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RESEARCH

Cultural Developments Between the Final MSA and the Robberg at Umbeli Belli, KwaZulu-Natal, South Africa

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Abstract

The Early Later Stone Age (ELSA) in southern Africa is one of the most poorly understood periods in the subcontinent. This is due to a lack of sites covering the time between the final MSA and the Robberg, but also due to a lack of agreement on what the ELSA actually is. In this paper, we present the lithic evidence from the site Umbeli Belli (KwaZulu-Natal, South Africa), covering the period between ~29,000 and 17,000 years ago. We find the changes which happen over the 12,000 years in between the final Middle Stone Age (MSA) and the Robberg at this site to be gradual and identify continuous technological and typological shifts. We compare these results to the lithic assemblages on a regional and supra-regional level, and in doing so, we find the patterns evident at Umbeli Belli to be repeated across southern Africa. Linking this to the research historical development of the term ELSA, we conclude that the MSA/LSA boundary is highly artificial and has become more of a hindrance than a means of structure in current archaeological research.

Keywords Early Later Stone Age · Lithic technology · Transition · Cultural taxonomy

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Introduction

The transition between Early and Middle Stone Age (ESA and MSA) around 300 thousand years ago (ka BP) is linked to the emergence of *Homo sapiens* and associated with entirely different technological systems (see, e.g. Lombard et al. 2022 for a comprehensive overview of the chronological framework of the African Stone Age). The proposed subdivision between MSA and Later Stone Age (LSA) is different, since behavioural changes occur within the same species raising questions about potential drivers such as environment, society, demography, genetics and subsistence (Mellars & Stringer, 1989; Klein, 1995, 2000, 2009, 2019; but see McBrearty & Brooks, 2000; Scerri & Will, 2023; Tryon, 2019). The archaeological record and hence the potential to examine this transition or the validity of the concept is patchy. In their recent synthesis of the MSA of South Africa, Bader et al. (2022a) point towards potential taphonomic issues leading to better preservation of organic materials in the relatively young LSA as compared to the much older MSA. Meanwhile, almost all features that Deacon (1984) had identified as characteristic for the LSA and therefore used to distinguish the LSA from the MSA have been found in several MSA sites in southern Africa up to 40,000 years before the onset of the LSA (Backwell et al., 2008; Henshilwood et al., 2001; Texier et al., 2013). It remains open whether the transition between MSA and LSA is sharp, blurry or existing at all. An abrupt and quick transition from the MSA to the LSA was deemed to be specific to Mediterranean ecozones at the northern and southern fringes of the African continent, while for east and central Africa a long transition has been proposed (McBrearty & Brooks, 2000).

In his review on the MSA/LSA transition in east Africa, Tryon points out, that the understanding of a (evolutionary) transition depends on '[…] solid [1] chronological, [2] stratigraphic and [3] terminological frameworks […]' (Tryon, 2019, 276). Hence, we will examine the current state of research in southern Africa with respect to these three pillars.

[1] Regarding chronology, the timing of the ELSA in southern Africa has recently been examined by compiling radiometric dates from a multitude of sites, regions and biomes that have been linked to assemblages described as ELSA or simply because they predate the Robberg but postdate the final MSA. Bousman and Brink (2018) give a maximum range for the transition of 26,750 years, which is somewhat thwarted by their framing of the transition as the 'Early Later Stone Age event'. This long chronology stems from their acceptance of Border Cave as the earliest appearance of the ELSA in southern Africa and the assumption that the new technology spread from there leaving a chronological gap of more than 13,000 years unexplained. As recently pointed out by Bader et al. (Bader et al. 2022b), Border Cave cannot be accepted as the origin of the LSA since the site represents a clear outlier lacking support from any surrounding site. Contrary to Bousman and Brink (2018); Bader et al. (2022b) showed that there is strong evidence for a late persistence of MSA technologies in the eastern part of southern Africa and that Border Cave may represent one specific expression of the late MIS3 technologies which are characterized by strong regional and temporal variation (see also Bader

et al., 2022c). Following this assumption, the potential time frame for the transition from MSA to LSA is reduced to about 8000 years ranging from approximately 28 to 20 ka, but with great variability between sites.

[2] Almost 100 years of archaeological research in South Africa yielded many sites with long stratigraphies from the MSA and LSA. Thus, in general, we can consider the stratigraphic record for both periods as good. Sequences containing both final MSA and ELSA, however, are still scarce, especially along the South African west coast (Mackay et al. 2014). Sites that provided such stratigraphic sequences in southern Africa are Boomplaas (Deacon, 1979; Pargeter & Faith, 2020; Pargeter et al., 2018), Rose Cottage Cave (Clark, 1999; Loftus et al., 2019; McCall and Thomas, 2009; Wadley, 1997) (all South Africa), Sehonghong (Mitchell, 1995, 1996; Pargeter & Dusseldorp, 2020; Pargeter et al., 2017; Pargeter & Redondo, 2016) (Lesotho) and Apollo 11 (Ossendorf, 2013, 2017) (Namibia). White Paintings Rock Shelter (Botswana) might contain such a sequence (Robbins et al., 2000), but the data currently available are not suitable for a meaningful comparison. Sites that yielded ELSA and Robberg assemblages are Sehonghong (Mitchell, 1994, 1995, 1996; Pargeter & Dusseldorp, 2020; Pargeter et al., 2017; Pargeter & Redondo, 2016) (Lesotho), Boomplaas (Deacon, 1979; Pargeter & Faith, 2020; Pargeter et al., 2018), Heuningneskrans (Beaumont, 1981; Porraz & Val, 2019), Elands Bay Cave (Parkington, 1980; Porraz et al., 2016a; Porraz et al., 2016b; Tribolo et al., 2016), Rose Cottage Cave (Clark, 1997; Wadley, 1996, 1997) and Umhlatuzana (Kaplan, 1989, 1990; McCall & Thomas. 2009) (all South Africa).

[3] Concerning the terminology, ELSA has become the standard designation for assemblages which are not final MSA but predate the Robberg technocomplex in South Africa (Lombard et al., 2012, 2022; Porraz et al., 2016a). In absence of the Robberg technocomplex in Apollo 11, Namibia, Ossendorf (2013, 2017) uses the term Late Pleistocene Later Stone Age (LPLSA) to describe the assemblage postdating the final MSA. Additional complication was added as the terms Early Later Stone Age and MSA/LSA transition were sometimes used interchangeably by different authors, but Clark (1997), and more recently also Villa et al. (2012), argued for those terms to represent two separate chrono-cultural entities and made a distinction between the Final Pleistocene assemblages from Rose Cottage Cave and the assemblages characterized as Early Later Stone Age from Border Cave (Beaumont & Vogel, 1972; but see Villa et al., 2012). As research on the period between the final MSA and the Robberg increased and new assemblages have been published, the term Early Later Stone Age replaced the term MSA/LSA transition at least in the description and classification of assemblages. By retaining the division between the MSA and LSA, the concept of the transition was simply subsumed under the predominantly technological paradigm of the ELSA. Hence, there are two ways the current terminology can be understood:

(1) ELSA is to be seen as an extension of the 'classical' LSA succession and the LSA should be subdivided into ELSA, Robberg, Oakhurst, and Wilton (see Lombard et al., 2012, 2022). This would imply a relatively sharp break between MSA and LSA.

(2) The ELSA is not part of the ‘classic’ LSA succession, but also not part of the MSA and can in consequence be understood as transitional. In this reading of the term, the ELSA would have to be seen as entirely independent from the Early, Middle and Later Stone Age periodization.

Today, we know that there is a considerable time span between the earliest Robberg and the final MSA, which raises the question: What characterizes this time slice of about 8000 years? Firstly, this is an interesting epistemological problem. The existence of one or even several chronological units, that exist after the final MSA, but before the Robberg as ‘original’ LSA automatically means that these assemblages can only be described by disqualifying them to be ‘true’ LSA. In turn, by defining what is LSA in opposition to what is MSA, such chronological units must also disqualify to be MSA. Consequentially, we are left with the problem of how to fit something into pre-existing categories where no room was left to fit something, and the ELSA was only qualified by what it is not (see also Mitchell, 1994). In an attempt to describe the ELSA for what it is, Clark (1997) identified it to be the technological elements of blank production from the LSA, mainly bladelet production, bipolar flaking and core reduced pieces while preserving MSA tool types in the form of bifacial and unifacial tools.

In this paper, we attempt to compile the lithic evidence for the ELSA from southern Africa in order to add the techno-typological dimension to what lately has been focussed on chronology (Bousman and Brink, 2018). We will combine this evidence with data from a previously unpublished lithic assemblage originating from the site Umbeli Belli, yielding a stratigraphic sequence that comprises the final MSA (Bader et al., 2016), a Robberg layer (Bader et al., 2018; Blessing et al., 2022) and three layers in between.

Background to Umbeli Belli

Umbeli Belli is a rock shelter formed in the Natal sandstone group situated above the Mpambanyoni river valley in KwaZulu-Natal, South Africa (Fig. 1). Charles Cable’s first excavation at the site in 1979 particularly focussed on the uppermost layers comprising the last 2000 years of hunter-gatherers in southern Africa (Cable, 1984).

In 2016, a team from the University of Tübingen led by Gregor Bader and Nicholas Conard returned to the site and continued excavating Cable’s old trench (Bader et al., 2016, 2018). The extension of the old profile revealed a rich stratigraphic sequence of MSA and LSA occupations (Fig. 2), which has been described by Bader and colleagues previously (Bader et al., 2018, 2022b). The LSA sequence is subdivided into six units. Layers 1, 2BE and 2AL on top (following Cable’s taxonomy) were not covered by these recent excavations but have been published before (Cable, 1984). Accordingly, our analysis of the LSA horizons focusses on the geological horizons (GH) 3, 4, 5 and 6. GH 3 contained an assemblage attributed to the Robberg complex (Blessing et al., 2022). GH 4, 5 and 6 superimpose GH 7, which

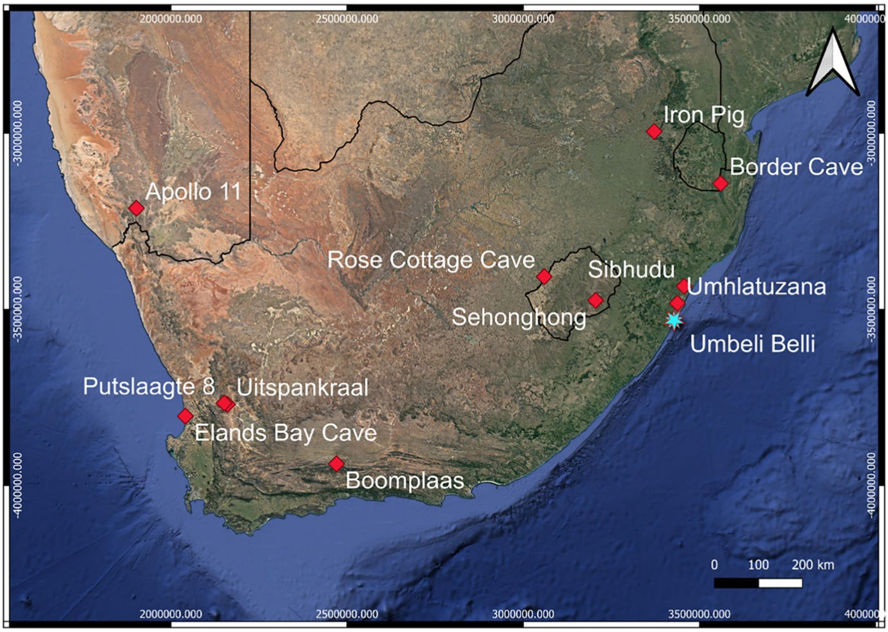

Fig. 1 Umbeli Belli in relation to other sites in southern Africa containing Early Later Stone Age assemblages (created with QGIS 3.32)

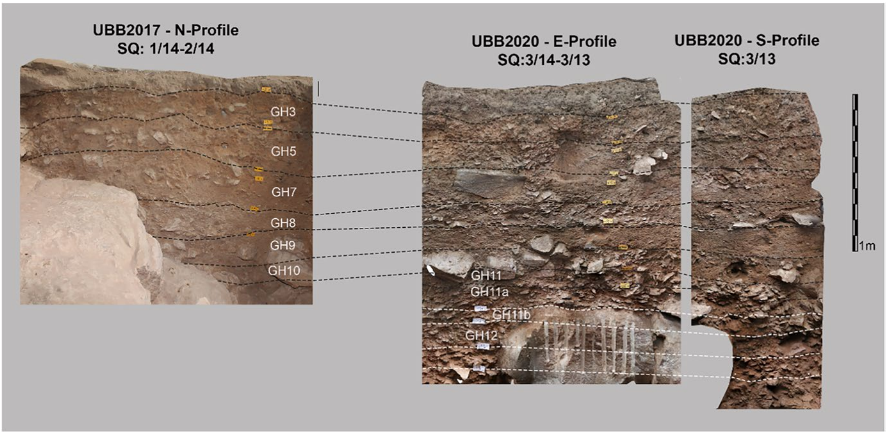

Fig. 2 Stratigraphic sequence of Umbeli Belli

yielded a rich final MSA assemblage published by Bader and colleagues (Bader et al., 2018, 2022c).

The OSL chronology of Umbeli Belli was recently revised (Tribolo et al., in prep.). For this article, we are using the new ages that are relevant here already. GH 5 was dated to 32 ± 3 and 29 ± 3 ka using OSL on quartz grains (Tribolo et al., (in prep.)). GH 4 and 6 have not been dated yet, but we can use the dates obtained from GH 7, 5 and 3 to build our chronological framework for those layers. The lower age limit for GH 6 is 35 ± 3 ka, imposed by GH 7. The upper limit for GH 6 is 29 ± 3 ka with respect to the younger date from GH 5. Consequently, GH 4 dates between at least 29 ± 3 ka and 21 ± 2 ka as indicated by the date from GH 3. The overall time frame for the transition from the MSA to the LSA and then into the Robberg is roughly 12,000 years, thus spanning the entire range for the ELSA given by Bousman and Brink (2018).

Materials and Methods

Excavation and Find Processing

The excavations at Umbeli Belli were undertaken following natural geological units, which approximate cultural stratigraphic units. Until bedrock was reached in 2020, 18 units were defined following a numerical system starting with 1 at the top and 15 at the bottom. In accordance with Cable's taxonomy (Cable, 1984), layer 2 is subdivided into 2BE and 2AL, and GH11 was split into 11a and b. Following the natural inclination of the sediments, these geological horizons were further subdivided into subunits of 1–3 cm thickness. Following the German taxonomy, and in the absence of a clear equivalent in English, we call these subunits '*Abtrag*' or in plural '*Abträge*'. For further details, see Bader et al. (2018). GH 4 and GH 6 represent a period of increased rockfall, but still contain artefacts. GH 5 (5YR, 4/6) consists of reddish-brown fine sand with significantly less quartzite spall than GH 4 and GH 6.

In square 3/13, GH 4 was excavated in 7 *Abträge*, in GH 5 in 6 *Abträge* and in GH 6 in 3 *Abträge*, allowing a high-resolution analysis of changes in lithic technology from bottom to top in this part of the sequence.

For our examination of GH 4, 5 and 6, we use lithic attribute analysis (Andrefsky, 1998; Auffermann et al., 1990; Odell, 2012; Scerri et al., 2016) as previously employed at Umbeli Belli (Bader et al., 2016, 2018, 2022c; Blessing et al., 2022) and Sibhudu (Will et al. 2014). We use the cut-off size of 2 cm previously used for lithic analysis at Umbeli Belli (Bader et al., 2018, 2022b; Blessing et al., 2022). All three layers combined yielded an assemblage of 820 artefacts >2 cm. Additionally, 1742 pieces of débitage <2 cm are available for analysis.

Terminology

Following previous work at the site, in order to maintain intra-site comparability, we subdivide blanks into flakes, blades and bladelets. In accordance with the established systematics for Umbeli Belli, a blade is defined as an intentional removal twice as long as wide and with parallel edges (Hahn, 1991). Bladelets are defined as blades with a width <12 mm as was done so at other LSA sites in southern Africa (Bader et al., 2020; Pargeter & Redondo, 2016, Deacon, 1984). The width of all blanks was measured at the widest preserved point on an artefact. For the sake of comparability with the previously studied Robberg assemblage from Umbeli Belli (Blessing et al. 2022), the analysis includes bladelet fragments smaller than 2 cm as well. Pieces <2 cm are subdivided into small debitage ranging from 10 to 19.9 mm (SD) and micro debitage ranging from 5 to 9.9 mm (MD). It becomes increasingly harder to securely distinguish roof spall from anthropogenically modified quartzite, the smaller the pieces get. Therefore, the raw material frequencies in the SD fraction have to be treated with some caution. For the MD section, we did not calculate the raw material frequencies at all, due to this problem. We use the same core terminology for non-bipolar cores that Bader et al. (2020) and Low and Pargeter (2020) used, which is based on the work of Deacon (1984). Additionally, we refer to a special form of platform cores that are typical for the final MSA in eastern South Africa as final MSA cores (see Bader et al., 2022c). These are characterized by the presence of one, rarely two, striking platforms and unidirectional reduction. Target blanks can be blades or flakes (for further details, see Bader et al., 2022c). In order to maintain comparability with our analysis of the Robberg assemblage (Blessing et al., 2022), bipolar cores are not further subdivided in the analysis. As noted by other authors (de la Peña, 2015; Hayden, 1980), we also acknowledge difficulties in discerning splintered pieces from bipolar-reduced pieces. Since a qualitative assessment for distinguishing bipolar blank production from the use of splintered pieces was rendered unsuitable for quartz (de la Peña, 2015), we emphasize that parts of our results regarding cores and tools might be slightly distorted towards an overrepresentation of bipolar cores made on quartz. Similarly, splintered pieces made from raw materials other than quartz might be slightly overrepresented as well. Given the low artefact count, especially in the core and tool assemblage, these expectations should not majorly impact our analysis, however.

The tool taxonomy generally follows the system commonly used for South African LSA sites (Bader et al., 2020; Deacon, 1984; Porraz et al., 2016a). Since the use of unretouched bladelets and flakes as tools has been indicated by use-wear analyses on other sites (Binneman, 1997; Binneman & Mitchell, 1997; Porraz et al., 2016a), and such analyses have not yet been undertaken at Umbeli Belli, we only refer to retouched pieces as tools.

Throughout the paper we will refer to various chronological terms that operate on different temporal and regional scales. We attempt to tie our assemblages into a both regional and supra-regional context. It is clear that considerable variability in the lithic technologies within the broader periods of MSA and LSA must be expected. Zooming in on a regional scale most often brings to light the variability that we can observe on smaller time-scales and in more confined areas as well. As such, there is also some variation to be expected from the more regional terms. In order to facilitate this discussion, we have compiled the main characteristics of the lithic technology of the multitude of terms we have to use in Table 1.

Results

Assemblage Structure (Table 2)

From the 820 artefacts >2 cm, almost half comes from GH 4 (46.8%, *n*=384). We recorded 255 (31.0%) artefacts from GH 5 and 182 (22.1%) from GH 6.

Table 1 Compilation of lithic technological traits of MSA and LSA in general and the regional idiosyncrasies relevant for the assemblages from Umbeli Belli presented in this paper

Time period (supra-regional)	Lithic characteristics	Time period/technocomplex (regional)	Lithic characteristics	Reference
Middle Stone Age	Prepared cores, platform cores, inclined cores, backed pieces, bifacial and unifacial points, bipolar reduction; highly variable throughout time and space	Final MSA eastern South Africa	Bifacial technology focussed on surface shaping, hollow-based points, platform cores 'final MSA core', backed pieces, basal thinning	Bader et al. (2018), (2022b), (2022c), Lombard et al. (2022), Conard et al. (2004)
Later Stone Age	Strong microlithic component, both geometric backed pieces and unretouched bladelets; also macrolithic component; bipolar knapping; highly variable throughout time and space	Early Later Stone Age	Retention of final MSA cores, and bifacial technology with addition of bipolar knapping and bladelet production	Lombard et al. (2022), McCall and Thomas (2009), Clark (1997)
		Robberg	Strong focus on bladelet production, bipolar knapping, scarcity of tools and few platform cores	Deacon (1984), Lombard et al. (2022), Mitchell (1995), Wadley (1996), Blessing et al. (2022)

The artefact density per *Abtrag* is, with the exception of *Abtrag* 6.2, very stable and undergoes only minor changes. Throughout the sequence, blanks are the most common artefact class never dropping below 86%. *Abtrag* 4.4 and 5.4 even exclusively yielded blanks. In total, there are 32 cores (3.9%) and 18 tools (2.2%) with most tools occurring in *Abtrag* 6.3 and 6.2 (Fig. 3).

Throughout the sequence, we observed short-term changes in raw material frequency (Fig. 4). There are three main raw materials represented in GH 4, 5 and 6: quartzite, hornfels and quartz. As pointed out previously (Blessing et al., 2022), what was identified as quartzite by the lithic analysts is most likely an arenite sandstone variant known as Natal Sandstone. In order to maintain comparability with previous lithic analyses (Blessing et al., 2022; Bader et al., 2016, 2018; Cable 1984), we keep the term quartzite to refer to the lithics. Other raw materials include variants of chert, shale and dolerite as well as rarer variants of the main raw materials like rose and smokey quartz. In GH 6 and the lower part of GH 5, hornfels is the most commonly used raw material, followed by quartzite. Quartz and other raw materials are comparably rare here. In the upper part of GH 5, the frequency of hornfels drops, while quartzite, quartz and other raw materials become more common. At the expense of quartz and other raw materials, the frequency of quartzite continues to rise in GH 4. The quartzite comes, with few exceptions of a very fine-grained quartzite variant of unknown, perhaps non-local provenance, from the shelter itself. Similarly, quartz and hornfels could have been sourced locally form the nearby Mpambanyoni River, but there are too few cortical artefacts to say anything with sufficient certainty here.

Knapping Technique

With regard to our small sample size, we only discern handheld and bipolar knapping. The latter is generally rare, though a slight increase from bottom to top can be observed. Handheld knapping dominates the assemblage, accounting for more than 95% of the knapping strategy throughout GH 4, 5 and 6. There are only two bipolar flakes in GH 6, 13 in GH 5 and 20 in GH 4. In addition to the bipolar flakes in GH 4, five bladelets and one blade have been manufactured using this technique. With the exception of one quartzite flake in GH 4 which has been produced using bipolar technique, all bipolar blanks are made on quartz. Handheld knapping was performed on all raw materials throughout the sequence.

Blanks

A total of 768 blanks are included into this analysis. The blank assemblages are characterized by the dominance of flakes in all the layers (Table 3). In GH 4, they account for 85.1% (*n*=303), in GH 5 for 83.8% (*n*=201) and in GH 6 for 83.7% (*n*=144). Thus, blades and bladelets combined never account for more than 11% in either layer. There are no trends between or within layers regarding changes

Table 2 General assemblage composition by raw material

Abtrag	Blanks				Cores				Tools				MP	AD
	QZT	QUA	HF	OTH	QZT	QUA	HF	OTH	QZT	QUA	HF	OTH	QUA	QUA
4.1	82.0%	6.0%	10.0%	2.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
4.2	51.7%	17.2%	29.3%	1.7%	33.3%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
4.3	67.8%	15.3%	16.9%	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4.4	71.9%	8.8%	15.8%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4.5	61.4%	21.1%	17.5%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
4.6	38.5%	23.1%	35.9%	2.6%	20.0%	80.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
4.7	59.5%	21.6%	13.5%	5.4%	20.0%	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5.1	55.6%	20.6%	19.0%	4.8%	25.0%	75.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
5.2	42.2%	28.9%	22.2%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
5.3	51.5%	24.2%	21.2%	3.0%	0.0%	66.7%	0.0%	33.3%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
5.5	39.0%	22.0%	34.1%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5.6	29.6%	7.4%	59.3%	3.7%	0.0%	0.0%	100.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%
6.1	33.3%	16.7%	40.0%	10.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6.2	41.7%	11.1%	44.4%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
6.3	34.9%	9.3%	51.2%	4.7%	100.0%	0.0%	0.0%	0.0%	0.0%	33.3%	50.0%	16.7%	0.0%	0.0%

Percentages are calculated as percent of raw material per lithic category for each *Abtrag* individually

QZT quartzite, *QUA* quartz, *HF* hornfels, *OTH* other, *MP* manuports, *AD* angular debris

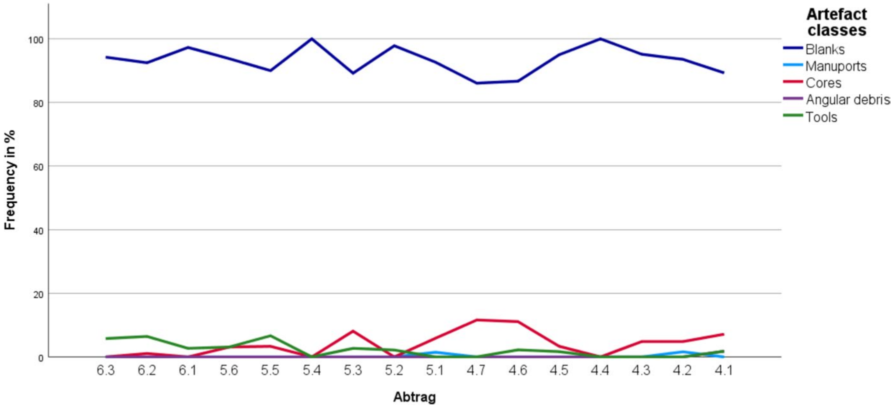

Fig. 3 Frequency of artefact classes in Umbeli Belli GH 4, 5 and 6 per *Abtrag* (created with SPSS 26)

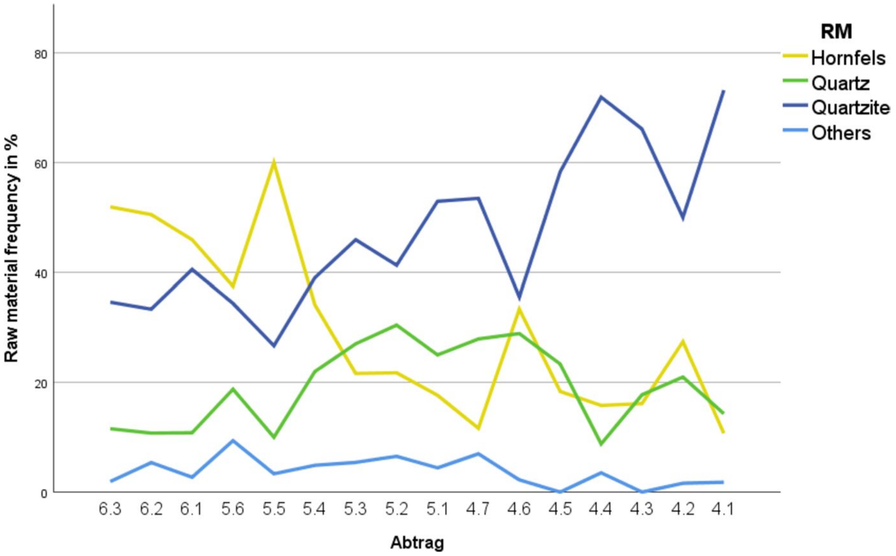

Fig. 4 Raw material frequency in Umbeli Belli GH 4, 5 and 6 per *Abtrag* for pieces >2 cm as well as bladelets and bladelet fragments <2 cm

in the frequency of blades or bladelets. Both range between 6 and 4% with only minor changes throughout the sequence.

In GH 6 and 5, all blades and bladelets are knapped using a freehand technique. In GH 4, five out 14 bladelets and one blade are produced from a bipolar core. Thus, bipolar flaking was mostly used to produce flakes, though this reduction technique is not very common in general.

The dominance of quartzite makes it difficult to see trends in raw material preferences in regards to blank types. It seems that in GH 6 hornfels was more commonly

Table 3 Blank assemblages from GH 4, 5 and 6 at Umbeli Belli. For comparative reasons, we have added the total values from GH 3 in *italics*, as they were published recently (Blessing et al., 2022)

	Abtrag	Flake %	Blade %	Bladelet %	Manuport/angular debris %	Total *n*
GH 4	1	91.8	4.1	2.0	2.0	49
	2	77.6	12.1	1.7	8.6	58
	3	84.7	8.5	6.8	n/a	59
	4	94.7	3.5	1.8	n/a	57
	5	80.7	5.3	5.3	8.8	57
	6	79.5	2.6	5.1	12.8	39
	7	86.5	2.7	5.4	5.4	37
Total GH 4		85.1	5.9	3.9	5.1	356
GH 5	1	84.1	4.8	4.8	6.3	63
	2	78.3	10.9	2.2	8.7	46
	3	87.9	3.0	6.1	3.0	33
	4	78.0	2.4	4.9	14.6	41
	5	88.9	3.7	0.0	7.4	27
	6	90.0	3.3	3.3	3.3	30
Total GH 5		83.8	5.0	3.8	7.5	240
GH 6	1	86.1	5.6	2.8	5.6	36
	2	83.9	5.7	4.6	5.7	87
	3	81.6	4.1	10.2	4.1	49
Total GH 6		83.7	5.2	5.8	5.2	172
Total GH 3		*83.0*	*3.0*	*10.0*	*4.0*	*2122*

used for the production of blades and bladelets compared to the upper layers. Flake production on quartzite exhibits a stark increase at the expense of hornfels which shows a decrease from GH 6 upwards. Quartz is very variable throughout the sequence. Thus, the raw material frequencies within the blank category follow the broader overall trends in raw material use (Table 4). Considering that flakes consistently account for more than 75% of the blank assemblage, this is not surprising.

Most blanks carry only a little evidence of platform preparation, and plain platforms dominate throughout the sequence. Crushed platforms become more common from bottom to top of the sequence, partly because this is how we labelled the platforms of bipolar blanks thus mirroring the increase in bipolar knapping. Nonetheless, crushed platforms are a common occurrence in handheld knapping as well, and they seem to become more frequent from the bottom to the top of the sequence.

Cores (Table 5, Fig. 5)

There are 32 cores in the assemblage, but they are unevenly distributed throughout the sequence. There is a clear increase in number of cores from bottom to top, but

Table 4 Raw material frequency within the blank assemblage as observed by geological horizon

GH		Quartzite %	Quartz %	Hornfels %	Other %
4	Flake	57.2	11.8	15.2	1.1
	Blade	0.6	1.1	0.6	0.0
	Bladelet	1.4	2.0	0.6	0.0
	Manuport	0.6	0.8	3.1	0.3
5	Flake	38.5	17.6	25.1	2.5
	Blade	3.8	0.8	0.4	0.0
	Bladelet	1.7	1.7	0.4	0.0
	Manuport	0.0	0.8	4.2	2.5
6	Flake	32.7	8.2	40.9	2.3
	Blade	2.3	0.6	2.3	0.0
	Bladelet	1.8	0.6	3.5	0.0
	Manuport	0.0	0.6	2.9	1.2

also in relative frequency. In GH 6, only 1% of the lithic artefacts are cores, while this rises to up to 5% in GH 5 and 11% in GH 4.

GH 4

In GH 4, 18 cores are made from quartz and four are made from quartzite. Other raw materials are entirely missing from the core assemblage. All cores made from quartz are bipolar cores, while the quartzite cores are all platform cores. Among these platform cores, there is one final MSA core *sensu* Bader et al. (2018, 2022c).

The predominant removal direction of the platform cores in GH 4 is unidirectional. The platform cores in GH 4 have only one striking platform. Two platform cores have two removal surfaces, and the remaining two cores have only one removal surface. All platform cores were used to produce flakes.

Out of the 14 bipolar cores, eight were used for flake production and the remaining six for bladelet production. Three of these bladelet cores could be referred to as rice grain cores, but the usefulness of the term has been disputed (ref). Nine bipolar

Table 5 Core assemblages from GH 4, 5 and 6 by raw material and knapping technique at Umbeli Belli

	GH 4		GH 5		GH 6	
Raw material	Handheld n	Bipolar *n*	Handheld *n*	Bipolar *n*	Handheld *n*	Bipolar *n*
Hornfels	n/a	n/a	1	n/a	n/a	n/a
Quartz	n/a	18	n/a	6	n/a	n/a
Quartzite	4	n/a	3	n/a	1	n/a
Other	n/a	n/a	n/a	n/a	n/a	n/a

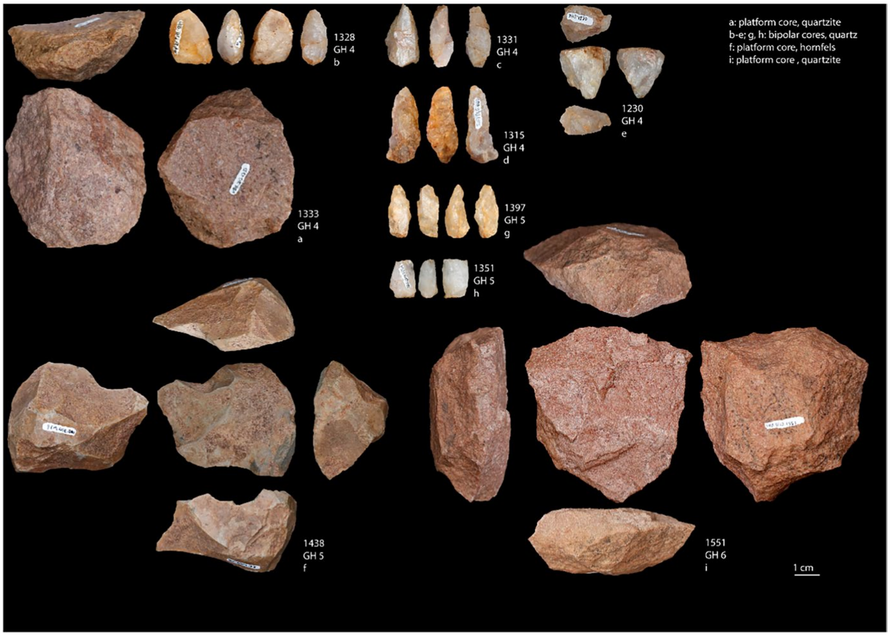

Fig. 5 Selection of cores from Umbeli Belli, GH 4, 5 and 6

bladelet cores have two removal surfaces, while bipolar cores with three or only one removal surface are less common (*n*=5 and *n*=3, respectively).

GH 5

The 10 cores that come from GH 5 are made from quartz (*n*=6), quartzite (*n*=3) and hornfels (*n*=1). They exhibit a clear pattern regarding reduction strategy and raw material. As in GH 4, all quartz cores are bipolar cores, while the platform cores are made on quartzite and hornfels. One core is a core on flake, which was manufactured on a non-local fine quartzite variant.

The platform cores made on quartzite exhibit a unidirectional, parallel removal pattern coming from one striking platform. The hornfels core, however, has two striking platforms and four removal surfaces resulting in an almost conical shape (Fig. 5f). All platform cores were used to produce flakes.

Four of the bipolar cores were used for bladelet production with the remaining two were used for flake production. One of the cores was rotated before discard resulting in the typical bipolar flaking scars being present on all edges that were either struck or rested on an anvil. Four of the bipolar cores have three removal surfaces, the remaining two having only two removal surfaces. This does not correspond with which blanks were produced from them.

GH 6

There is only core in the assemblage of layer 6. It is a final MSA core as defined by Bader et al. (2018, 2022c) and made from quartzite.

Tools (Table 6, Fig. 6)

In total, there are 17 tools from layers 4, 5 and 6. Eleven tools are made from hornfels, five from quartz and one from quartzite.

Bifacial pieces are only present in layers 5 and 6 and not in layer 4. There is one bifacial piece from layer 5 that cannot be further classified because both the tip and the base are missing, and two bifacial points from layer 6, where also a unifacial point is present. The bifacial points and the unidentifiable bifacial piece from layer 5 are made from quartz and quartzite, respectively. The unifacial point is made from hornfels. The other tools are four side- and endscrapers, three retouched flakes, three splintered pieces and one naturally backed piece.

Table 6 Tool assemblage of GH 4, 5 and 6 at Umbeli Belli

Tool type	GH 4	GH 5	GH 6
Bifacial point	n/a	n/a	2
Bifacial indet	n/a	1	n/a
Unifacial point	n/a	n/a	1
Scraper	n/a	3	1
Splintered piece	n/a	1	2
Retouched blank	1	n/a	2
NBT	n/a	n/a	1

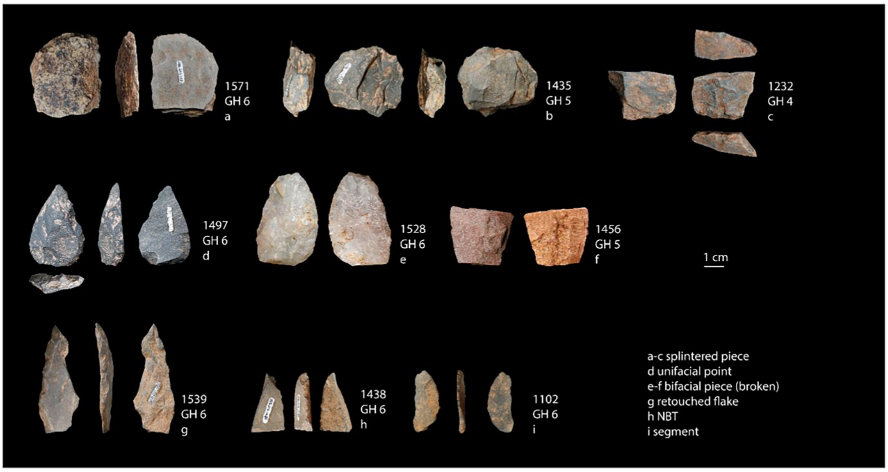

Fig. 6 Selection of tools from Umbeli Belli, GH 4, 5 and 6

Two of the splintered pieces come from layer 6 and one from layer 5. All are made on hornfels, and no splintered pieces are present in layer 4.

Three of the four scrapers are made on quartz, while one is made on hornfels. Their sizes vary widely between 46 and 18 mm of maximum dimension. No pattern can be observed due to small sample size.

The retouched flakes are all made on hornfels, where one comes from layer 4 and the other two from layer 6.

There is one naturally backed tool from layer 6, a tool class absent in the LSA layers of Umbeli Belli (see also Blessing et al., 2022).

Discussion

Internal Assemblage Variability

The raw material trend observed at the top of layer 4 almost perfectly fits the raw material pattern at the base of GH 3 (Blessing et al., 2022). Interestingly, the layers below GH 3 have almost no component of the 'indetermined coarse-grained raw material', which we suspected to be heavily weathered hornfels. If this were the case, the lack of this weathered hornfels would most likely be attributable to different pedogenetic conditions between GH 3 and the underlying geological horizons, which must remain speculative at this point, however. At the lower end of the sequence, the dominance of hornfels mirrors the raw material frequency in GH 7 (Bader et al., 2018). Similar to GH 3, the most significant changes in raw material frequency happen within layers and not between them. Assuming that layer boundaries were recognized sufficiently precisely during excavation, we deem this as a sign of a very continuous occupational pattern. Unlike the changes in GH 3, the shifts in raw material frequency that we observe in the GHs 4, 5 and 6 are rather gradual. This matches the change in tool frequency and tool typology, where the low number of tools makes it impossible to assess the changes on the *Abtrag* level, which is why we discuss them on the level of GH instead. While GH 6—despite its thinness—yielded the most overall tools (n=10), among them two bifacials and a unifacial point, GH 4 more or less lacks tools (n=3), two of them being splintered pieces and one a retouched flake. In between is GH 5 with five tools total, among them a broken bifacial piece. A paucity of retouched tools is a core feature of Pleistocene LSA assemblages (Deacon, 1984). The continuous decrease of tools from the bottom to the top of the sequence fits this characterization well.

The emerging preference of hornfels for the manufacturing of blades and bladelets from handheld cores exhibited in GH 4 finds its parallel in the lower part of GH 3 (Blessing et al., 2022). While the GH 3 bladelet assemblage is dominated by bipolar quartz bladelets, the few bladelets from handheld cores found there are mostly made on hornfels. Thus, the emerging pattern that we observe throughout GH 4, 5 and 6 seems to be part of continuous process culminating in a fully developed Robberg technocomplex in the upper part of GH 3.

Though cores are overall more common in the GHs 4, 5 and 6 of Umbeli Belli than they are in GH 7, their occurrence is not continuous. In GH 6 and the lower part of GH 5, cores are almost not present, thus making a good connection to the underlying final MSA horizon. Cores that we identified as typical final MSA cores previously (Bader et al., 2018, 2022b) occur in GH 4 and 6, thus spanning the entire sequence between final MSA and Robberg at Umbeli Belli. This contradicts earlier notions according to which transitional assemblages preserve MSA tool types but employ LSA core reduction techniques (Clark, 1997). The presence of bipolar bladelet cores shows that the increasing bladelet production over time is not an invention *sensu strictu* that marks the onset of the LSA but rather an amplification of an already existing part of the technological repertoire of southern African hunter-gatherers.

The high tool frequency in the two lowermost *Abträge* of the sequence connects the assemblage from GH 6 to GH 7, where retouched tools make up 7.7 % of the entire assemblage (Bader et al., 2018).

Given the good connection to both the underlying GH 7 and the overlying GH 3, we can infer a very gradual and continuous change of the lithic technology from the final MSA into the Robberg spanning three layers. Additionally, there are no abrupt changes in between geological horizons, but fluctuations occur rather within them. This amplifies our impression of a gradual change throughout the sequence. This raises the question of how sure we can be that GH 6 is not an extension of final MSA from GH 7 and GH 4 another Robberg layer. The latter distinction is perhaps a little clearer than the former, because the low frequency of bladelet production and bipolar knapping compared to GH 3 alongside the presence of a final MSA core in GH 4 are good arguments to distinguish the two. Regarding GH 6 as an extension of the final MSA from GH 7 is difficult to judge because bladelets smaller than 2 cm have not been included in Bader et al. (2018). We will say, however, that the absence of hollow-based points in GH 6 might be meaningful in this context. Additionally, the relevant OSL dates fall exactly within the timeframe where we would expect to see an ELSA assemblage. Lastly, GH 7 doubtlessly being final MSA and GH 3 doubtlessly being Robberg, it made sense to analyse the GHs in between as a package. Admittedly, on first glance GH 4, 5 and 6 do not have a lot in common and there is a lot of change happening within this layer package. Nonetheless, we call it ELSA because it fits the transitional and variable nature that has been reported from other sites as well, which we will discuss now in more depth.

A Regional Perspective on the MSA/LSA Transition in Southern Africa

The transition from the MSA to the LSA coincides with the transition from MIS 3 to MIS 2. This period exhibits a fragmentation of occupational patterns, especially on the west coast, contrasted by a surge in occupation intensity along the South African east coast (Mackay et al., 2014). Umbeli Belli with its seemingly continuous occupation from late MIS 3 into MIS 2 fits well within this supra-regional pattern. Due to the scarcity of assemblages from this time and considerable temporal variability, an inter-site comparison is only possible on a broad scale. Variability, may it be caused by environmental differences, site function, occupational intensity, social factors or even excavation technique, is to be expected due to the low number of assemblages known until today. It has also been suggested that the difference among ELSA-labelled assemblages reflects different analytical approaches (Porraz et al., 2016b). The overall number of sites containing ELSA sequences in southern Africa may also be too low for recognizing regional patterns. Therefore, instead of highlighting the expected variability without being able to attribute it to one or more of the above-mentioned factors, we draw on the similarities across the southern African subcontinent. We selected, Rose Cottage Cave, Umhlatuzana, Umbeli Belli (all South Africa), Sehonghong (Lesotho) and Apollo 11 (Namibia) for our comparative analysis of the ELSA in southern Africa. We chose Apollo 11 as an 'outgroup' example to show that the term Early LSA, while used to refer to the same chrono-cultural unit in the South African record, is highly contingent on what is present in specific sites or in different regions before and after what is considered ELSA. Since the presence or absence of certain artefacts in a site is not only determined by its chronological position, but also by site function, the term Early LSA runs a high risk of conflating technological choices characteristic for a time period with technological patterns signifying site function. We will confine our comparison to the lithic technology and typology, due to the lack of organic preservation at Umbeli Belli and Umhlatuzana.

Umhlatuzana is an arenite sandstone rock shelter like Umbeli Belli and was previously assessed as a difficult assemblage due to the complicated stratigraphy (Kaplan 1990; McCall and Thomas 2009), which, has recently been revoked (Sifogeorgaki et al. 2020). Thus, the site became much less problematic as a comparative site. Like at Umbeli Belli, there is no organic preservation at Umhlatuzana, but the lithic record is rich and fairly well documented. The final MSA at Umhlatuzana ends between 30 and 28 ka, while the Robberg begins at approximately 20 ka (Kaplan, 1989, 1990; McCall & Thomas 2009), giving a time frame of at least 8000 years for what Kaplan called the transitional MSA/LSA layers 14–18 at Umhlatuzana (Kaplan, 1990).

The lithic assemblage is characterized by the presence of microlithic blanks, scrapers and hollow-based points. Even segments are present, though the assemblage is dominated by blanks (Kaplan, 1990). We would like to point out that hollow-based points have been identified as a key characteristic of the Eastern Final MSA (e.g. Bader et al., 2022c). Even though the stratigraphic integrity of the site appears to be solid, we suspect their presence in the transitional layer to be the result of admixture caused by Kaplan's excavation technique. From layer 18 to 14, the percentage of quartz steadily increases at the expense of hornfels, but the latter remains the dominant raw material used for tools, especially for bifacial and unifacial points (Kaplan 1990). The changes that occur between the final MSA and the Robberg are more gradual and display a certain degree of continuity as there are no abrupt changes in the site's lithic technology (Kaplan, 1989; McCall & Thomas, 2009). This is confirmed by a comparative analysis of Umhlatuzana's and Rose Cottage Cave's MSA/LSA transitional layers (McCall & Thomas, 2009). The study found that the assemblages retain aspects of MSA lithic technology that are complemented by LSA technology like an increase in microlithic production. This complementation is not attributed to the admixture of MSA and Robberg horizons but constitutes a distinct technological signal that is different from both (McCall &

Thomas, 2009). This signal is characterized by the presence of '[…] single platform cores, bipolar cores, blades, and the percentage of quartz' (McCall & Thomas 2009, 317). New investigations in the Umhlatuzana material are currently conducted by V. Schmid, G. Bader and G. Dusseldorp and will help to clarify the chrono-cultural setting and stratigraphic integrity of the Kaplan material.

The findings of the comparative study (McCall & Thomas, 2009) are consistent with a previous characterization for the Rose Cottage Cave MSA/LSA transitional assemblage by A. Clark (1997). Here, the transitional period begins before 27 ka BP (Beaumont & Vogel, 1972; Clark, 1997) and lasts until 15 to 13 ka BP, marked by the beginning of the Robberg at this site. Hence, the time frame given for the duration of the transition is at least 12,000 years. Like at Umhlatuzana and Umbeli Belli, the changes occur gradually (Clark, 1997; McCall & Thomas, 2009). There is a microlithic component present that predates the Robberg, but it occurs together with prepared cores that bear resemblance of final MSA core reduction technology (Clark, 1997). The assemblage was deemed transitional in nature as LSA flaking technology such as bladelet production becomes increasingly important while retaining artefacts typologically assigned to the final MSA (Clark, 1997). Both Clark (1997) and McCall and Thomas (2009) find this assemblage to be a separate techno-typological unit that is neither Robberg nor final MSA even though Clark's characterization is somewhat ambiguous in this respect. Clark even argues for a differentiation between MSA/LSA transitional assemblages and ELSA assemblages (Clark, 1997).

Sehonghong comprises a sequence predating the Robberg spanning from 26 ka BP to 20 ka BP, giving a 6000-year time frame for the time between final MSA and Robberg (Mitchell, 1994). Similar to the overlying Robberg layers, the dominant raw material for the ELSA layers at Sehonghong is opaline. There is little evidence for prepared core technologies, and bipolar knapping is present in the pre-Robberg layers, though not very common (Mitchell, 1994). Unsurprisingly, the microlithic signal from these layers is weaker than in the overlying Robberg, but still present. Tools are scarce in all three ELSA layers (Mitchell, 1994). The assemblage cannot be attributed to the MSA, but it also has features that are absent in the overlying LSA layers, such as prepared cores and MSA 'knives' (Mitchell, 1994; Wadley, 1997). Furthermore, the Sehonghong ELSA assemblage is characterized by an increase in opaline as a raw material, which peaks in the Robberg assemblages, at the expense of dolerite and hornfels (Mitchell, 1994). It should be noted here that Carter and colleagues chose not to assign the assemblage the name ELSA, in order to avoid confusion in the literature (Carter et al., 1988; Mitchell, 1994).

In the Western Cape, Elands Bay Cave yielded a sequence that includes ELSA layers (Porraz et al., 2016a; Tribolo et al., 2016). The sedimentary units K to F yielded MSA and ELSA assemblages (Porraz et al., 2016a). Unit F has been dated to 24 to 22 ka BP, which falls within the range commonly associated with the ELSA in southern Africa (see Lombard et al., 2012, 2022). The raw material selection is very constant throughout this part of the sequence with quartz dominating. Bipolar knapping is frequently present both in the MSA and ELSA assemblages, with bipolar flakes sometimes accounting for 50% of the flakes. Blades and bladelets are much less frequent. The preliminary description of the assemblage hints towards a shift within blade technology, which was described as blades becoming less common and less regular in the younger part of the sequence (Porraz et al., 2016a). Bipolar knapping becomes increasingly important in H and F, while a discoidal reduction pattern is more common in the lower part of the sequence. In the tool, assemblage denticulates are dominant. In the lower part of the sequence, bifacial and unifacial points alongside asymmetric convergent tools (ACTs) and splintered pieces are present. Porraz et al. (2016a) note that in the upper levels only denticulates are present, but no typical MSA bifacial and unifacial points (e.g. Archer et al., 2016; Soriano et al., 2015; Will & Conard, 2016). Also, splintered pieces seem to be more common in the upper part of the sequence (Porraz et al., 2016a). Overall, the ELSA assemblage from Elands Bay Cave is described as an expedient technology with microlithic components. The near absence of tools makes it difficult to characterize the assemblage typologically. Scarcity of tools compared to MSA assemblages has been identified as a marker for both ELSA and Robberg assemblages (Deacon, 1984; Low et al., 2017; Porraz et al., 2016a; Wadley, 1993).

An interesting and fruitful approach to clarify the ELSA in the western part of South Africa was recently undertaken by Low and colleagues in their comparative study of the Putslaagte 8 rock shelter and the open-air site Uitspanskraal 7 (Low and Mackay, 2016; Low et al., 2017; Mackay, 2016). They aimed for a better understanding of time periods on a landscape level as opposed to the still more common single site approach taken in southern African archaeology (Low et al., 2017). This is especially important in addressing questions surrounding the regionality of chrono-cultural units in both the MSA and LSA. The Putslaagte 8 ELSA assemblage dates between 25 and 22 ka BP, though all occupations seem to be organized in pulses and not necessarily continuous (Low et al., 2017; Mackay et al., 2015). They report shifts in raw material preference, blade size and production methods from the ELSA towards the Robberg of Putslaagte 8 (Low and Mackay 2016). Bipolar reduction and standardization of blades and bladelets are less common in the ELSA as opposed to the Robberg assemblage on the site. A final MSA is not reported from the site (Mackay et al. 2015, but see Bader et al. 2022a).

The open-air site of Uitspanskraal contains several temporally and spatially distinct lithic scatters, some of which have been assigned to a post-Howiesons Poort context (Will et al., 2015), but one area (AoA 3) has been assigned to the ELSA based on the similarity to the assemblage from Putslaagte 8 based on lithic technology and raw material preference (Low et al., 2017). Both assemblages have hornfels as the preferred raw material and a significant blade component produced on cores with only limited amounts of preparation or maintenance, if any. (Low et al., 2017). This stands in strong opposition to the Robberg from Putslaagte 8, where silcrete bipolar flaking plays a major role within the technological system (Low & Mackay 2016; Low et al., 2017). There are also marked differences between the stratified Putslaagte 8 assemblage and the open-air context of Uitspankraal 7, which indicate distinct flake and discard patterns reflected by varying ratios of cortex retention, higher numbers of cores at Uitspankraal 7 as well as the abundance of flaking tools like hammerstones and one anvil in the open-air context (Low et al., 2017). The study of the open-air locality Uitspanskraal 7 highlights that what researchers view as a similarity on a regional or even supra-regional level actually constitutes a research bias grounded in the site-based approach, which most often only includes rock shelter sites (see also Low et al., 2017).

Both sites are situated in the Doring River Catchment, where a large-scale archaeological project has been conducted for years now (see Shaw et al. 2019 for a recent synthesis). This landscape-scale project exemplifies that our definitions of technocomplexes and lithic industries largely hinge on the long stratigraphic sequences along the coast of South Africa and that a hiatus in occupation there need not to mean that people were absent from the landscape altogether. Unfortunately, such a dataset is not available from the surroundings of Umbeli Belli and will be extremely difficult if not impossible to obtain, due to environmental factors, mainly dense vegetation, and current land use.

At Apollo 11 (Namibia), the term Late Pleistocene Later Stone Age (LPLSA) has been employed to describe the assemblage postdating the final MSA (Ossendorf, 2017). Ossendorf describes the assemblage as ‘highly informal’ and as ‘characterized by extremely expedient technological behaviours’ (Ossendorf, 2017, 33). The LPLSA of Apollo 11 can be subdivided into two phases, the younger one dating between 24.2 and 20.4 ka BP, thus coinciding with ELSA signals and the early appearances of the Robberg technocomplex in South Africa (Ossendorf, 2013, 2017; Bousman & Brink, 2018; Tribolo et al., (in prep.)). Yet, a Robberg component is absent at Apollo 11. This adds some difficulties in comparing the LPLSA assemblage from Apollo 11 with ELSA assemblages from South Africa and Lesotho, because integral part of the ELSA is an increase in bladelet production and bipolar knapping, both key features of the subsequent Robberg. The LPLSA of Apollo 11 only exhibits an increase of bipolar knapping (Ossendorf, 2017). That being said, while bladelet production is characteristic for Robberg assemblages, bladelets are rarely the dominant blank type (see also Mitchell, 1995; Wadley, 1996; Lombard et al., 2012, 2022; Deacon, 1995), thus increasing the similarity between the Robberg and the LPLSA of Apollo 11 (Ossendorf, 2017). We agree with Ossendorf’s notion that the LPLSA of Apollo 11 is distinguishable from other ELSA occurrences in southern Africa. We suspect this to be a taxonomic problem as the ELSA was defined in presence of the Robberg technocomplex. So, parts of such a definition will not be mirrored in regions without Robberg assemblages. Therefore, it might be premature to conclude that the LPLSA is a regional variant of the ELSA in southern Africa as proposed by Ossendorf (2017). It might as well be that the Late Pleistocene human populations in southernmost Namibia became isolated during late MIS 3 and MIS 2 (Ossendorf, 2017), which might explain why the Robberg technocomplex did not reach this region (Mackay et al., 2014). In this sense, it would become more likely that the southern Namibian LPLSA is not a regional variant of the southern African ELSA but marks the emergence of a different technological tradition developed from a common ancestral tradition. We consider the data currently available from this region as too scarce to reach a conclusion in this matter.

Historical Context of the Early Later Stone Age in South Africa

Twenty-six years after Goodwin and van Riet Lowes initial definition of the Early, Middle and Later Stone Age (Goodwin & Van Riet Lowe, 1929), the Pan-African Congress in 1955 formed the necessary platform in order to further refine the stone age sequence. By then, researchers had become aware of specific assemblages which seemed not to fit accurately in either of the three previously defined units but seemed to represent a mixture in between and thus a first intermediate stage between ESA and MSA and a second one between MSA and LSA where introduced (Clark, 1959; Malan, 1949). This scheme placed the Howiesons Poort, for example, within the latter transition called Magosian (see also Clark et al., 1966). This transitional mode, however, was formally rejected at the 6th meeting of the Pan-African Congress in 1967 after the ESA/MSA 'intermediates' of the Sangoan and Fauresmith had been rejected at the Burg Wartenstein Symposium already (Bishop & Clark, 1967). At this meeting it was also suggested to relinquish Goodwin and Van Riet Lowe's age system and any intermediate stages altogether (Clark et al., 1966; Bishop & Clark, 1967) due to a lack of supporting field evidence and the ambiguity of the term MSA (see also McBrearty, 2000; McBrearty & Tryon, 2006). Yet, the terms ESA, MSA and LSA were and are being used to this day.

The very first LSA chronology only involved the so-called Smithfield and Wilton as technologically distinct units (Goodwin & Van Riet Lowe, 1929). H. J. Deacon (1976) and J. Deacon (1984) revised and further developed the LSA chronology by subdividing the LSA into the Robberg, Albany and Wilton technocomplexes. Subsequently, the Robberg would succeed the final MSA according to the prevailing chronological model of the Stone Age in southern Africa (Deacon and Deacon 1999). This implied a comparably sharp and rapid technological change, despite the term Early Later Stone Age having been introduced by Beaumont and Vogel (1972) already, though only weakly defined. The continuous adding and abandoning of cultural taxonomic units within the African Stone Age succession became an obstacle in some instances, rather than a means of structuring, which is especially true at the MSA/LSA boundary.

What Is the (Early) Later Stone Age?

Over the past 40 years, research in southern Africa began to emphasize the MSA after the realization that modern humans had evolved much earlier than previously thought (Bräuer 1984), given that radiometric dating pushed back to chronology of the MSA beyond 100 ka in the late 1970s already, and even further today (Lombard et al., 2012, 2022), and behaviours described as 'modern' were identified all over Africa long before 40 ka (McBrearty & Brooks, 2000). In the wake of this research focused on the MSA, it became clear that microlithic technologies are not unique to the LSA, but occur much earlier in the MSA (e.g. Barham, 2002; Brown et al., 2012; Clarkson et al., 2018; Gibson et al., 2004; Villa et al., 2010; Wadley et al., 2009). Likewise, as technocomplexes like the Oakhurst show, the LSA is not confined to microlithic technologies (Kaplan 1989; Mitchell 2002; Wadley 1993).

Even before these realizations, though for different reasons, questions were raised about whether the subdivision of the Stone Age into ESA, MSA and LSA reflects the sharp distinctions that are implied by the terms themselves or whether they might be arbitrary (Deacon, 1982; Sampson, 1974; Clark et al., 1966). By defining or adhering to successive chrono-cultural units, questions about the timing, speed and nature of the transition from one unit to another are posed inherently, regardless of scale and whether researchers actively raise these questions or not.

All across the southern African subcontinent, changes in the organization of lithic technology have been observed post-dating the final MSA but pre-dating the Robberg. They are not a perfect mirror image of each other. This is most likely attributable to differences in raw material selection and site function. Hence, we refrain from defining regional variants of the ELSA because we deem the archaeological record from this period as too scarce at the moment. Differences in the timing of the occupations further complicate the picture (see also Mackay, 2009). If we accept the final MIS 3 and early MIS 2 as a time of fragmentation as suggested by Mackay and colleagues (Mackay et al., 2014), these differences in the time of occupation between sites could account for the variability at hand, as the disconnect of populations would lead to different lithic technological traits emerging from a shared technological ancestor. For the early LSA specifically, Mackay et al. (2014) showed that the technological evidence exhibits increasing localization. While this signal is observed throughout all the rainfall zones, it seems to be pronounced more strongly in the winter and year-round rainfall zones (Mackay et al., 2014). Most recently, Carr et al. (2023) have presented evidence for the presence of now-dry paleolakes in the interior of South Africa during MIS 3-2 resulting in a more habitable and richer environment than previously thought. Consequentially, they attribute the spotty archaeological evidence from this region to a preservation bias rather than reflecting a period of repeated depopulation (Carr et al., 2023). Their results do not necessarily contradict the suggestion of a population fragmentation during MIS 3 but rather exemplify that tapping into more regional environmental archives holds great potential for the study of a highly variable time period like the early LSA appears to be.

Apart from the lithic technology, recent genetic studies offer another line of evidence for population fragmentation (al-Hindi et al., 2022; Lipson et al., 2022). When trying to tie the archaeological record to genetic studies, it is important to note that a genetic divergence does not equal a population divergence when it comes to timing. Genetic divergence happens before populations actually split spatially (al-Hindi et al., 2022). As such, the old dates given for genetic divergence of southern African hunter-gatherer populations in al-Hindi et al. (2022) do not contradict the archaeological evidence, but might actually support it. Interestingly enough, the divergence model presented there pictures the southern African interior as the area where the genetic diversification happens and populations spread from later (al-Hindi et al., 2022), thus fitting nicely the findings of Carr et al. (2023). The connection of the archaeological evidence with the emerging genetic data from southern Africa, however, is too big of a topic to be discussed here any further.

Finally, how can we best characterize the change from MSA to LSA technology? Given the long coexistence of MSA and LSA lithic technology across southern

Africa, a pattern that can also be observed in other regions of Africa, such as Ethiopia, the Horn of Africa or west Africa (Scerri et al., 2021; Tryon, 2019), the term transition seems inappropriate. It can even be argued that the coexistence of these technological traits not only occur on an inter-site comparative level, but that the definition of the ELSA itself is evidence for the coexistence as it simply combines characteristics of MSA and LSA lithic technologies into a new chrono-cultural unit. This is important because the MSA and LSA should not be seen as time periods or cultural entities but rather as large overarching technological complexes (see also Tryon, 2019). In this sense it is also important to state that there might not be an 'origin' of the Later Stone Age. The lithic technological changes appear so gradually that we might as well call them continuous and '[o]rigins disappear in continuity' (Foley et al., 2016, 1). In other words, the ELSA might simply be whatever technologies were in use during the final MSA and the Robberg at a given site, thus conflating environmental, social and economic factors that influence lithic technological organization into an ill-defined chrono-cultural term. Apollo 11 provides an excellent 'outgroup' case for this notion as the LPLSA there, similar to the final MSA already (Vogelsang et al., 2010), looks very different from anything else observed in South Africa and Lesotho, perhaps due to the absence of a subsequent Robberg industry.

An argument has been made that aside from changes in lithic technology, the seemingly abrupt emergence of worked bone tools and figurative parietal art mark the beginning of the LSA as well (Klein 1995, 2000, 2009, 2019). Bone tools are abundant in MSA contexts before and after the Howiesons Poort (Backwell et al., 2008; Becher, 2016; Henshilwood et al., 2001) and figurative art is known from the MSA in Apollo 11 (Rifkin et al., 2015; Rifkin et al., 2016; Vogelsang et al., 2010; Wendt, 1976). Both are heavily affected by preservation issues rendering them not suitable for far-reaching interpretations based on their presence or absence. Addressing this question is beyond the scope of this paper, but the organic component accompanying the lithic artefacts are certainly one major research topic, if we want to come closer to answering what happened in southern Africa between 30 and 20 ka BP (see also Lombard & Parsons, 2011; Mitchell, 2012).

Conclusion

Due to the lack of organic preservation, the radiometric chronology of Umbeli Belli is not as refined as those from other sites with stratigraphies covering the period from the final MSA to the Robberg. Nonetheless, enabled by the *Abtrag*-based excavation technique, the techno-typological analysis of the lithic assemblages from GH 4, 5 and 6 at Umbeli Belli revealed a gradual pattern of changes consistent with that from Apollo 11, Sehonghong, Rose Cottage Cave and to a lesser extent to sites from the southern and western Cape.

Despite efforts and successes in evaluating the timing, speed and nature of the transition from the MSA to the LSA, the period between final MSA and Robberg remains poorly understood. This is due to a lack of sites that contain assemblages from these periods, which is further complicated by different research approaches and a strong emphasis on rock shelter sites. A short transitional phase between the MSA and LSA in southern Africa as proposed by McBrearty and Brooks (2000) does not appear to hold against the evidence presented here. Rather, the current evidence points towards gradual and continuous changes throughout southern Africa during this time period. This observation takes us back to the question asked at the beginning of this paper - Is there a 'beginning' of the LSA or is this question simply imposed on us because of the terminology developed almost a century ago? In the same way that the ELSA can be attributed to the LSA by acknowledging that it shows elements of it, but is not yet 'fully developed', an argument could be made to say it that it belongs to the MSA as it exhibits 'classic' final MSA technological traits and adds something that we call LSA from today's perspective. We find the term ELSA misleading because this distinct chrono-cultural unit could also be seen as a continuation of the MSA and not mark the beginning of the LSA at all. It almost appears that we use the term ELSA only because final MSA is already taken. Even though the continued use of the terms MSA and LSA might seem beneficial, in order to maintain a certain kind of order in an archaeological record that spans well over 300 000 years, an argument is to be made that the two cannot be understood as time periods in the southern African archaeological record, similarly to what recently has been proposed for east Africa as well (Tryon, 2019). MSA and LSA are best seen as purely organizational means for researchers who study the archaeological record, rather than culturally distinct periods that bore any meaning to the Stone Age populations who produced the artefacts. Ultimately, we have to ask the question whether the differences between MSA and LSA are substantially larger than between individual technocomplexes, e.g. between Still Bay and Howiesons poort, between Sibudan and final MSA or between Oakhurst and Wilton? From our perspective, they are not and in consequence we must ask if it is still appropriate to generically separate one from the other? The debate of whether named stone tool industries or 'NASTIES' should be replaced by other descriptions of a lithic assemblage is a long-standing debate and far from being resolved (Clark, 1969; Shea, 2013, 2014; Wilkins, 2020). This debate is relevant to the ELSA insofar as it highlights the same problems the definition of the ELSA is suffering from. ELSA might describe two or more very different assemblages from two different regions, while creating the illusion that it is somehow the same. However, the ELSA does not operate on the same level as NASTIES like the Robberg and the Howieson's Poort. These are, despite the regional variability that is to be expected, well-defined both chronologically and technologically. The same cannot be said about the ELSA, due to a scarcity of suitable sites. Nonetheless, the ELSA might be another good example why the debate about how we name things is so important. In the meantime we have to communicate somehow and we chose to go with ELSA rather than modes.

Based on the evidence reviewed here, we argue that the ELSA represents an artefact of our terminology rather than a reflection of (pre-)historical processes. The changes observed across the southern African subcontinent span several thousand years and seem to be continuous and of regional indigeneity (see also McCall & Thomas, 2009). Furthermore, *H. sapiens* were the authors of both the MSA and the LSA. For those reasons we would like to see this contribution and other recent and related publications (Bader et al., 2022b; Scerri et al., 2021; Tryon, 2019) as the starting point of an open discussion about reforming the cultural taxonomy of southern Africa in particular, but perhaps Africa as a whole. Rather than trying to fit new discoveries into a century-old concept that pays little tribute to the vastness and diversity of the African continent and the variability of the archaeological record, we suggest to adopt a more regionally focussed approach and only use the terms Middle and Later Stone Age in a broad sense to help organize a much more complex archaeological record.

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Author Contributions M.A.B and G.D.B wrote the main manuscript. M.A.B conducted the lithic analyses. G.D.B and N.J.C. directed the excavations. All authors reviewed the manuscript.

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Data Availability Any raw data will be made available to individuals upon request.

Declarations

Ethical Approval Not applicable

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