view/129

Whitelaw, G. (1994b). Towards an Early Iron Age worldview: Some ideas from KwaZulu-Natal. *Azania: Archaeological Research in Africa*, *29–30*(1), 37–50. https://doi.org/10.1080/00672709409511660

Whitelaw, G. (1996). Lydenburg revisited: another look at the Mpumalanga Early Iron Age sequence. *The South African Archaeological Bulletin*, *51*(164), 75–83. https://doi.org/10.2307/3888842

Whitelaw, G. (2005). Comment on Greenfield and Van Schalkwyk's article on Ndondondwane,

Whitelaw, G. (2008). A Brief history of Precolonial farming in KwaZulu-Natal. In B. Carton, J. Laband, & J. Sithole (Eds.), *Zulu Identities: Being Zulu, past and present* (pp. 47–61). Columbia University Press.

Whitelaw, G. (2012). Anthropology and History in the Southern African Iron Age. *African Studies*, *71*(1), 127–144. https://doi.org/10.1080/00020184.2012.668297

Whitelaw, G. (2013). Pollution concepts and marriage for the Southern African Iron Age. *Cambridge Archaeological Journal*, *23*(2), 203–225. https://doi.org/10.1080/00020184.2012.668297

Whitelaw, G. (2015). *Economy and cosmology in the Iron Age of KwaZulu-Natal,[*Doctoral dissertation, University of the Witwatersrand].

Whitelaw, G. (2019a). Homesteads, pots, and marriage in southeast southern Africa. In D. S. Whitley, J. H. N. Loubser, & G. Whitelaw (Eds.), *Cognitive Archaeology: Mind, Ethnography, and the Past in South Africa and Beyond* (pp. 152–183). Routledge. https://doi.org/10.4324/9781315157696-7

Whitelaw, G. (2019b). Ntshekane and the end of the Early Iron Age in KwaZulu-Natal. *The Digging Stick*, *37*(2), 1–4.

Whitelaw, G. (2019c). *Progress report on excavations at Ntshekane, conducted in terms of a permit from Amafa aKwaZulu-Natali (ref: 12/05)*.

Whitelaw, G. (2021). Zulu pottery and its production context. In J. Charlton, F. rankin-Smith, & A. Nettleton (Eds.), *Seen, Heard and Valued: WAM celebrates 40 years of the Standard Bank African Art Collection* (pp. 139–152). Witwatersrand University Art Museums.

Whitelaw, G., & Hall, S. (2016). Archaeological Context and the creation of social categories before the Zulu Kingdom. In C. Hamilton & N. Leibhammer (Eds.), *Tribing and Untribing the Archive: Identity and the Material Record in Southern KwaZulu-Natal in the Late Independent and Colonial Periods* (Vol. 1, pp. 147–182). University of KwaZulu-Natal Press.

Whitelaw, G., & Mazel, A. D. (2023). Archaeology of the Past Two Thousand Years in KwaZulu-Natal, South Africa. In *Oxford Research Encyclopedia of African History*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190277734.013.768

Whitelaw, G., & Moon, M. (1996). The ceramics and distribution of pioneer agriculturalists in KwaZulu-Natal. *Natal Museum Journal of Humanities*, *8*, 53–79.

Whittle, A., Healy, F., & Bayliss, A. (2011). *Gathering Time: Dating the Early Neolithic Enclosures of Southern Britain and Ireland*. Oxbow Books.

Widgren, M. (2010). Besieged palaeonegritics or innovative farmers: Historical political ecology of intensive and terraced agriculture in West Africa and Sudan. *African Studies*, *69*(2), 323–343. https://doi.org/10.1080/00020184.2010.499204

Wiessner, P. (1983). Style and Social Information in Kalahari San Projectile Points. *American Antiquity*, *48*(2), 253–276. https://doi.org/10.2307/280450

Wiessner, P. (1985). Style or isochrestic variation: a reply to Sackett. *American Antiquity*, *50*(1), 160–166.

Wiessner, P. (1989). Style and changing relations between the individual and society. In I. R. Hodder (Ed.), *The meanings of things: material culture and symbolic expression* (pp. 56–63). Unwin Hyman.

Willey, G. R., & Phillips, P. (1958). *Method and theory in American archaeology*. University of Chicago Press.

Willey, G. R., & Phillips, P. (1980). *A history of American archaeology*. W. H. Freeman and Company.

Wilmsen, E. N., Killick, D., Denbow, J. R., Daggett, A., & Thebe, P. C. (2019). Keeping up alliances: multifaceted values of pottery in eighth- to seventeenth-century eastern Botswana

as reconstructed by optical petrography. *Azania: Archaeological Research in Africa*. https://doi.org/10.1080/0067270X.2019.1650523 10.1080/0067270X.2019.1650523

Wilson, D. C. (1994). Identification and assessment of secondary refuse aggregates. *Journal of Archaeological Method and Theory*, *1*, 41–68.

Wilson, M. (1981). Nguni Markers. In J. B. Peires (Ed.), *Before and after Shaka: Papers in Nguni History* (pp. 145–157). Institute of Social and Economic Research, Rhodes University.

Wissler, C. (1914). Material Cultures of the North American Indians. *American Anthropologist*, *16*(3), 447–505. https://doi.org/10.1525/aa.1914.16.3.02a00030

Wissler, C. (1923). *Man and Culture*. Thomas Y. Crowell Company.

Wobst, M. (1977). Stylistic behavior and information exchange. In C. Cleland (Ed.), *Papers for the Director: research esays in honor of James B. Griffin* (Issue 61, pp. 317–342).

Wobst, M. (1999). Style in Archaeology or Archaeologists in Style. In *Material Meanings: Critical Approaches to the Interpretation of Material Culture* (pp. 118–132).

Woguia, D. L., Fagel, N., Pirard, E., Gourfi, A., Ngo bidjeck, L. M., & El ouahabi, M. (2021). Talc schist deposits from central Cameroon: Mineralogical and physico-chemical characterization. *Journal of African Earth Sciences*, *178*. https://doi.org/10.1016/j.jafrearsci.2021.104182

Woods, H. J. (1935a). The geometrical basis of pattern design. Part I: Point and Line Symmetry in Simple Figures and Borders. *Journal of the Textile Institute Transactions*, *26*(6), T197–T210. https://doi.org/10.1080/19447023508661654

Woods, H. J. (1935b). The geometrical basis of pattern design: Part II—Nets and sateens. *Journal of the Textile Institute Transactions*, *26*(10), T293–T308. https://doi.org/10.1080/19447023508661660

Woods, H. J. (1935c). The geometrical basis of pattern design: Part III—Geometrical symmetry in plane patterns. *Journal of the Textile Institute Transactions*, *26*(12), T341–T357. https://doi.org/10.1080/19447023508661663

Woods, H. J. (1936). The geometrical basis of pattern design: Part IV: Counterchange symmetry in plane patterns. *Journal of the Textile Institute Transactions*, *27*(12), T305–T320. https://doi.org/10.1080/19447023608661695

Wright, J. (2010). Putting Bokoni on the historian's map. *African Studies*, *69*(2), 229–233. https://doi.org/10.1080/00020184.2010.499199

Zaslow, B. (1980). Mirror Orientation in Hohokam Designs and the Chronology of Early Hohokam Phases. In *Source: Kiva , Spring* (Vol. 45, Issue 3).

Zaslow, B. (1981). *A guide to analyzing prehistoric ceramic decoration by symmetry and pattern mathematics*. Department of Chemistry Arizona State University.

Zaslow, B. (1986). Symmetry and Contemporary Hopi Art. *Kiva*, *51*(4), 233–253. https://doi.org/10.1080/00231940.1986.11758060

Zaslow, B. (1990). On the use of symmetry as an archaeological and anthropological tool. *Symmetr: Culture and Science*, *1*(1), 49–56.

Zaslow, B., & Dittert, A. E. (1981). *Pattern theory used as an archaeological tool: A preliminary statement*.

Appendix A

Table A.1 Unmodeled calibrated radiocarbon assays. Dates were calibrated using OxCal v4.4.4. Bronk Ramsey (2021); r5 Atmospheric data from Hogg et al., 2020

Name	from	to	%	from	to	%	mu	sigma	median
Charcoal									
1,-10,0	-1.24	-0.05	68.268949	-3.19	-0.05	95.449974	-1.05042	0.997485	-0.74
0,3	2.21E-17	3	68.268949	2.21E-17	3	95.449974	1.515	0.865982	1.515
Start Msuluzi									
Msuluzi									
Pta-5492 (1580,50)	438	585	68.268949	417	635	95.449974	519	59	524
Pta-2195 (1310,40)	680	842	68.268949	674	875	95.449974	760	60	744
Pta-2197 (1370,30)	661	770	68.268949	652	774	95.449973	715	40	715
Pta-2874 (1360,50)	660	772	68.268949	640	860	95.449973	726	54	722
Pta-3716 (1320,50)	675	837	68.26895	661	880	95.449974	758	63	745
Pta-2878 (1400,50)	640	771	68.268949	596	774	95.449974	694	53	679
Pta-4100 (1460,50)	593	664	68.268949	540	769	95.449974	629	47	629
Pta-4104 (1430,60)	598	768	68.268949	544	774	95.449973	663	63	655
Wits-1917 (1275,60)	689	882	68.26895	669	966	95.449973	804	76	808
Wits-1918 (1395,60)	640	772	68.268949	582	850	95.449974	701	62	690
Wits-1938 (1315,60)	675	849	68.268949	651	890	95.449974	768	71	757
Pta-2881 (1270,60)	689	885	68.268949	672	968	95.449974	809	77	812
Pta-002 (1320,40)	678	827	68.268949	667	871	95.449974	750	57	737
Pta-2019 (1340,60)	661	830	68.26895	646	881	95.449974	747	66	739
Pta-4900 (1340,60)	661	830	68.26895	646	881	95.449974	747	66	739
Pta-4917 (1330,50)	670	829	68.268949	657	875	95.449973	749	61	739
Pta-4303 (1300,50)	683	865	68.268949	670	886	95.449974	776	67	772
Pta-4684 (1290,50)	687	872	68.268949	670	892	95.449974	786	68	791
Msuluzi Span									
End Msuluzi									

Start Ndondondwane									
Ndondondwane									
Pta-2388 (1220,50)	774	961	68.268949	691	990	95.449973	861	72	864
Pta-2389 (1190,50)	775	989	68.268949	772	994	95.449974	895	69	906
Pta-2875 (1190,50)	775	989	68.268949	772	994	95.449974	895	69	906
Pta-4093 (1390,50)	644	771	68.268949	598	831	95.449973	703	52	692
Pta-4094 (1290,50)	687	872	68.268949	670	892	95.449974	786	68	791
Pta-4095 (1270,60)	689	885	68.268949	672	968	95.449974	809	77	812
Pta-4114 (1300,50)	683	865	68.268949	670	886	95.449974	776	67	772
Pta-4132 (1290,50)	687	872	68.268949	670	892	95.449974	786	68	791
Pta-4137 (1300,50)	683	865	68.268949	670	886	95.449974	776	67	772
Pta-4164 (1170,60)	775	1012	68.268949	772	1022	95.449974	909	73	920
Pta-4687 (1180,50)	778	990	68.268949	772	1017	95.449974	906	66	918
Pta-4695 (1180,50)	778	990	68.268949	772	1017	95.449974	906	66	918
Pta-5865 (1250,40)	775	884	68.268949	687	963	95.449973	827	62	830
Pta-6982 (1270,50)	691	883	68.26895	678	959	95.449973	806	70	813
Wits-1919 (1245,60)	693	957	68.26895	683	987	95.449974	833	79	835
Wits-1937 (1260,60)	690	889	68.268949	676	972	95.449974	818	78	821
Pta-3268 (1080,70)	898	1138	68.26895	775	1181	95.449973	1012	85	1010
Ndondondwane Span									
End Ndondondwane									
Start Ntshekane									
Ntshekane									
Pta-1057 (1100,50)	899	1027	68.26895	886	1144	95.449974	984	63	989
Pta-1058 (1150,45)	894	991	68.268949	773	1025	95.449973	936	53	939
Wits-1920 (1080,60)	900	1132	68.26895	890	1153	95.449974	1013	76	1010
Pta-2879 (1050,60)	991	1147	68.268949	895	1181	95.449973	1052	70	1047
Pta-2880 (1130,40)	897	1017	68.268949	888	1024	95.449974	953	45	959
Ntshekane Span									
End Ntshekane									

Start Blackburn									
Blackburn									
Pta-2527 (980,50)	1041	1154	68.268949	1021	1213	95.449974	1105	53	1104
Pta-2528 (930,50)	1048	1219	68.268949	1030	1262	95.449973	1142	61	1154
Pta-2534 (885,50)	1157	1267	68.268949	1047	1281	95.449974	1190	58	1198
Pta-162 (900,40)	1153	1226	68.268949	1047	1274	95.449973	1180	53	1189
Blackburn Span									
End Blackburn facies									

Table A.2 Modelled calibrated radiocarbon assays of 30 legacy dates were used for the study. Bayesian model #16. Dates were calibrated using OxCal v4.4.4. Bronk Ramsey (2021); r5 Atmospheric data from Hogg et al., 2020

Name	from	to	%	from	to	%	mu	sigma	median	Acomb	A	L	P	C
Charcoal	-16	3	68.268949	-71	3	95.449974	-15	25	-6					99.8
1,-10,0							-1.04552	1.00607	-0.73					100
0,3	0.09	1.653	68.268949	3.60E-17	1.662	95.449974	0.933415	0.503228	0.987		100			96
Start Msuluzi	645	705	68.268949	625	760	95.449974	682	33	677					98.7
Msuluzi														
Pta-5492 (1580,50)	591	728	68.26895	564	774	95.449974	656	55	643		60.1			98.4
Pta-2195 (1310,40)	690	750	68.268949	670	801	95.449974	729	34	725		120			99.3
Pta-2197 (1370,30)	670	771	68.268949	660	780	95.449974	720	36	718		94.1			99.4
Pta-2874 (1360,50)	680	759	68.268949	655	785	95.449974	722	36	720		109.1			99.2
Pta-3716 (1320,50)	686	755	68.268949	662	799	95.449974	728	35	724		119.4			99.3
Pta-2878 (1400,50)	662	769	68.268949	645	782	95.449974	712	40	710		102.1			99.1
Pta-4100 (1460,50)	636	767	68.268949	609	779	95.449974	688	47	678		92.1			98.8
Pta-4104 (1430,60)	653	768	68.268949	624	785	95.449974	704	44	701		101.4			99.1
Wits-1917 (1275,60)	687	755	68.268949	669	821	95.449974	734	39	727		94.6			99.2
Wits-1918 (1395,60)	668	766	68.268949	642	786	95.449974	714	40	713		108.9			99.1
Wits-1938 (1315,60)	686	756	68.268949	659	804	95.449974	728	37	724		117.5			99.1
Pta-2881 (1270,60)	687	755	68.268949	670	823	95.449974	734	40	728		90.8			99.2
Pta-002 (1320,40)	688	751	68.268949	669	792	95.449974	728	33	724		119.6			99.3
Pta-2019 (1340,60)	685	757	68.268949	654	795	95.449974	725	37	722		119.1			99.2
Pta-4900 (1340,60)	684	756	68.268949	654	794	95.449974	725	37	722		119.2			99.1
Pta-4917 (1330,50)	686	756	68.268949	660	795	95.449974	726	35	723		118.6			99
Pta-4303 (1300,50)	688	752	68.268949	667	811	95.449974	731	36	726		111.8			99.2
Pta-4684 (1290,50)	688	752	68.268949	670	817	95.449974	732	37	726		103.7			99.4

Msuluzi Span	11	202	68.268949	0	264	95.449974	132	73	129		99.2
End Msuluzi	720	781	68.268949	696	820	95.449974	756	31	754		99.4
Start Ndondondwane	775	853	68.268949	739	893	95.449974	814	39	812		99.5
Ndondondwane											
Pta-2388 (1220,50)	800	901	68.268949	775	956	95.449974	858	47	860	110.7	99.6
Pta-2389 (1190,50)	796	914	68.268949	777	964	95.449974	868	51	870	85.1	99.5
Pta-2875 (1190,50)	796	914	68.268949	777	964	95.449974	868	51	870	85.2	99.6
Pta-4093 (1390,50)	750	884	68.268949	706	915	95.449974	813	55	819	63.2	99.4
Pta-4094 (1290,50)	808	890	68.268949	735	925	95.449974	842	45	847	103.9	99.6
Pta-4095 (1270,60)	806	894	68.268949	760	955	95.449974	848	46	851	116.3	99.6
Pta-4114 (1300,50)	806	890	68.268949	731	921	95.449974	840	45	845	95.1	99.6
Pta-4132 (1290,50)	809	890	68.268949	733	924	95.449974	842	44	847	103.9	99.6
Pta-4137 (1300,50)	806	890	68.268949	731	921	95.449974	840	45	845	95.1	99.6
Pta-4164 (1170,60)	798	921	68.268949	776	971	95.449974	871	53	873	79.1	99.6
Pta-4687 (1180,50)	798	921	68.268949	777	967	95.449974	872	52	874	77.4	99.6
Pta-4695 (1180,50)	797	921	68.26895	777	967	95.449974	872	52	874	77.3	99.7
Pta-5865 (1250,40)	808	893	68.268949	773	930	95.449974	850	41	853	115.8	99.6
Pta-6982 (1270,50)	810	891	68.268949	738	947	95.449973	847	44	850	115.5	99.5
Wits-1919 (1245,60)	806	895	68.268949	772	958	95.449974	853	46	855	120	99.5
Wits-1937 (1260,60)	806	894	68.268949	767	960	95.449974	850	46	853	119	99.7
Pta-3268 (1080,70)	798	940	68.26895	776	1002	95.449974	889	59	896	52.8	99.7
Ndondondwane Span	0	185	68.268949	0	285	95.449974	136	84	132		99.6
End Ndondondwane	860	940	68.268949	800	975	95.449974	895	43	897		99.5
Start Ntshekane	913	1020	68.268949	822	1045	95.449974	952	66	968		98.7
Ntshekane											
Pta-1057 (1100,50)	970	1038	68.268949	899	1065	95.449974	997	42	1003	118.6	99.6
Pta-1058 (1150,45)	954	1030	68.268949	896	1050	95.449974	982	40	988	101.8	99.5
Wits-1920 (1080,60)	971	1046	68.268949	899	1102	95.449974	1004	47	1007	123.6	99.5

Pta-2879 (1050,60)	976	1053	68.268949	902	1120	95.449974	1015	50	1013	103.2	99.6
Pta-2880 (1130,40)	965	1031	68.268949	900	1050	95.449974	987	39	993	102.2	99.6
Ntshekane Span	0	91	68.268949	0	198	95.449974	71	60	55		99.2
End Ntshekane	986	1073	68.268949	912	1177	95.449974	1042	69	1028		99
Start Blackburn	1099	1207	68.268949	897	1237	95.449974	1115	107	1146		99.2
Blackburn											
Pta-2527 (980,50)	1117	1211	68.268949	1041	1218	95.449974	1141	49	1151	87.4	99.7
Pta-2528 (930,50)	1146	1217	68.268949	1047	1228	95.449974	1162	47	1172	113.1	99.7
Pta-2534 (885,50)	1155	1220	68.268949	1050	1272	95.449974	1181	44	1186	108.5	99.7
Pta-162 (900,40)	1158	1213	68.268949	1049	1266	95.449973	1178	41	1184	111.5	99.8
Blackburn Span	0	103	68.268949	0	181	95.449974	75	56	64		99.8
End Blackburn facies	1168	1262	68.268949	1059	1417	95.449973	1238	85	1220		99.1

Table A.3 Metadata of 39 radiocarbon assays used in the study

Sites	Site Code	**Region**	Material	Facies	Sample name #	Date	Error	Location	Depth	**Reference**
Msuluzi	Msz1	Upper Thukela Basin	Charcoal	Msz	Pta-2197	1370	30	Pit (Square D7)	45 cm	Maggs, 1980
	Msz2	Upper Thukela Basin	Charcoal	Msz	Pta-2195	1310	40	Pit (Square E3)	90 cm	Maggs, 1980
Magogo	Mag1	Upper Thukela Basin	Charcoal	Msz	Pta-2874	1360	50	Pit 1	500cm	Maggs & Ward, 1984
	Mag2	Upper Thukela Basin	Charcoal	Ndo	Pta-2875	1190	50	Pit 13B	40cm	Maggs & Ward, 1984
Mhlopeni	Mhl1	Upper Thukela Basin	Charcoal	Msz	Pta-2878	1400	50	Pit 1	Bottom half of pit	Maggs & Ward, 1984
Ntshekane	Ntsh1	Upper Thukela Basin	Charcoal	Ntsh	Pta-1058	1150	50	Pit (Feature O)	20-40 cm	Maggs & Michael, 1976
	Ntsh2	Upper Thukela Basin	Charcoal	Ntsh	Pta-1057	1100	50	Pit (Feature V)	140-220cm	Maggs & Michael, 1976
Ndondondwane	Ndo1	Lower Thukela Basin	Charcoal	Ndo	Pta-2388	1220	50	Pile of stones	50-60cm	Maggs, 1984
	Ndo2	Lower Thukela Basin	Charcoal	Ndo	Pta-2389	1190	50	Rich faunal concentration	40-50cm	Maggs, 1984
Wosi	Wz1	Lower Thukela Basin	Charcoal	Msz	Pta-4100	1460	50	Layer 3 (Grid II)	NaN	Van Schalkwyk, 1994
	Wz2	Lower Thukela Basin	Charcoal	Msz	Pta-4104	1430	60	Layer 4(Grid II)	NaN	Van Schalkwyk, 1994
	Wz3	Lower Thukela Basin	Charcoal	Ndo	Pta-4094	1290	50	Clay compaction (Grid I)	30 cm	Van Schalkwyk, 1994
	Wz4	Lower Thukela Basin	Charcoal	Ndo	Pta-4095	1270	60	Layer 2(Grid II)	NaN	Van Schalkwyk, 1994
Mamba	Mab1	Lower Thukela Basin	Bone	Ndo	Pta-4164	1170	60	clay structure (Feature OVI)	NaN	Van Schalkwyk, 1994
	Mab2	Lower Thukela Basin	Bone	Ndo	Pta-4114	1300	50	Midden (Feature AII)	30 cm	Van Schalkwyk, 1994
	Mab3	Lower Thukela Basin	Charcoal	Ndo	Pta-4093	1390	50	Midden (Feature AII)	30 cm	Van Schalkwyk, 1994
	Mab4	Lower Thukela Basin	Bone	Ndo	Pta-4137	1300	50	clay feature (Feature AVII)	NaN	Van Schalkwyk, 1994

	Mab5	Lower Thukela Basin	Bone	Ndo	Pta-4132	1290	50	Dung deposit (Feature AIV)	NaN	Van Schalkwyk, 1994
KwaGandaganda	Kwa1	uMngeni Valley	Charcoal	Msz	Wits-1918	1395	60	Square 25	NaN	Whitelaw, 1994
	Kwa2	uMngeni Valley	Charcoal	Msz	Wits-1938	1315	60	Square 25	NaN	Whitelaw, 1994
	Kwa3	uMngeni Valley	Charcoal	Ndo	Wits-1937	1260	60	Square 22	NaN	Whitelaw, 1994
	Kwa4	uMngeni Valley	Charcoal	Ndo	Wits-1919	1245	60	Square 22	NaN	Whitelaw, 1994
	Kwa5	uMngeni Valley	Charcoal	Ntsh	Wits-1920	1080	60	Square 14	NaN	Whitelaw, 1994
Nanda	Nad1	uMngeni Valley	Charcoal	Msz	Wits-1917	1275	60	Pit (Trench 1)	45 cm	Whitelaw, 1993
Inanda Quarry	InQ1	uMngeni Valley	Charcoal	Mzonjani	Pta-5492	1580	50	Pit 3	NaN	Whitelaw & Moon, 1996
2930 DB 43	InaDam1	uMngeni Valley	Charcoal	Msz	Pta-4303	1300	50	Pit 1	NaN	Whitelaw & Moon, 1996
Emberton Way	Emb1	Coastal Belt	Charcoal	Ntsh	Pta-2879	1050	60	Layer 2 (Hearth)	NaN	Horwitz et al., 1991
	Emb2	Coastal Belt	Charcoal	Ntsh	Pta-2880	1130	40	Layer 2(Base)	NaN	Horwitz et al., 1991
	Emb3	Coastal Belt	Charcoal	Msz	Pta-2881	1270	60	Layer 3	NaN	Horwitz et al., 1991
Mhlanga Lagoon	Mhlag1	Coastal Belt	Charcoal	Ndo	Pta-3268	1080	70	Midden	90-100 cm	Horwitz et al., 1991
Ntsitsana	Ntsi1	Eastern Cape	Charcoal	Msz	Pta-4684	1290	50	Spit 3(Pit 1)	150mm	Prins & Granger, 1993
	Ntsi2	Eastern Cape	Charcoal	Ndo	Pta-4687	1180	50	Pit 6	150mm	Prins & Granger, 1993
	Ntsi3	Eastern Cape	Charcoal	Ndo	Pta-4695	1180	50	Pit 5	200mm	Prins & Granger, 1993
Kulubele	Kulu1	Eastern Cape	Charcoal	Ndo	Pta-6982	1270	50	NaN	NaN	Binneman, 1996
	Kulu2	Eastern Cape	Charcoal	Ndo	Pta-5865	1250	40	NaN	NaN	Binneman, 1996
Mpame	Mpa1	Eastern Cape	NaN	Msz	Pta-2019	1340	60	NaN	NaN	Cronin, 1982
Mqandule	Mq1	Eastern Cape	Charcoal	Msz	Pta-4900	1340	60	NaN	NaN	Huffman, 2007/Vogel & Fuls, 1999
	Mq2	Eastern Cape	Charcoal	Msz	Pta-4917	1330	50	NaN	NaN	Huffman, 2007/Vogel & Fuls, 1999
Ndumu	Ndu1	Eastern Cape	Charcoal	Msz	Pta-002	1320	40	NaN	NaN	Vogel & Marais, 1971

Figure A.1 Bayesian radiocarbon model #16 for the Msuluzi Sequence

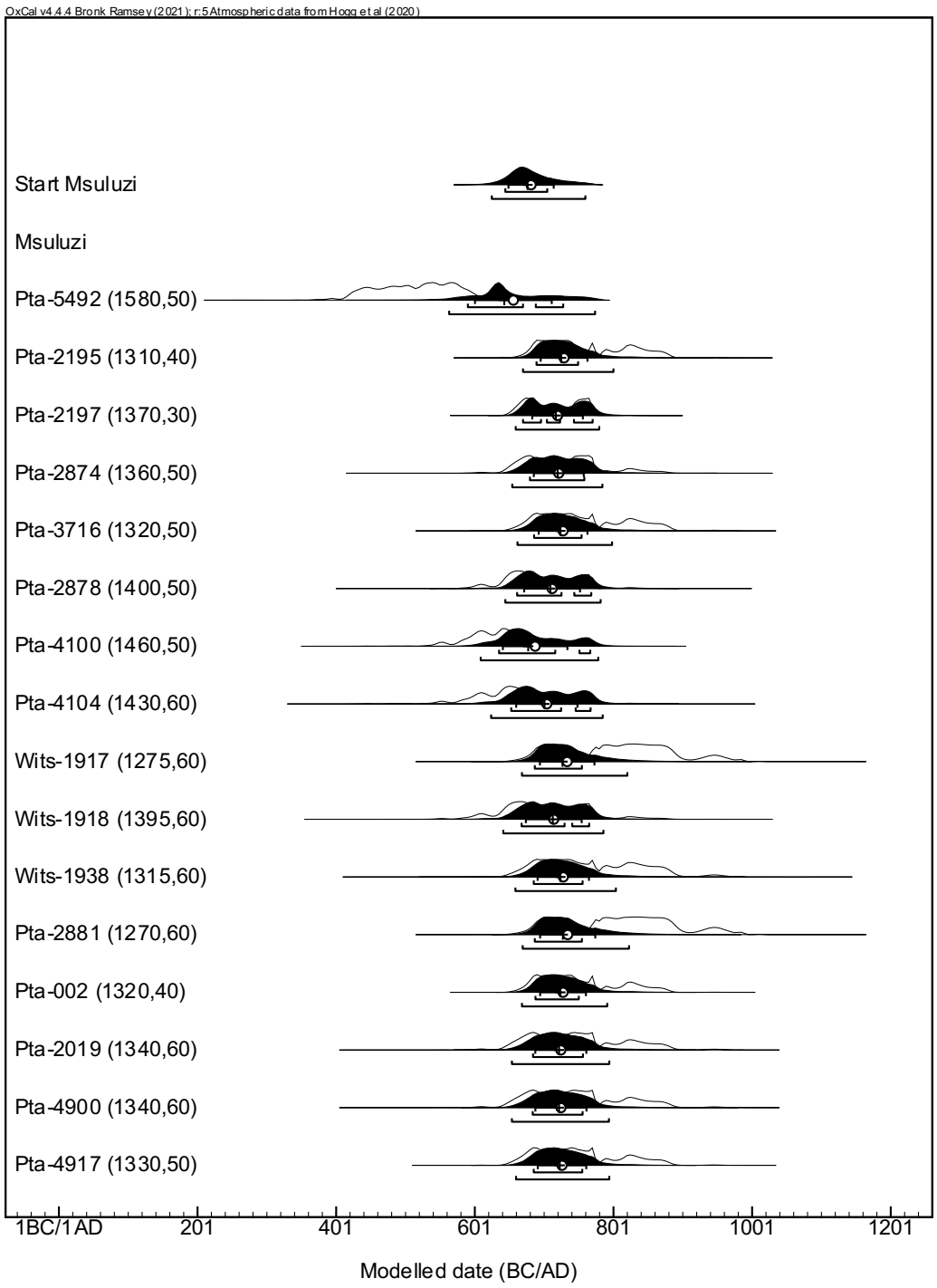


Figure A.1 continued Bayesian radiocarbon model #16 for the Msuluzi Sequence continued

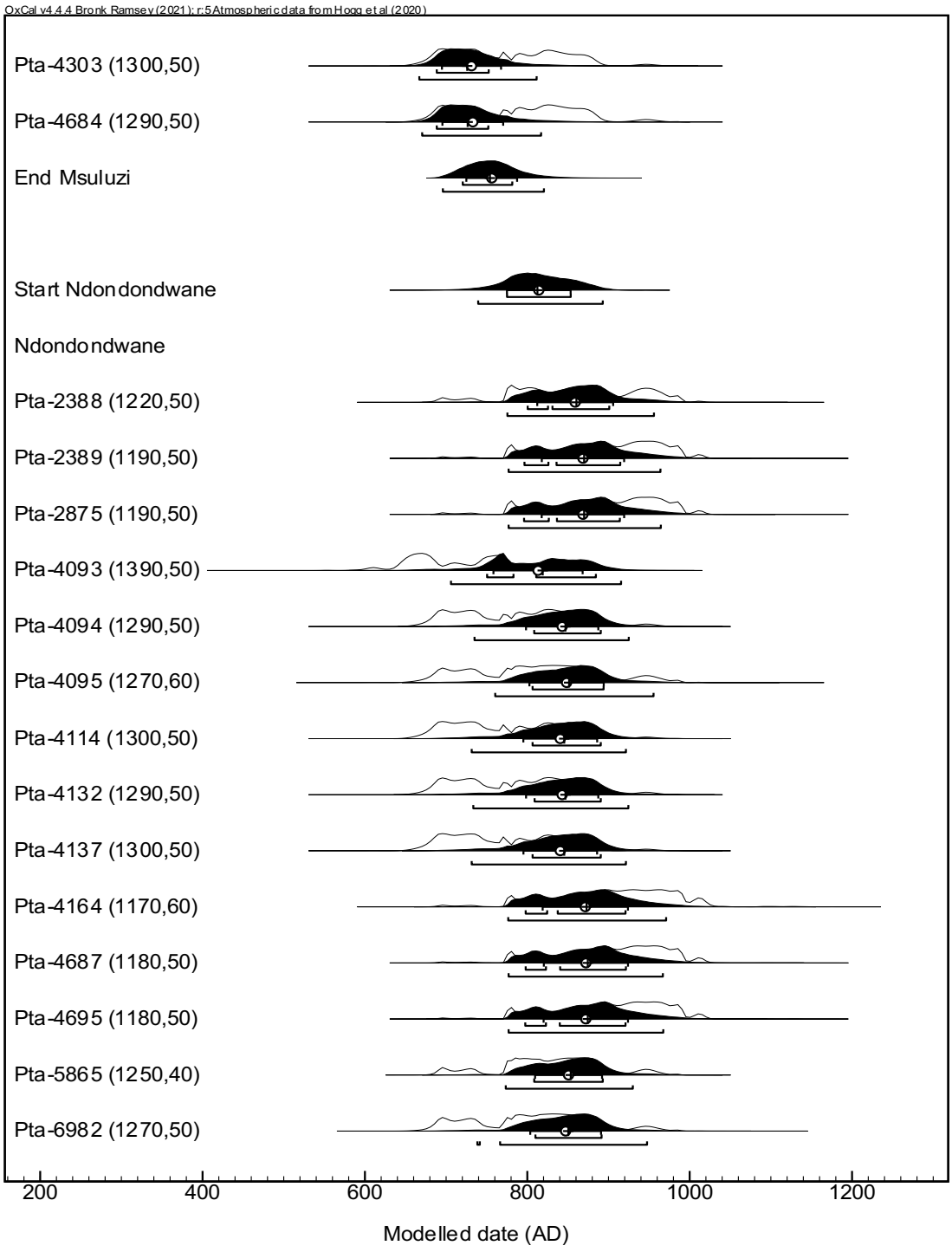


Figure A.1 continued Bayesian radiocarbon model #16 for the Msuluzi Sequence continued

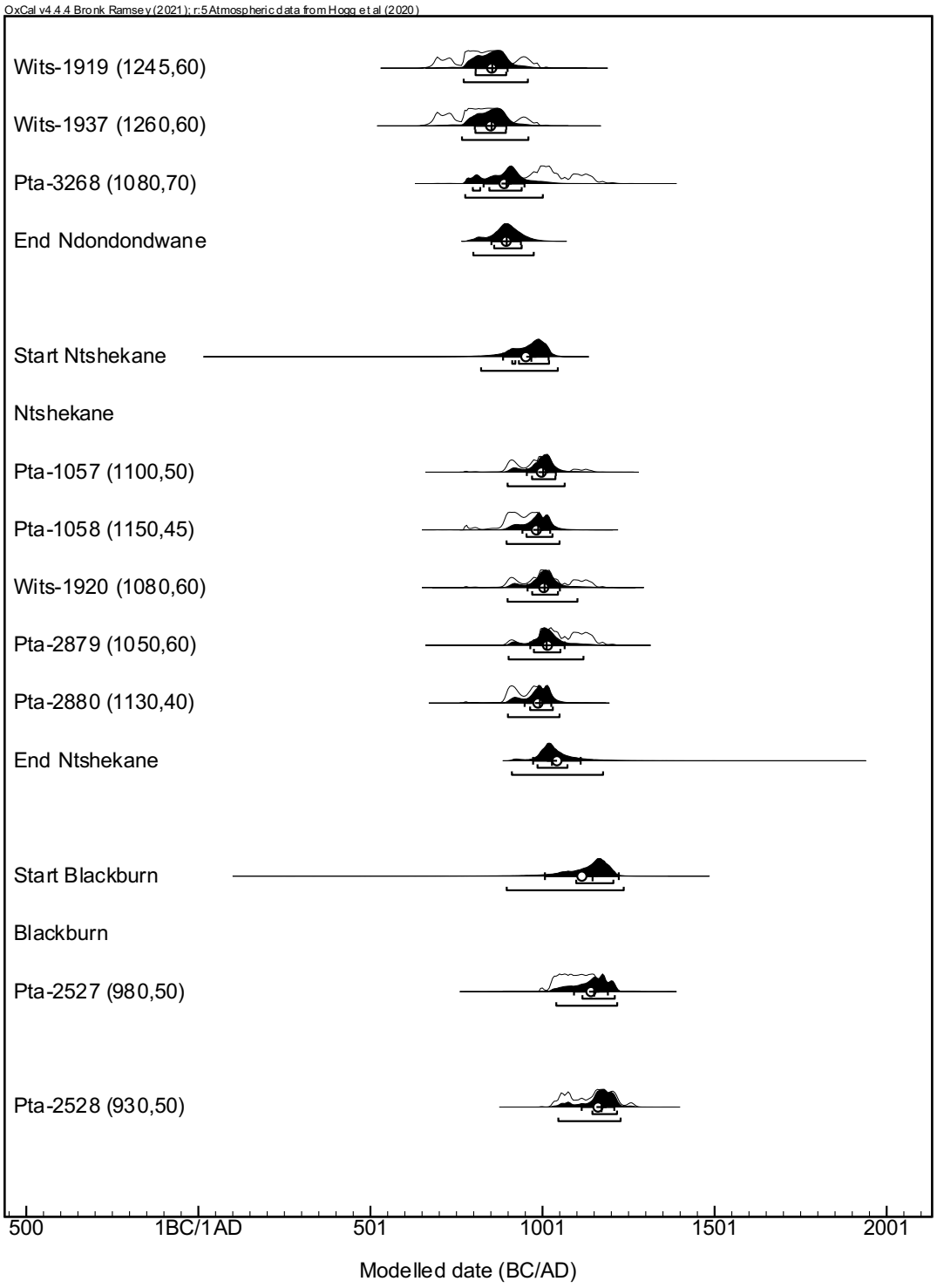


Figure A.1 continued Bayesian radiocarbon model #16 for the Msuluzi Sequence continued

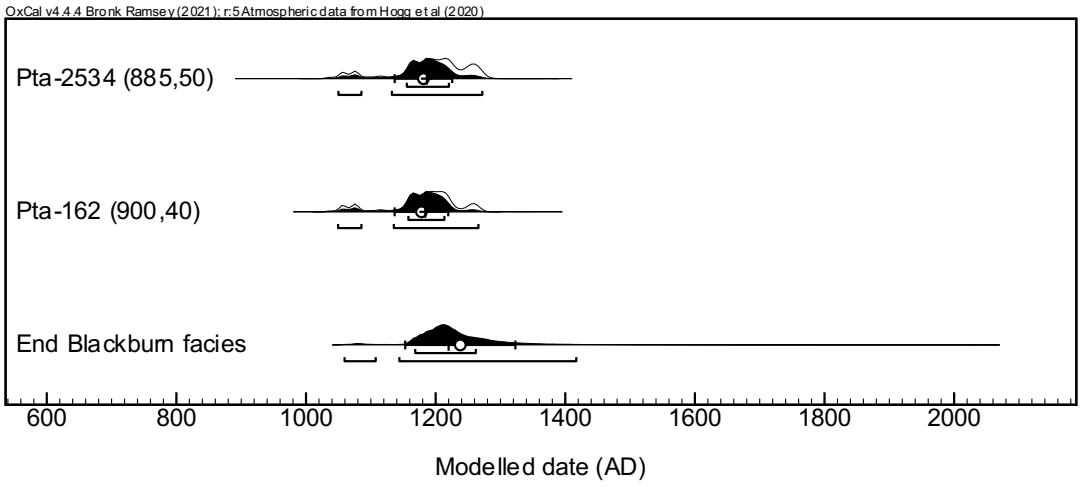


Table A.4 Brainerd-Robinson Coefficient of Similarity scores of Lower Thukela Basin apportioned periods

	MamII_a	Wosi_I	Nsuze_I	MamII_b	MamI_a	Wosi_II	Ndo_I	ShuShu_I	Nsuze_II	MamI_b	Wosi_III	Ndo_II	ShuShu_II	Nsuze_III	MamI_c	Ndo_III	ShuShu_III	Nsuze_IV
MamII_a	1	0.45833	0.52273	0.65	0.64706	0.41337	0.60101	0.325	0.54167	0.64151	0.36683	0.61674	0.70833	0.375	0.75	0.60147	0.25	0.39286
Wosi_I	0.45833	1	0.64935	0.61333	0.68627	0.86578	0.65806	0.71429	0.72619	0.71069	0.84781	0.65565	0.5873	0.41071	0.45833	0.70392	0.57143	0.28571
Nsuze_I	0.52273	0.64935	1	0.63273	0.62567	0.59112	0.579	0.36364	0.62121	0.66895	0.56744	0.56749	0.71717	0.76136	0.48864	0.59305	0.59091	0.5974
MamII_b	0.65	0.61333	0.63273	1	0.89176	0.58233	0.6372	0.4	0.58	0.85358	0.5251	0.65714	0.69333	0.485	0.605	0.66824	0.56	0.42286
MamI_a	0.64706	0.68627	0.62567	0.89176	1	0.6104	0.69329	0.43529	0.67647	0.92897	0.59477	0.70523	0.67974	0.47794	0.65441	0.73529	0.52941	0.37815
Wosi_II	0.41337	0.86578	0.59112	0.58233	0.6104	1	0.62171	0.71628	0.61783	0.65871	0.79204	0.63841	0.54832	0.38081	0.39942	0.67469	0.64186	0.27774
Ndo_I	0.60101	0.65806	0.579	0.6372	0.69329	0.62171	1	0.49963	0.82319	0.75012	0.69498	0.94743	0.75154	0.35009	0.61624	0.93744	0.30627	0.22773
ShuShu_I	0.325	0.71429	0.36364	0.4	0.43529	0.71628	0.49963	1	0.53333	0.44528	0.62157	0.51295	0.4	0.125	0.2	0.54118	0.4	0.14286
Nsuze_II	0.54167	0.72619	0.62121	0.58	0.67647	0.61783	0.82319	0.53333	1	0.70755	0.64706	0.79477	0.69444	0.45833	0.66667	0.83137	0.33333	0.22619
MamI_b	0.64151	0.71069	0.66895	0.85358	0.92897	0.65871	0.75012	0.44528	0.70755	1	0.62246	0.75118	0.7086	0.48349	0.63443	0.79656	0.5283	0.36927
Wosi_III	0.36683	0.84781	0.56744	0.5251	0.59477	0.79204	0.69498	0.62157	0.64706	0.62246	1	0.70788	0.57516	0.38562	0.3701	0.71373	0.53595	0.24183
Ndo_II	0.61674	0.65565	0.56749	0.65714	0.70523	0.63841	0.94743	0.51295	0.79477	0.75118	0.70788	1	0.76492	0.33437	0.59229	0.93703	0.29477	0.25167
ShuShu_II	0.70833	0.5873	0.71717	0.69333	0.67974	0.54832	0.75154	0.4	0.69444	0.7086	0.57516	0.76492	1	0.56944	0.56944	0.76667	0.44444	0.47619
Nsuze_III	0.375	0.41071	0.76136	0.485	0.47794	0.38081	0.35009	0.125	0.45833	0.48349	0.38562	0.33437	0.56944	1	0.5	0.35441	0.5	0.75
MamI_c	0.75	0.45833	0.48864	0.605	0.65441	0.39942	0.61624	0.2	0.66667	0.63443	0.3701	0.59229	0.56944	0.5	1	0.60588	0.29167	0.26786
Ndo_III	0.60147	0.70392	0.59305	0.66824	0.73529	0.67469	0.93744	0.54118	0.83137	0.79656	0.71373	0.93703	0.76667	0.35441	0.60588	1	0.33529	0.24286
ShuShu_III	0.25	0.57143	0.59091	0.56	0.52941	0.64186	0.30627	0.4	0.33333	0.5283	0.53595	0.29477	0.44444	0.5	0.29167	0.33529	1	0.33333
Nsuze_IV	0.39286	0.28571	0.5974	0.42286	0.37815	0.27774	0.22773	0.14286	0.22619	0.36927	0.24183	0.25167	0.47619	0.75	0.26786	0.24286	0.33333	1

Table A.5 Brainerd-Robinson Coefficient of Similarity scores of Lower Thukela Basin Msuluzi Sequence ceramic facies

	Nsuze(Msz)	Mamba II(Ndo)	Wosi(Msz)	Nsuze(Ndo)	Mamba I(Ndo)	Wosi(Ndo)	Ndo (Ndo)	ShuShu(Ndo)	Nsuze(Ntsh)
Nsuze(Msz)	1	0.69697	0.81996	0.63636	0.72494	0.72727	0.64392	0.83732	0.18182
Mamba II(Ndo)	0.69697	1	0.51693	0.63636	0.86597	0.51288	0.66503	0.66348	0.27273
Wosi(Msz)	0.81996	0.51693	1	0.55169	0.62443	0.7799	0.6397	0.8096	0.08824
Nsuze(Ndo)	0.63636	0.63636	0.55169	1	0.6958	0.52727	0.60614	0.66268	0.31818
Mamba I(Ndo)	0.72494	0.86597	0.62443	0.6958	1	0.61795	0.75226	0.74426	0.23077
Wosi(Ndo)	0.72727	0.51288	0.7799	0.52727	0.61795	1	0.69894	0.84031	0.15909
Ndo (Ndo)	0.64392	0.66503	0.6397	0.60614	0.75226	0.69894	1	0.68962	0.11654
ShuShu(Ndo)	0.83732	0.66348	0.8096	0.66268	0.74426	0.84031	0.68962	1	0.21053
Nsuze(Ntsh)	0.18182	0.27273	0.08824	0.31818	0.23077	0.15909	0.11654	0.21053	1

Table A.6 Brainerd-Robinson Coefficient of Similarity scores of Upper Thukela Basin Msuluzi Sequence ceramic facies

	Magogo(Msz)	Magogo(Msz/Ndo)	Magogo(Ndo)	Mhlopeni(Msz)	Msuluzi(Msz)	Ntshekane(Msz)	Ntshekane(Ndo)	Ntshekane(Ntsh)
Magogo(Msz)	1	0.8857749	0.7190806	0.76682	0.8869895	0.720632	0.6121694	0.6559194
Magogo(Msz/Ndo)	0.8857749	1	0.7	0.67368	0.8493199	0.6277512	0.5983553	0.6421053
Magogo(Ndo)	0.7190806	0.7	1	0.775	0.6926966	0.4780303	0.33125	0.375
Mhlopeni(Msz)	0.7668226	0.6736842	0.775	1	0.7239165	0.5835498	0.5151786	0.5027719
Msuluzi(Msz)	0.8869895	0.8493199	0.6926966	0.72392	1	0.7425945	0.6113062	0.6464364
Ntshekane(Msz)	0.720632	0.6277512	0.4780303	0.58355	0.7425945	1	0.7888258	0.7690638
Ntshekane(Ndo)	0.6121694	0.5983553	0.33125	0.51518	0.6113062	0.7888258	1	0.9231343
Ntshekane(Ntsh)	0.6559194	0.6421053	0.375	0.50277	0.6464364	0.7690638	0.9231343	1

Table A.7 Brainerd-Robinson Coefficient of Similarity of Upper Thukela Basin apportioned Msuluzi Sequence ceramic

	Magogo(AD600)	Mhlopeni (AD600)	Ntshekane(AD600)	Msuluzi(AD600)	Magogo(AD700)	Mhlopeni(AD700)	Ntshekane(AD700)	Msuluzi(AD700)	Magogo(AD800)	Ntshekane(AD800)	Ntshekane(AD900)	Ntshekane(AD100)
Magogo(AD600)	1	0.40952	0.54286	0.66429	0.78571	0.68177	0.55714	0.81118	0.92201	0.59725	0.58925	0.59804
Mhlopeni (AD600)	0.40952	1	0.5	0.4	0.47037	0.41379	0.31667	0.36232	0.42896	0.40385	0.27434	0.29452
Ntshekane(AD600)	0.54286	0.5	1	0.4	0.54815	0.43678	0.4	0.36957	0.56557	0.33974	0.28319	0.33562
Msuluzi(AD600)	0.66429	0.4	0.4	1	0.82407	0.71034	0.4	0.71159	0.7123	0.51154	0.46969	0.49589
Magogo(AD700)	0.78571	0.47037	0.54815	0.82407	1	0.79923	0.51296	0.71014	0.84007	0.55228	0.48607	0.54135
Mhlopeni(AD700)	0.68177	0.41379	0.43678	0.71034	0.79923	1	0.3569	0.65817	0.71198	0.53316	0.40159	0.44662
Ntshekane(AD700)	0.55714	0.31667	0.4	0.4	0.51296	0.3569	1	0.58696	0.53279	0.74615	0.80354	0.86027
Msuluzi(AD700)	0.81118	0.36232	0.36957	0.71159	0.71014	0.65817	0.58696	1	0.78914	0.71154	0.69155	0.68285
Magogo(AD800)	0.92201	0.42896	0.56557	0.7123	0.84007	0.71198	0.53279	0.78914	1	0.5476	0.53961	0.54839
Ntshekane(AD800)	0.59725	0.40385	0.33974	0.51154	0.55228	0.53316	0.74615	0.71154	0.5476	1	0.78199	0.81401
Ntshekane(AD900)	0.58925	0.27434	0.28319	0.46969	0.48607	0.40159	0.80354	0.69155	0.53961	0.78199	1	0.90817
Ntshekane(AD1000)	0.59804	0.29452	0.33562	0.49589	0.54135	0.44662	0.86027	0.68285	0.54839	0.81401	0.90817	1

Table A.8 Brainerd-Robinson Coefficient of Similarity of uMngeni Valley apportioned Msuluzi Sequence ceramic

	Kwa_I	In_dam_I	Nanda_I	In_q_I	2930DB48_I	Kwa_II	In_dam_II	Nanda_II	In_q_II	2930DB48_II	Kwa_III	In_dam_III	Nanda_III	2930DB48_III	Kwa_IV	Kwa_V	2930DB48_IV
Kwa_I	1	0.53226	0.77202	0.60887	0.70833	0.82044	0.66978	0.87893	0.40899	0.8027	0.84715	0.58065	0.70861	0.51855	0.69797	0.73223	0.47177
In_dam_I	0.53226	1	0.58333	0.5625	0.70833	0.63487	0.59211	0.57361	0.57143	0.5431	0.58472	0.375	0.74235	0.675	0.57404	0.54861	0.375
Nanda_I	0.77202	0.58333	1	0.58067	0.54787	0.7617	0.50429	0.84437	0.36981	0.62045	0.81298	0.36702	0.6891	0.63191	0.72058	0.69981	0.42553
In_q_I	0.60887	0.5625	0.58067	1	0.5	0.56012	0.35526	0.63841	0.69643	0.49138	0.58557	0.32292	0.50446	0.425	0.50537	0.58449	0.15625
2930DB48_I	0.70833	0.70833	0.54787	0.5	1	0.70549	0.78509	0.69032	0.40476	0.70977	0.64616	0.58333	0.78231	0.63333	0.57537	0.59028	0.5
Kwa_II	0.82044	0.63487	0.7617	0.56012	0.70549	1	0.71764	0.83892	0.43737	0.80421	0.91425	0.55388	0.85804	0.58755	0.86388	0.81813	0.52209
In_dam_II	0.66978	0.59211	0.50429	0.35526	0.78509	0.71764	1	0.61715	0.31955	0.82396	0.68443	0.63596	0.73255	0.46842	0.7236	0.66825	0.60526
Nanda_II	0.87893	0.57361	0.84437	0.63841	0.69032	0.83892	0.61715	1	0.38919	0.73168	0.887	0.49633	0.72354	0.57684	0.73375	0.74009	0.41925
In_q_II	0.40899	0.57143	0.36981	0.69643	0.40476	0.43737	0.31955	0.38919	1	0.37192	0.41606	0.2381	0.45918	0.34286	0.40036	0.46164	0.07143
2930DB48_II	0.8027	0.5431	0.62045	0.49138	0.70977	0.80421	0.82396	0.73168	0.37192	1	0.77313	0.56609	0.6981	0.4931	0.75126	0.72717	0.53448
Kwa_III	0.84715	0.58472	0.81298	0.58557	0.64616	0.91425	0.68443	0.887	0.41606	0.77313	1	0.49939	0.7764	0.53472	0.8467	0.80388	0.46507
In_dam_III	0.58065	0.375	0.36702	0.32292	0.58333	0.55388	0.63596	0.49633	0.2381	0.56609	0.49939	1	0.57653	0.35	0.52601	0.58565	0.66667
Nanda_III	0.70861	0.74235	0.6891	0.50446	0.78231	0.85804	0.73255	0.72354	0.45918	0.6981	0.7764	0.57653	1	0.62653	0.73476	0.70933	0.59184
2930DB48_III	0.51855	0.675	0.63191	0.425	0.63333	0.58755	0.46842	0.57684	0.34286	0.4931	0.53472	0.35	0.62653	1	0.52484	0.52361	0.4
Kwa_IV	0.69797	0.57404	0.72058	0.50537	0.57537	0.86388	0.7236	0.73375	0.40036	0.75126	0.8467	0.52601	0.73476	0.52484	1	0.88483	0.53822
Kwa_V	0.73223	0.54861	0.69981	0.58449	0.59028	0.81813	0.66825	0.74009	0.46164	0.72717	0.80388	0.58565	0.70933	0.52361	0.88483	1	0.47685
2930DB48_IV	0.47177	0.375	0.42553	0.15625	0.5	0.52209	0.60526	0.41925	0.07143	0.53448	0.46507	0.66667	0.59184	0.4	0.53822	0.47685	1

Table A.9 Brainerd-Robinson Coefficient of Similarity scores of uMngeni Valley Msuluzi Sequence ceramic facies

	Kwa_MSZ	Inandam_MSZ	Nanda_MSZ	Inanquar_MSZ	2930DB_MSZ	Kwa_Ndo	Inandam_Ndo	Inanquar_Ndo	2930DB_Ndo	Kwa_Ntsh
Kwa_MSZ	1	0.7708482	0.8780562	0.5957992	0.8308009	0.894551	0.5621882	0.4329498	0.5766215	0.80375
Inandam_MSZ	0.7708482	1	0.6673074	0.4021739	0.8582016	0.7464267	0.6268116	0.3664596	0.576087	0.68753
Nanda_MSZ	0.8780562	0.6673074	1	0.6342621	0.7389477	0.8565055	0.4828767	0.3919231	0.5267746	0.7461
Inanquar_MSZ	0.5957992	0.4021739	0.6342621	1	0.5	0.567529	0.3229167	0.6964286	0.34375	0.5834
2930DB_MSZ	0.8308009	0.8582016	0.7389477	0.5	1	0.7645941	0.5719697	0.4042208	0.5340909	0.70287
Kwa_Ndo	0.894551	0.7464267	0.8565055	0.567529	0.7645941	1	0.5128887	0.4228464	0.4959299	0.83967
Inandam_Ndo	0.5621882	0.6268116	0.4828767	0.3229167	0.5719697	0.5128887	1	0.2380952	0.5	0.58333
Inanquar_Ndo	0.4329498	0.3664596	0.3919231	0.6964286	0.4042208	0.4228464	0.2380952	1	0.3214286	0.45797
2930DB_Ndo	0.5766215	0.576087	0.5267746	0.34375	0.5340909	0.4959299	0.5	0.3214286	1	0.40716
Kwa_Ntsh	0.8037491	0.6875304	0.7460975	0.5834032	0.7028676	0.8396686	0.5833333	0.4579738	0.4071588	1

Table A.10 Brainerd-Robinson Coefficient of Similarity scores for the apportioned periods in the Coastal Belt

	Sink_I	Mhlan_I	Shrimp_I	Sink_II	Mhlan_II	Ember_I	Shrimp_II	Mhlan_III	Ember_II	Mhlan_IV	Ember_III
Sink_I	1	0.62319	0.26667	0	0.3	0.56667	0.36842	0.46154	0	0.66667	0.125
Mhlan_I	0.62319	1	0.41739	0.15217	0.5058	0.58735	0.5492	0.41472	0.16522	0.67391	0.2337
Shrimp_I	0.26667	0.41739	1	0.1	0.35	0.49545	0.72632	0.17692	0	0.2	0.225
Sink_II	0	0.15217	0.1	1	0.13333	0.05455	0.21053	0.07692	0	0.16667	0
Mhlan_II	0.3	0.5058	0.35	0.13333	1	0.55152	0.29123	0.55385	0.4	0.43333	0.4
Ember_I	0.56667	0.58735	0.49545	0.05455	0.55152	1	0.51388	0.56364	0.10909	0.55152	0.325
Shrimp_II	0.36842	0.5492	0.72632	0.21053	0.29123	0.51388	1	0.34008	0	0.42982	0.25
Mhlan_III	0.46154	0.41472	0.17692	0.07692	0.55385	0.56364	0.34008	1	0.46154	0.65385	0.58654
Ember_II	0	0.16522	0	0	0.4	0.10909	0	0.46154	1	0.16667	0.75
Mhlan_IV	0.66667	0.67391	0.2	0.16667	0.43333	0.55152	0.42982	0.65385	0.16667	1	0.29167
Ember_III	0.125	0.2337	0.225	0	0.4	0.325	0.25	0.58654	0.75	0.29167	1

Table A.11 Brainerd-Robinson Coefficient of Similarity scores of the Coastal Belt Msuluzi Sequence ceramic facies

	Sink_Msz	Sink_Ndo	Mhlanga_Msz	Mhlanga_Ndo	Mhlanga_Ntsh	Emberton_Msz	Emberton_Ndo	Emberton_Ntsh	Shrimp_Msz	Shrimp_Ndo
Sink_Msz	1	0	0.6578947	0.3809524	0.5	0.5144928	0.4666667	0.15	0.4166667	0.5
Sink_Ndo	0	1	0.1315789	0.0714286	0.0714286	0.1304348	0	0	0.25	0.4444444
Mhlanga_Msz	0.6578947	0.1315789	1	0.443609	0.4774436	0.6647597	0.4578947	0.2263158	0.5	0.5964912
Mhlanga_Ndo	0.3809524	0.0714286	0.443609	1	0.7142857	0.5590062	0.8571429	0.5	0.4285714	0.4761905
Mhlanga_Ntsh	0.5	0.0714286	0.4774436	0.7142857	1	0.4627329	0.7	0.5785714	0.3214286	0.4047619
Emberton_Msz	0.5144928	0.1304348	0.6647597	0.5590062	0.4627329	1	0.6304348	0.1934783	0.7282609	0.6618357
Emberton_Ndo	0.4666667	0	0.4578947	0.8571429	0.7	0.6304348	1	0.55	0.5	0.5222222
Emberton_Ntsh	0.15	0	0.2263158	0.5	0.5785714	0.1934783	0.55	1	0.15	0.15
Shrimp_Msz	0.4166667	0.25	0.5	0.4285714	0.3214286	0.7282609	0.5	0.15	1	0.6944444
Shrimp_Ndo	0.5	0.4444444	0.5964912	0.4761905	0.4047619	0.6618357	0.5222222	0.15	0.6944444	1

Table A.12 Each occupation's network measures from (a) Upper Thukela Basin, (b) Lower Thukela Basin, (c) uMngeni Valley, and (d) Coastal Belt

a

Site	Period	degree centrality	eigenvector centrality	betweenness centrality	closeness centrality
Mag_I	AD600	10	1	6.47	0.92
Mhl_I	AD600	1	0.05	0.00	0.39
Ntsh_I	AD600	4	0.38	10.00	0.61
Msz_I	AD600	6	0.70	0.00	0.65
Mag_II	AD700	9	0.92	48.00	0.85
Mhl_II	AD700	6	0.70	0.00	0.65
Ntsh_II	AD700	7	0.80	0.17	0.69
Msz_II	AD700	9	0.96	1.47	0.79
Mag_III	AD800	10	1.00	6.47	0.92
Ntsh_III	AD800	9	0.96	1.47	0.79
Ntsh_IV	AD900	6	0.70	0.00	0.65
Ntsh_V	AD1000	7	0.80	0.17	0.69

b

Site	Period	degree centrality	eigenvector centrality	betweenness centrality	closeness centrality
MamlI_a	AD600	8	0.65	0	0.61
Wosi_I	AD600	13	0.94	7.67	0.81
Nsuze_I	AD700	14	0.94	23.73	0.85
MamlI_b	AD700	13	0.96	5.34	0.81
Maml_a	AD700	13	1.00	2.01	0.81
Wosi_II	AD700	12	0.86	6.43	0.77
Ndo_I	AD700	13	1.00	2.01	0.81
ShuShu_I	AD800	3	0.22	0	0.49
Nsuze_II	AD800	12	0.95	0.98	0.77
Maml_b	AD800	13	1.00	2.01	0.81
Wosi_III	AD800	11	0.84	4.30	0.74
Ndo_II	AD800	13	1.00	2.01	0.81
ShuShu_II	AD900	13	0.95	8.64	0.81
Nsuze_III	AD900	3	0.17	0.74	0.53
Maml_c	AD900	9	0.72	0.13	0.63
Ndo_III	AD900	13	1.00	2.01	0.81
ShuShu_III	AD1000	4	0.31	0	0.57
Nsuze_IV	AD1000	2	0.09	0	0.49

c

Site	Period	degree centrality	eigenvector centrality	betweenness centrality	closeness centrality
Kwa_I	AD600	12	0.90	2.36	0.80
In_dam_I	AD600	11	0.75	10.88	0.76
Nanda_I	AD600	11	0.81	2.19	0.76
In_q_I	AD600	8	0.56	5.08	0.64
2930DB48_I	AD600	12	0.89	2.71	0.80
Kwa_II	AD700	14	1.00	4.89	0.89
In_dam_II	AD700	12	0.87	5.78	0.80
Nanda_II	AD700	13	0.95	3.00	0.84
In_q_II	AD700	2	0.12	0.00	0.48
2930DB48_II	AD700	11	0.86	0.84	0.73
Kwa_III	AD800	12	0.91	1.61	0.80
In_dam_III	AD800	8	0.58	1.85	0.64
Nanda_III	AD800	14	0.97	9.72	0.89
2930DB48_III	AD800	6	0.48	0.10	0.62
Kwa_IV	AD900	11	0.87	0.63	0.76
Kwa_V	AD1000	12	0.90	2.36	0.80
2930DB48_IV	AD1000	3	0.21	0.00	0.52

d

Site	Period	degree centrality	eigenvector centrality	betweenness centrality	closeness centrality
Sink_I	AD700	3	0.65	0.00	0.47
Mhlan_I	AD700	5	0.87	3.83	0.56
Shrimp_I	AD700	1	0.12	0.00	0.35
Sink_II	AD800	0	0.00	0.00	NaN
Mhlan_II	AD800	3	0.62	1.00	0.53
Ember_I	AD800	6	1.00	12.33	0.69
Shrimp_II	AD800	3	0.49	8.00	0.50
Mhlan_III	AD900	4	0.63	14.33	0.60
Ember_II	AD900	1	0.04	0.00	0.31
Mhlan_IV	AD1000	4	0.78	2.50	0.56
Ember_III	AD1000	2	0.17	8.00	0.43

Table A.13 Individual node measures from (a) AD 600, (b) AD 700, (c) AD 800, (d) AD 900, and (e) AD 1000

a

	Degree Centralities	Eigenvector Centralities	Betweenness Centralities	Closeness Centralities
Kwa	8	0.87	7.86	0.83
Inanda Dam site	6	0.72	1.37	0.67
Nanda	6	0.76	1.26	0.71
Inanda Quarry	5	0.62	1.18	0.67
2930DB48	7	0.81	3.91	0.77
MambaII	2	0.26	0.00	0.50
Wosi	9	1.00	6.27	0.91
Magogo	6	0.72	3.04	0.71
Mhlopeni	4	0.51	0.25	0.59
Ntshekane	3	0.43	0.00	0.59
Msuluzi	6	0.78	0.87	0.71

b

	Degree Centralities	Eigenvector Centralities	Betweenness Centralities	Closeness Centralities
Kwa	14	1	4.17	0.89
Inanda Dam	13	0.97	1.63	0.84
Nanda	14	1	4.17	0.89
Inanda Q	2	0.11	0.00	0.50
2930DB48	13	0.97	1.63	0.84
Nsuze	11	0.87	0.10	0.76
MambaII	12	0.86	5.58	0.80
Mamba I	13	0.93	6.98	0.84
Wosi	14	0.96	14.15	0.89
Ndo	13	0.97	1.63	0.84
Magogo	13	0.96	2.37	0.84
Mhlopeni	9	0.72	0.00	0.67
Ntshekane	3	0.20	0.00	0.50
Msuluzi	12	0.92	0.54	0.80
Sinkwazi	6	0.41	2.22	0.59
Mhlanga	12	0.89	1.76	0.80
Shrimp	8	0.57	2.08	0.64

c

	Degree Centralities	Eigenvector Centralities	Betweenness Centralities	Closeness Centralities
Kwa	8	0.85	3.79	0.72
Inanda Dam	5	0.59	0.00	0.57
Nanda	10	0.99	7.98	0.76
2930DB	3	0.31	0.00	0.54
ShuShu	8	0.90	1.31	0.68
Nsuze	8	0.90	1.31	0.68
Mamba I	10	0.94	12.62	0.81
Wosi	2	0.11	0.00	0.42
Ndo	4	0.43	0.33	0.57
Magogo	8	0.88	4.01	0.72
Ntshekane	5	0.44	6.49	0.62
Sinkwazi	0	0.00	0.00	NaN
Mhlanga	6	0.69	0.27	0.62
Emberton	10	1.00	9.80	0.81
Shrimp	5	0.42	5.08	0.59

d

	Degree Centralities	Eigenvector Centralities	Betweenness Centralities	Closeness Centralities
Kwa	2	0.42	12.00	0.50
ShuShu	3	1.00	10.00	0.44
Ndo	2	0.80	0.00	0.33
Mamba I	2	0.63	12.00	0.50
Ntshekane	2	0.80	0.00	0.33
Mhlanga	1	0.14	0.00	0.32
Emberton	1	0.14	0.00	0.32
Nsuze	3	0.31	11.00	0.44

e

	Degree Centralities	Eigenvector Centralities	Betweenness Centralities	Closeness Centralities
Kwa	3	1	3	0.8
2930DB48	1	0.43	0.00	0.50
ShuShu	2	0.87	0.00	0.67
Nsuze	1	0.00	0.00	1.00
Ntshekane	1	0.43	0.00	0.50
Mhlanga	3	1.00	3.00	0.80
Emberton	1	0.00	1.00	1.00

Table A.14 Brainerd-Robinson Coefficient of Similarity scores for AD 600

	Kwa	Inanda Dam site	Nanda	Inanda Quarry	2930DB48	Mamball	Wosi	Magogo	Mhlopeni	Ntshekane	Msuluzi
Kwa	1	0.53226	0.77202	0.60887	0.70833	0.63065	0.73925	0.7644	0.40054	0.58602	0.65161
Inanda Dam site	0.53226	1	0.58333	0.5625	0.70833	0.225	0.70833	0.46429	0.625	0.41667	0.575
Nanda	0.77202	0.58333	1	0.58067	0.54787	0.44184	0.63298	0.74113	0.29787	0.36879	0.78972
Inanda Quarry	0.60887	0.5625	0.58067	1	0.5	0.35625	0.625	0.5375	0.625	0.32292	0.5375
2930DB48	0.70833	0.70833	0.54787	0.5	1	0.43333	0.79167	0.55238	0.58333	0.58333	0.575
Mamball	0.63065	0.225	0.44184	0.35625	0.43333	1	0.51667	0.61429	0.33333	0.53333	0.5
Wosi	0.73925	0.70833	0.63298	0.625	0.79167	0.51667	1	0.75595	0.625	0.58333	0.7
Magogo	0.7644	0.46429	0.74113	0.5375	0.55238	0.61429	0.75595	1	0.40952	0.54286	0.66429
Mhlopeni	0.40054	0.625	0.29787	0.625	0.58333	0.33333	0.625	0.40952	1	0.5	0.4
Ntshekane	0.58602	0.41667	0.36879	0.32292	0.58333	0.53333	0.58333	0.54286	0.5	1	0.4
Msuluzi	0.65161	0.575	0.78972	0.5375	0.575	0.5	0.7	0.66429	0.4	0.4	1

Table A.15 Brainerd-Robinson Coefficient of Similarity scores for AD 700

	Kwagan	Inanda Dam	Nanda	Inanda Q	2930DB48	Nsuze	MambaII	Mamba I	Wosi	Ndo	Magogo	Mhlopeni	Ntshekane	Msuluzi	Sinkwazi	Mhlanga	Shrimp
Kwagan	1	0.80986	0.90831	0.42884	0.77475	0.65591	0.64924	0.6814	0.77392	0.81755	0.94245	0.7496	0.42995	0.80059	0.61514	0.86916	0.58615
Inanda Dam	0.80986	1	0.76899	0.33603	0.91407	0.70335	0.65895	0.7291	0.70526	0.77209	0.79498	0.65675	0.39474	0.78395	0.42982	0.7512	0.57895
Nanda	0.90831	0.76899	1	0.4289	0.76595	0.57343	0.63431	0.67997	0.78944	0.78823	0.91259	0.72089	0.48951	0.79427	0.65618	0.85315	0.5742
Inanda Q	0.42884	0.33603	0.4289	1	0.33281	0.32168	0.35692	0.37104	0.59785	0.31678	0.39965	0.37124	0.45192	0.34853	0.57692	0.43531	0.45299
2930DB48	0.77475	0.91407	0.76595	0.33281	1	0.6475	0.65143	0.7479	0.65524	0.85534	0.76735	0.63265	0.46939	0.70824	0.43197	0.75603	0.65306
Nsuze	0.65591	0.70335	0.57343	0.32168	0.6475	1	0.63273	0.62567	0.59112	0.579	0.62727	0.49407	0.27273	0.6633	0.34848	0.59091	0.45455
MambaII	0.64924	0.65895	0.63431	0.35692	0.65143	0.63273	1	0.89176	0.58233	0.6372	0.62091	0.41043	0.6	0.62321	0.36667	0.53	0.68
Mamba I	0.6814	0.7291	0.67997	0.37104	0.7479	0.62567	0.89176	1	0.6104	0.69329	0.69412	0.48338	0.58824	0.68845	0.34314	0.60294	0.70588
Wosi	0.77392	0.70526	0.78944	0.59785	0.65524	0.59112	0.58233	0.6104	1	0.62171	0.77389	0.6455	0.52849	0.74533	0.68837	0.72389	0.49664
Ndo	0.81755	0.77209	0.78823	0.31678	0.85534	0.579	0.6372	0.69329	0.62171	1	0.80018	0.58559	0.47232	0.69067	0.51353	0.75554	0.61255
Magogo	0.94245	0.79498	0.91259	0.39965	0.76735	0.62727	0.62091	0.69412	0.77389	0.80018	1	0.76403	0.40909	0.82379	0.63485	0.89545	0.54091
Mhlopeni	0.7496	0.65675	0.72089	0.37124	0.63265	0.49407	0.41043	0.48338	0.6455	0.58559	0.76403	1	0.21739	0.72303	0.47826	0.80632	0.43478
Ntshekane	0.42995	0.39474	0.48951	0.45192	0.46939	0.27273	0.6	0.58824	0.52849	0.47232	0.40909	0.21739	1	0.2963	0.54167	0.38636	0.77778
Msuluzi	0.80059	0.78395	0.79427	0.34853	0.70824	0.6633	0.62321	0.68845	0.74533	0.69067	0.82379	0.72303	0.2963	1	0.53086	0.80892	0.40741
Sinkwazi	0.61514	0.42982	0.65618	0.57692	0.43197	0.34848	0.36667	0.34314	0.68837	0.51353	0.63485	0.47826	0.54167	0.53086	1	0.64394	0.38889
Mhlanga	0.86916	0.7512	0.85315	0.43531	0.75603	0.59091	0.53	0.60294	0.72389	0.75554	0.89545	0.80632	0.38636	0.80892	0.64394	1	0.54545
Shrimp	0.58615	0.57895	0.5742	0.45299	0.65306	0.45455	0.68	0.70588	0.49664	0.61255	0.54091	0.43478	0.77778	0.40741	0.38889	0.54545	1

Table A.16 Brainerd-Robinson Coefficient of Similarity scores for AD 800

	Kwagan	Inanda Dam	Nanda	2930DB	ShuShu	Nsuze	Mamba I	Wosi	Ndo	Magogo	Ntshekane	Sinkwazi	Mhlanga	Emberton	Shrimp
Kwagan	1	0.49939	0.7764	0.53472	0.64095	0.6439	0.80232	0.43765	0.49948	0.90208	0.60049	0.13243	0.54418	0.61149	0.67927
Inanda Dam	0.49939	1	0.57653	0.35	0.58333	0.76786	0.45787	0.15991	0.45	0.50956	0.35897	0	0.66667	0.67576	0.32456
Nanda	0.7764	0.57653	1	0.62653	0.68027	0.70663	0.85502	0.22459	0.6449	0.73235	0.47684	0.12245	0.58231	0.68757	0.53169
2930DB	0.53472	0.35	0.62653	1	0.43333	0.38571	0.69607	0.24476	0.7	0.4623	0.39615	0	0.23333	0.44545	0.45263
ShuShu	0.64095	0.58333	0.68027	0.43333	1	0.69643	0.603	0.18378	0.53333	0.68169	0.28205	0.25	0.68333	0.60909	0.45175
Nsuze	0.6439	0.76786	0.70663	0.38571	0.69643	1	0.61998	0.22327	0.43214	0.6733	0.42308	0.125	0.70833	0.75909	0.48026
Mamba I	0.80232	0.45787	0.85502	0.69607	0.603	0.61998	1	0.32679	0.56236	0.73421	0.56828	0.1236	0.46479	0.61246	0.61428
Wosi	0.43765	0.15991	0.22459	0.24476	0.18378	0.22327	0.32679	1	0.14476	0.43788	0.68954	0.01874	0.16273	0.26955	0.57942
Ndo	0.49948	0.45	0.6449	0.7	0.53333	0.43214	0.56236	0.14476	1	0.45902	0.34615	0	0.33333	0.6	0.36842
Magogo	0.90208	0.50956	0.73235	0.4623	0.68169	0.6733	0.73421	0.43788	0.45902	1	0.5476	0.13934	0.61093	0.58778	0.6333
Ntshekane	0.60049	0.35897	0.47684	0.39615	0.28205	0.42308	0.56828	0.68954	0.34615	0.5476	1	0.01923	0.21154	0.55245	0.74696
Sinkwazi	0.13243	0	0.12245	0	0.25	0.125	0.1236	0.01874	0	0.13934	0.01923	1	0.13333	0.05455	0.21053
Mhlanga	0.54418	0.66667	0.58231	0.23333	0.68333	0.70833	0.46479	0.16273	0.33333	0.61093	0.21154	0.13333	1	0.55152	0.29123
Emberton	0.61149	0.67576	0.68757	0.44545	0.60909	0.75909	0.61246	0.26955	0.6	0.58778	0.55245	0.05455	0.55152	1	0.51388
Shrimp	0.67927	0.32456	0.53169	0.45263	0.45175	0.48026	0.61428	0.57942	0.36842	0.6333	0.74696	0.21053	0.29123	0.51388	1

Table A.17 Brainerd-Robinson Coefficient of Similarity scores for AD 900

	Kwa	ShuShu	Nsuze	Mamba I	Ndo	Ntshekane	Mhlanga	Emberton
Kwa	1	0.75	0.50318	0.48049	0.29595	0.47038	0.47232	0.21656
ShuShu	0.75	1	0.45833	0.64583	0.3576	0.44469	0.40385	0.25
Nsuze	0.50318	0.45833	1	0.3125	0.0775	0.18584	0.53846	0.625
Mamba I	0.48049	0.64583	0.3125	1	0.5775	0.68584	0.13942	0.0625
Ndo	0.29595	0.3576	0.0775	0.5775	1	0.79618	0.07299	0.01881
Ntshekane	0.47038	0.44469	0.18584	0.68584	0.79618	1	0.18584	0.07965
Mhlanga	0.47232	0.40385	0.53846	0.13942	0.07299	0.18584	1	0.46154
Emberton	0.21656	0.25	0.625	0.0625	0.01881	0.07965	0.46154	1

Table A.18 Brainerd-Robinson Coefficient of Similarity scores for AD 1000

	Kwa	2930DB48	ShuShu	Nsuze	Ntshekane	Mhlanga	Emberton
Kwa	1	0.47685	0.57639	0.33565	0.50824	0.6412	0.49306
2930DB48	0.47685	1	0.33333	0.47619	0.17123	0.5	0.33333
ShuShu	0.57639	0.33333	1	0.33333	0.21918	0.66667	0.45833
Nsuze	0.33565	0.47619	0.33333	1	0.15068	0.16667	0.75
Ntshekane	0.50824	0.17123	0.21918	0.15068	1	0.23973	0.28425
Mhlanga	0.6412	0.5	0.66667	0.16667	0.23973	1	0.29167
Emberton	0.49306	0.33333	0.45833	0.75	0.28425	0.29167	1

Appendix B. Oxcal script for Msuluzi Sequence. The primary model used: charcoal outlier, sigma boundaries, and an overlapping-phase model type.

Model 16

```
Options()
 {
  Curve="shcal20.14c";
 };
Plot()
 {
  Outlier_Model("Charcoal",Exp(1,-10,0),U(0,3),"t");
  Sequence()
  {
   Boundary ("Start Msuluzi");
   Phase("Msuluzi")
   {
    R_Date("Pta-2195", 1310, 40)
    {
     Outlier(“Charcoal”, 1);
    };
    R_Date("Pta-2197", 1370, 30)
    {
     Outlier(“Charcoal”, 1);
     };
    R_Date("Pta-2874", 1360, 50)
    {
     Outlier(“Charcoal”, 1);
     };
    R_Date("Pta-3716", 1320, 50)
    {
     Outlier(“Charcoal”, 1);
     };
    R_Date("Pta-2878", 1400, 50)
    {
     Outlier(“Charcoal”, 1);
     };
    R_Date("Pta-4104",1430,60)
    {
     Outlier(“Charcoal”, 1);
     };
```

```
 R_Date("Wits-1917",1275,60)
 {
  Outlier(“Charcoal l”, 1);
  };
 R_Date("Wits-1918",1395,60)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Wits-1938",1315,60)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-2881",1270,60)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-4303", 1300, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 Span("Msuluzi Span");
};
Boundary ("End Msuluzi");
Boundary ("Start Ndondondwane");
Phase("Ndondondwane")
{
 R_Date("Pta-2388", 1220, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-2389", 1190, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-2875", 1190, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-4093", 1390, 50)
 {
  Outlier(“Charcoal l”, 1);
  };
 R_Date("Pta-4094", 1290, 50)
 {
  Outlier(“Charcoal”, 1);
  };
```

```
 R_Date("Pta-4095", 1270, 60)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-4114", 1300, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-4132", 1290, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-4137", 1300, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-4164", 1170, 60)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Wits-1919", 1245, 60)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Wits-1937",1260,60)
 {
  Outlier(“Charcoal”, 1);
  };
 Span("Ndondondwane Span");
};
Boundary ("End Ndondondwane");
Boundary ("Start Ntshekane");
Phase("Ntshekane")
{
 R_Date("Pta-1057", 1100, 50)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Pta-1058", 1150, 45)
 {
  Outlier(“Charcoal”, 1);
  };
 R_Date("Wits-1920", 1080, 60)
 {
  Outlier(“Charcoal”, 1);
  };
```

```
   R_Date("Pta-2879", 1050, 60)
   {
    Outlier(“Charcoal”, 1);
    };
   R_Date("Pta-2880", 1130, 40)
   {
    Outlier(“Charcoal”, 1);
    };
   Span("Ntshekane Span");
  };
  Boundary ("End Ntshekane ");
    };
};
  Boundary ("Start Blackburn");
  Phase("Blackburn")
  {
   R_Date("Pta-1057", 1100, 50)
   {
    Outlier(“Charcoal”, 1);
    };
   R_Date("Pta-2528", 930, 50)
   {
    Outlier(“Charcoal”, 1);
    };
   R_Date("Pta-2534", 885, 50)
   {
    Outlier(“Charcoal”, 1);
    };
   R_Date("Pta-162", 900, 40)
   {
    Outlier(“Charcoal”, 1);
    };
   Span("Blackburn Span");
  };
  Boundary ("End Blackburn ");
    };
};
```