
A game of two halves: Looking for evidence for both embedded and direct procurement in a simulated dataset

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Abstract:

The concepts of embedded and direct procurement have become weighted with extra baggage over the years. In embedded procurement, lithics are obtained along with other resources, while direct procurement involves a deliberate trip to the source for the sole purpose of obtaining that raw material. Lewis Binford suggested that direct procurement means something went wrong (a sign of poor planning), and that embedded procurement is the norm. Other authors found valid reasons why direct procurement could be deliberate, planned, and beneficial. Regardless, the two have often been seen as diametrically opposed, and applied to interpretations of mobility and lithic procurement as if they are mutually exclusive of one another. They have also been variously conflated with expedient and curated technology, the use of local vs. exotic raw materials, and so on. The often site-centric vision of archaeologists (we find it hard to see that people may have been passing through a site, not based there and going out and coming back), can further confuse the issue. The most important problem, however, is: how can we tell the difference between embedded and direct procurement from the stone tools collected at an archaeological site? We created the scenario of a site with various proportions of stone tools from different sources. In order to not influence the site characteristics through a priori expectations, we randomly assigned source qualities and percentages in the assemblage, along with the distances and directions of each source relative to the site. Then each author analysed those data from one of two points of view: LW convinced in advance that the evidence supported embedded lithic procurement, and PM equally certain that a direct strategy was apparent. In both cases, the authors felt they had sufficient “justification” to bolster their point of view and build a strong case for their raw material procurement strategy. This exercise gave some insight into the usefulness and limitations of these two concepts as heuristic devices, as they continue to be a major influence on anyone trying to interpret lithic procurement.

Keywords: lithic provisioning; direct procurement; embedded procurement; hominin mobility strategies; raw material selection

1. Introduction and background

Throughout prehistory, the survival of hunter-gatherer societies was contingent on the procurement of stone for the manufacture of tools. Since these tools persist in the material



record, they have become the focus of much attention aimed at understanding the past lifeways of our palaeolithic ancestors, and in particular how forager groups organised their lives within the landscape that they inhabited (Agam 2020; Andrefsky 2009; Bamforth 1990; Binford 1979; Kuhn 1995; Wilson & Browne 2014). Mobility is a central concept in this type of research, where hominin stone tool raw material choices are evaluated against the expectations of ecological variables and/or evolutionary theory. Attempting to determine causal relationships for the types, amounts, and distances of raw material transport thus remains an indispensable aspect of the study of prehistoric human mobility in general, where, using raw material as a proxy, lithic assemblages are often broadly classified in terms of the mobility strategies that led to their formation. Much of this work traces its origins to the early 1970s when, prompted by the emerging field of behavioural ecology (Tinbergen 1963), researchers began to construct models that observed and sought to explain the foraging strategies of extant human groups (Dyson-Hudson & Smith 1978; Wilmsen 1973). Both these and the explicitly archaeological models that followed are rooted in optimal foraging theory, which predicts and evaluates an “ideal” behaviour by maximising positive variables usually concerned with fitness (Arroyo 2009; Jeske 1992; Nettle *et al.* 2013; Schmuck *et al.* 2022). Closely related ideas that have also seen an archaeological application include central place foraging theory (Beck *et al.* 2002) and gravity models (Wilson 2007). All of these ideas tend to rely on the notion that sources of raw material were exploited based on the physical costs and benefits of doing so - the utility of a source was calculated and weighed up in a manner that would directly influence survival.

Although lithic assemblages continue to be investigated through a variety of evolving methods and increasingly sophisticated schools of thought, the work of Lewis Binford (1976; 1979; 1980; 1982; 1989; Binford & O’Connell 1984) from the late 1970s and 1980s has an enduring influence on the discussion of lithic procurement strategies (Yu *et al.* 2015). In particular, assemblages are often considered in a dichotomous manner based on Binford’s concept of whether lithic raw material was directly procured (acquired with a sole and express intention), or whether its procurement was embedded into other subsistence activities as a secondary consideration (Binford 1976; 1979; 1980). A large part of Binford’s work uses ethnographic research as an analogue to support inferences about prehistoric societies, including his notion of direct and embedded procurement. While a critique of ethnoarchaeological approaches is beyond the scope of this paper (but see McCall 2012; Odell 2001; Skibo 2009), it is worthwhile mentioning that relatively few of these studies have focussed primarily on stone tools and the procurement of their raw materials. This may, in part, contribute to the lasting impact of Binford’s concepts, since a lack of fine-grained data in the archaeological record alone (*i.e.*, being able to actively monitor behaviours and even make enquiries of hunter-gatherers themselves, *etc.*) is a limiting factor for describing systems of subsistence.

The concepts of embedded and direct procurement are well established in archaeological thought, perhaps to the point where they are taken for granted and have become muddled. The dichotomy they are often implied to represent might be better seen as two endpoints of a continuum, and, as Pop & Agam (2021) showed, the terms are frequently used incorrectly or without being defined at all. Also, it seems that embedded procurement has come to be the default scenario in many interpretations of resource procurement: the assumption is that procurement of lithics must have been embedded in other activities, and all site data are interpreted through this lens (however, see Frahm *et al.* 2019; Shimelmitz *et al.* 2020 for more complicated narratives). Binford himself even stressed that the composition of lithic assemblages is a reflection of other subsistence activity, commenting that “...*only when things have gone wrong, does one go out into the environment for the express and exclusive purpose of obtaining raw material for tools*” (Binford 1979: 259). While we agree that the

concepts of embedded and direct procurement are useful as spurs to our thinking about how resources were procured, especially as they give us contrasting questions that we can ask ourselves about our data, if we just assume that embedded is the answer, then we are not thinking at all.

In addition to this apparent problem of seeing embedded procurement everywhere because that is what we believe we are supposed to see, there is a related problem: can we really tell the difference between embedded and direct procurement just from artefacts? Or are we fooling ourselves through our own preconceptions? Are we interpreting data in order to prove what we expect to be the case, whichever procurement option we prefer, or are there real indicators of one or the other which we can not wish away or ignore? To explore this problem, we decided to invent a set of lithic resource data for an imaginary archaeological site, and have one of us interpret it with the mindset of “this is embedded procurement”, while the other interpreted it as “clearly, this is direct procurement”. We invented the data so that they would be unbiased, as explained below, and would have no underlying strategy, so that there would be no reason for embedded or direct to be the right or wrong answer. Our goal was to see if the data could plausibly be interpreted from both points of view, and to see what lessons we could learn from this. Are there potential characteristics of the data that would “get in the way” of interpreting it from one or the other point of view? What can we learn about the strengths and weaknesses of each interpretation, that might lead us forward when looking at real datasets?

2. Methods

To begin with, LW made up a base map of an area 100 km by 100 km, with an archaeological site in the middle (Figure 1). To make it interesting (rather than just a flat featureless plain), there is a ridge running basically NW-SE through the area, with the steepest slope at the middle. The archaeological site is located at the base of that slope. To the NE is a plateau and to the SW a plain. The age of the site was never specified, but since we work on the Middle and Lower Palaeolithic, we treated it from that viewpoint and disregarded any possibility of trade for resources.

Several weeks after making up the base map (and without looking at it again), LW generated the following details for 10 sources (labelled 1-10), using the random number generator in Microsoft Excel: direction, distance and raw material quality. Direction was a number from 1 to 16, which corresponds to a compass direction as shown in Table 1. Distance was a number from 0 to 50 km. Quality was a number from 1 to 6, corresponding to a quality as shown in Table 2. The authors acknowledge that ‘quality’ is a term which much be used carefully in real cases, since it could be expressed as a function of the knapper’s specific needs (*i.e.*, durability in a tool, or a tool which is quickly or easily made, *etc.*). In our simulated study we need only say that quality represented whatever the hominins wanted, and that its value varied from source to source.

Once LW had done that, but before PM saw the source details, PM generated percentages of the site assemblage for the raw materials from each source. He did this by generating random numbers from 0 to 50, until they totalled more than 50, and then he reset the maximum number each time to the remainder available to make a total of 100 percent. The total of 100 was met on the 7th iteration, so the last three numbers were automatically 0. We then wrote numbers from 1 to 10 on separate slips of paper, folded them up and put them in an empty box, mixed them around, and took turns drawing out one at a time. The first one drawn was assigned the first percentage number generated, and so on, until every source’s information was complete, as shown in Table 3. Then we took two more slips of paper, wrote D on one and E on the other, folded them up into tiny packages, mixed them around and each

chose one. That is how we “decided” that LW would take the “E for embedded” side of the game, and PM would do the direct procurement point of view. Following that, PM added the sources to the base map and shared that with LW, and then we each went to work separately on our interpretations and justifications.

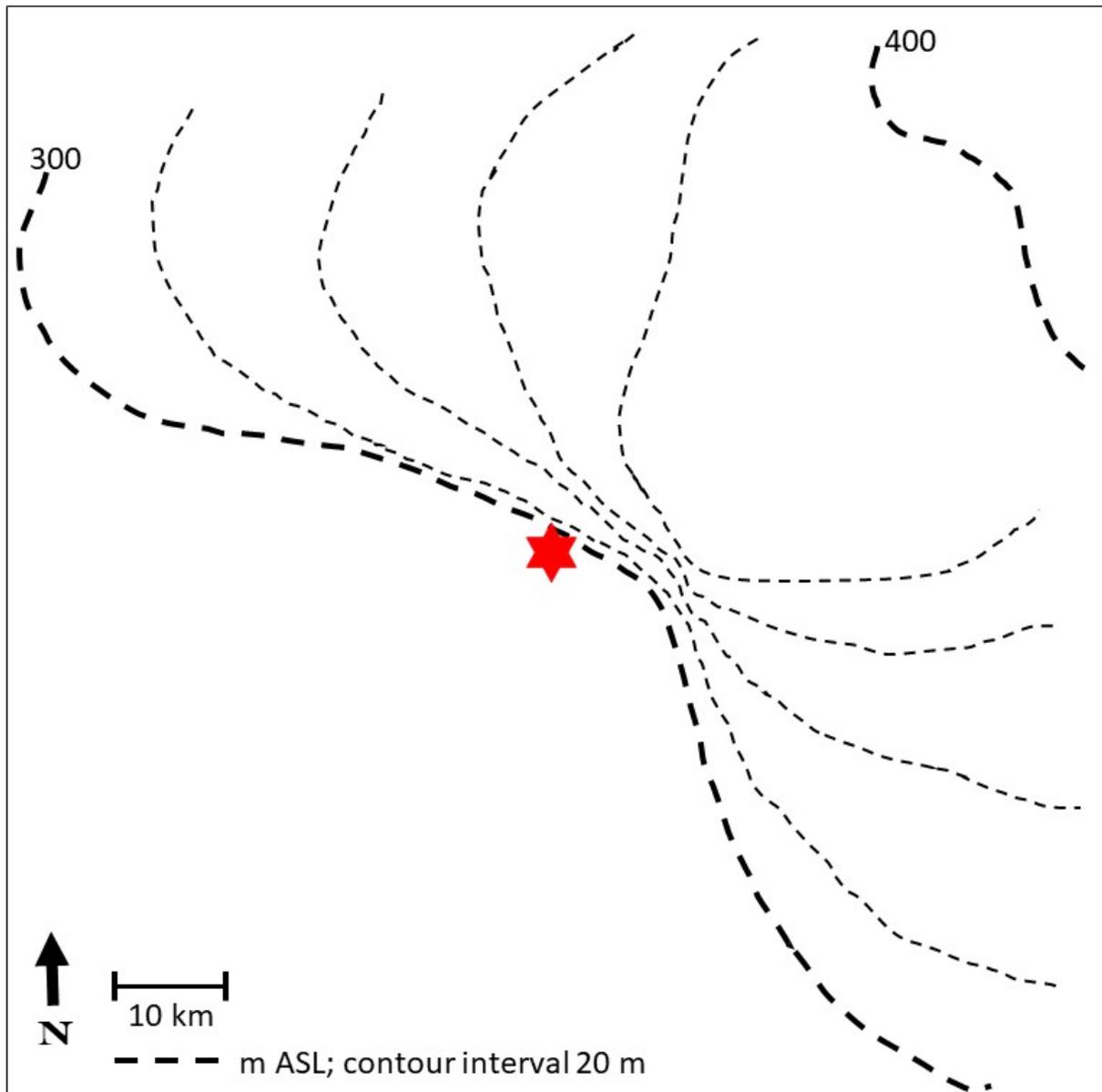


Figure 1. The base map of the fictional area. The red star indicates the location of the site.

Table 1. Possible directions used.

Direction	Number code
N	1
NNE	2
NE	3
ENE	4
E	5
ESE	6
SE	7
SSE	8
S	9
SSW	10
SW	11
WSW	12
W	13
WNW	14
NW	15
NNW	16

Table 2. Possible quality attributions used.

Quality	Number code
Poor	1
Fair	2
Medium	3
Good	4
Very good	5
Excellent	6

Table 3. Details of the sources.

Source number	Direction number code	Direction	Distance (km)	Quality number code	Quality	% of assemblage
1	5	E	11	4	good	1
2	7	SE	50	5	very good	33
3	14	WNW	21	5	very good	35
4	16	NNW	5	4	good	1
5	16	NNW	36	1	poor	6
6	4	ENE	40	4	good	0
7	14	WNW	32	5	very good	19
8	12	WSW	19	1	poor	0
9	13	W	23	3	medium	5
10	16	NNW	2	3	medium	0

We want to reiterate that everything was randomly assigned. We did not plan or manipulate the results; it just turned out this way (Figure 2). So, oddly, most of the sources are located more or less along a NW-SE axis, which coincides with the ridge in the area. No

source was assigned “fair” or “excellent” quality; “very good” is the best - and those were the ones with the highest use percentages.

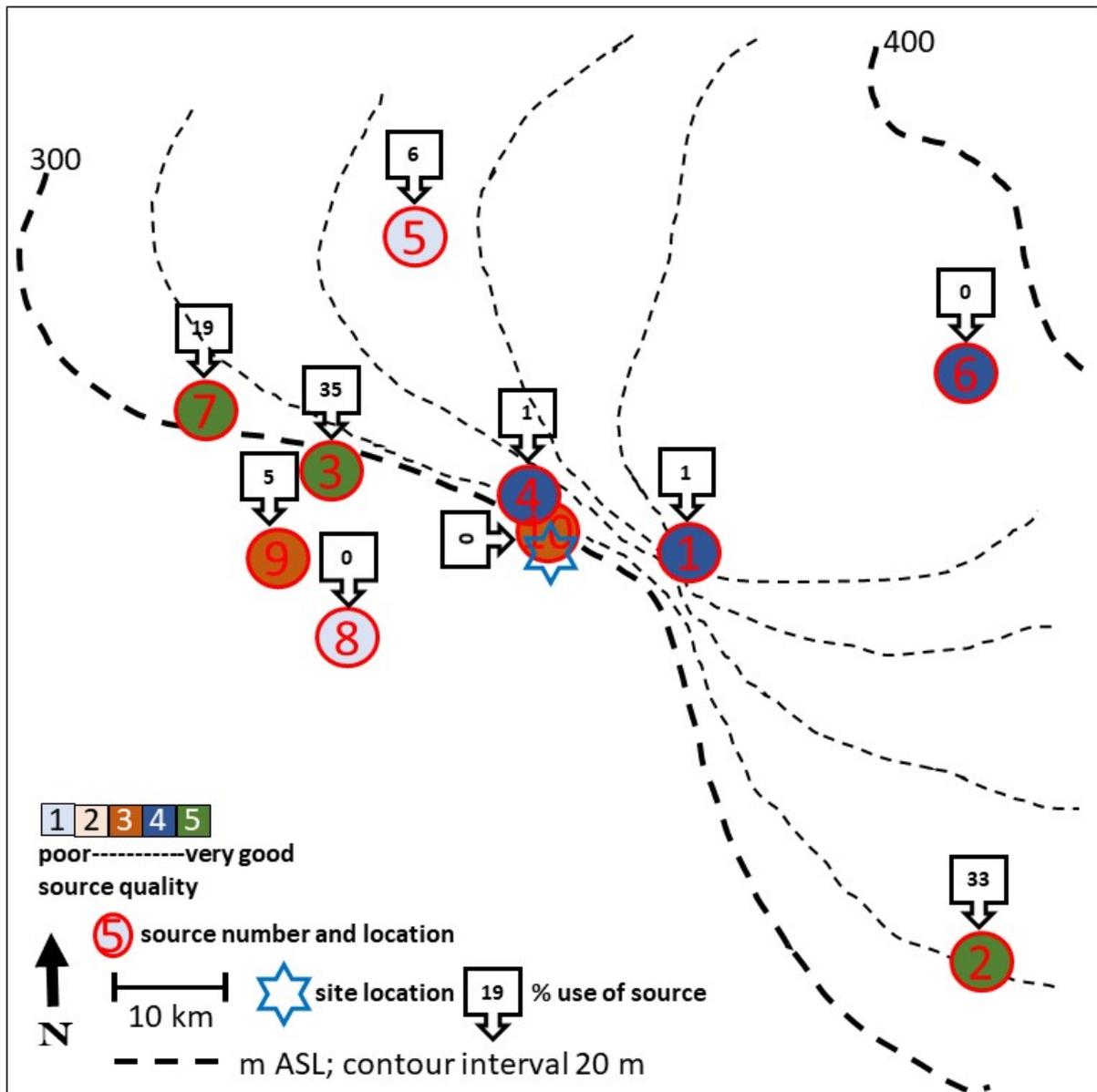


Figure 2. The base map with details of the raw material sources.

3. Results and interpretations of the data

3.1. Direct procurement

The raw material sources for the assemblage at our site can be categorised into three groups: (1) an unused group of three sources; (2) a group of four sources that see very occasional use; and (3) three sources that make up the great majority of what is found at the site (Figure 3). These latter three sources must be the focus of attention when considering something as general as a raw material procurement strategy for the residents of our site, because the occasional use of other sources is too easily explained by plausible, but ultimately incidental, factors that may just be artifacts of a challenging and complex dataset built across a vast body of time (e.g., close vicinity of the little-used sources to either the heavily used ones or the site itself, or hominin groups/individuals with occasionally different motivations

and behaviours, *etc.*). If there is any scope to generalise broad trends from these data, it comes through respecting their strongest signals and not incorporating the “noise” into an interpretation.

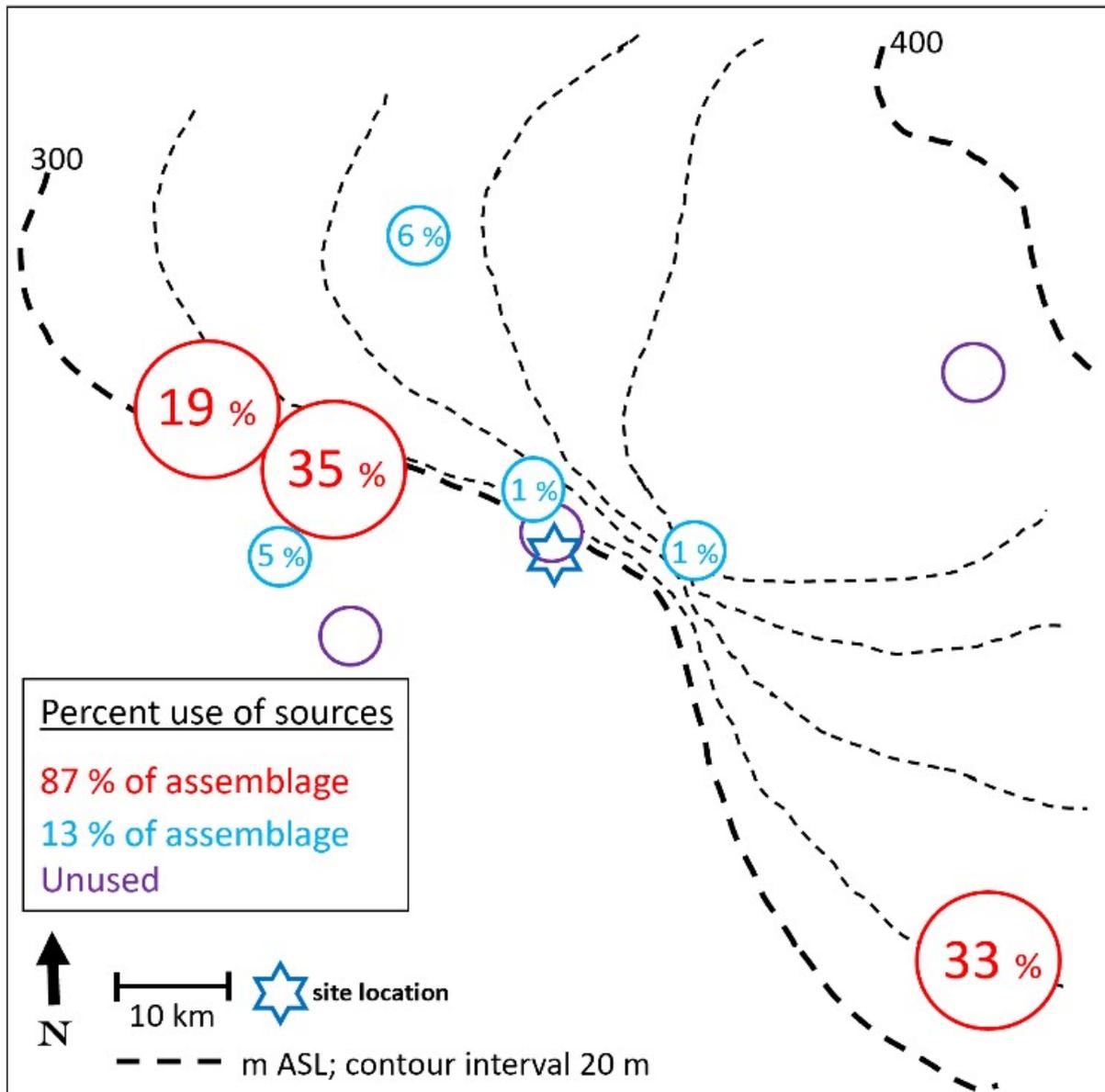


Figure 3. Raw material locations around the site, showing a heavy concentration of use at three of the sources.

The strong evidence for a direct strategy of stone procurement unfolds when the quality of flint at each source is considered. The sources with the highest known quality of stone in the landscape make up close to 90% of the assemblage, and those three sources with the highest quality are used roughly equally (Figure 4). Source use appears irrespective of the distance of raw material sources from the site and even includes a heavily used source that is over 50 km away. This particular source, on the periphery of all known sources for the site, is also geographically unique by being virtually the only one that lies to the south.

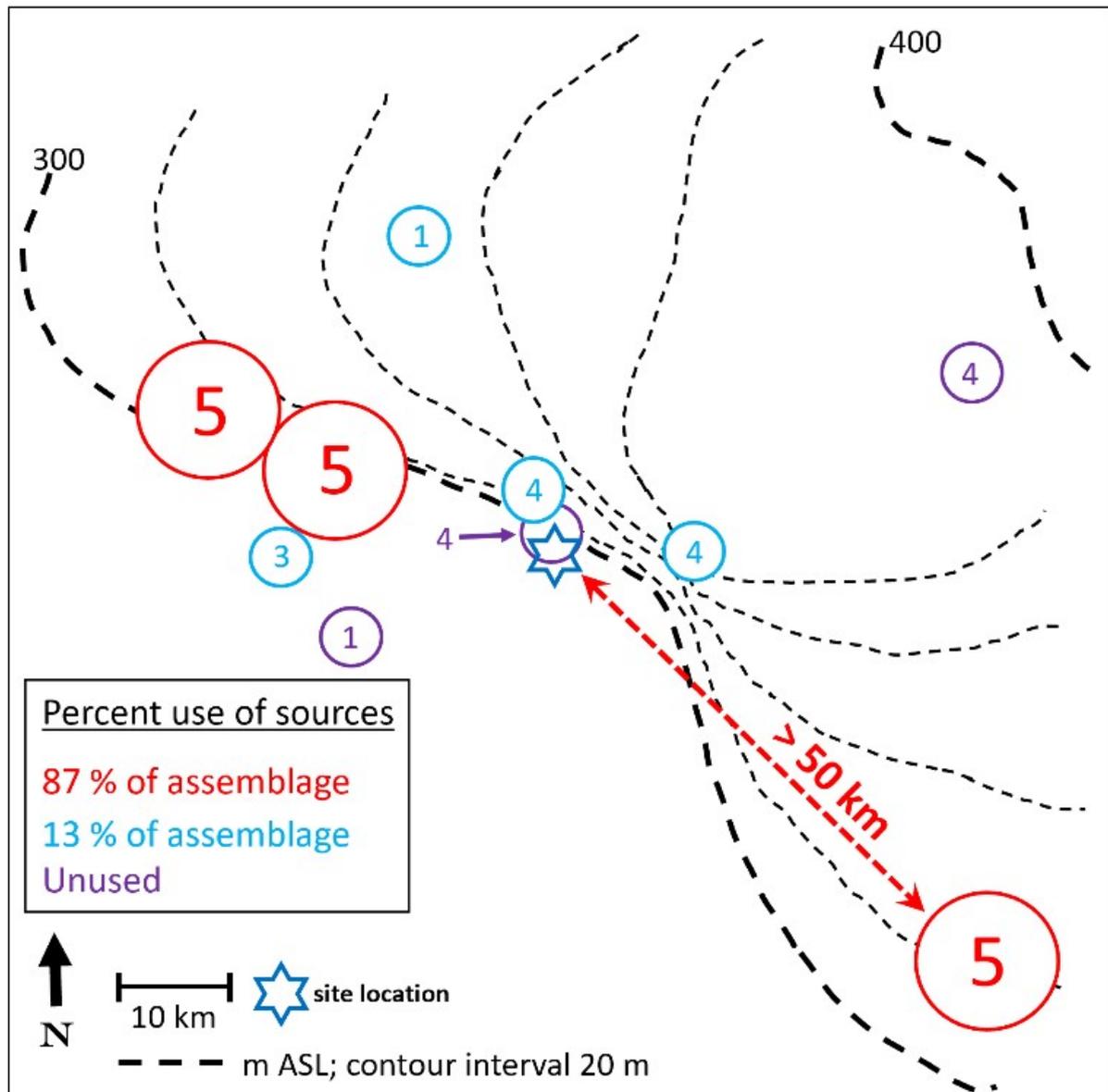


Figure 4. The location and quality of material (a larger number means higher quality) at known sources in the landscape surrounding the site. A great majority of the used material was of the highest available quality (5 = “very good”), regardless of its distance from the site.

Our data point to highly mobile hominin groups who were seeking out only the highest quality of flint that the landscape had to offer. Prioritising high quality stone with direct procurement would have complemented this mobile lifestyle because higher quality stone improves return rates for the tasks it is used for, while it is not generally available in relative abundance across wide areas. It made sense to prioritise high quality material and its procurement, because transporting material over long distances (as these hominins clearly did) is energetically expensive and leads to an increased selective pressure on those materials being *good* quality. High mobility also means a high rate of encounters with food and other resources. To challenge an embedded interpretation of stone procurement, the question is raised “how could an extensive exploitation of stone from a source over 50 km away from the site be considered a purely incidental part of other subsistence activity? - what every-day resource could coincidentally be so localised in this setting?” Given the empirical data that we must work with, it is not a parsimonious conclusion and relies heavily on an assumption that

the embedded procurement of stone is simply the *modus operandi* for mobile hunter-gatherers.

Certainly, there are limitations to an argument for a strategy of direct procurement: we do not know that the site was a central node to these hominins (a useful point of reference for distances to and between sources of raw material); and we cannot assume that hominins conceived of the manufacture and use of their tools relative to the site where they were discarded - a point firmly addressed by Binford (1989). Nevertheless, stone tools did end up at the site and those artefacts suggest that seven potential sources for their raw material were being consistently overlooked. Compared to the used ones, those overlooked sources are at roughly equivalent distances (or are much closer) to the site, and given the range that these hominins were operating in, provide evidence for an extremely selective procurement of stone on their part. The extent of this discrimination for quality stone raw materials could only support an embedded theory if we assume that there was a significant lack of other subsistence resources in the landscape - that all necessary resources were coincidentally located nearby to, or on a convoluted and extensive path between, only the highest quality stone materials. Even if we had the data to support such a notion, it would still be equally plausible to reason that these hominins were primarily engaged in the direct procurement of stone. On that point, these data even suggest that the procurement of stone must have directed other subsistence activity (reversing completely the idea of its embedded procurement), given the time constraints on navigating such a wide territory in order to exploit only the highest quality stone resources.

3.2. Embedded procurement

The map area includes the relatively flat upland zone, the sloping ridge, and the flat plain. As we can clearly see, the hominins who used this site had a strategy of mainly using the resources available along the ridge, which makes sense because this would be an ecotone: a connection between two or more separate ecological areas. Such areas tend to be richer in plant and animal resources than would be found in a single ecosystem. The raw material in the lithic assemblage shows that, at least some of the time, hominins arrived at the site from the SE, carrying with them tools made in the raw material from source 2, which is of very good quality and which is, in any case, the only source we know of in that direction. That raw material makes up 33% of the assemblage.

At other times, the hominins arrived at the site from the NW, carrying with them tools made in the raw materials from the two very good sources over there: source 7 (32 km away, 19% of the assemblage) and source 3 (21 km away, 35% of the assemblage). The lower percentage of material from source 7 may be a case of distance decay, and it may also reflect use of the area while based at the site, where the closer source would be more frequently encountered during hunting and gathering expeditions. This travel back and forth along the ridge is illustrated in Figure 5.

While they were based at the site, the hominins gathered resources along the ridge, sometimes going back and forth there, but sometimes they also ventured either farther upslope or out onto the plain (Figure 6). In the latter case, they likely travelled along the base of the slope then looped back across the plain (perhaps capturing large herbivores?), intersecting with source 9, which although of only medium quality was good enough for expedient tools and makes up 5% of the assemblage. They either did not go as far as source 8, or did not bother collecting the poor quality material available there.

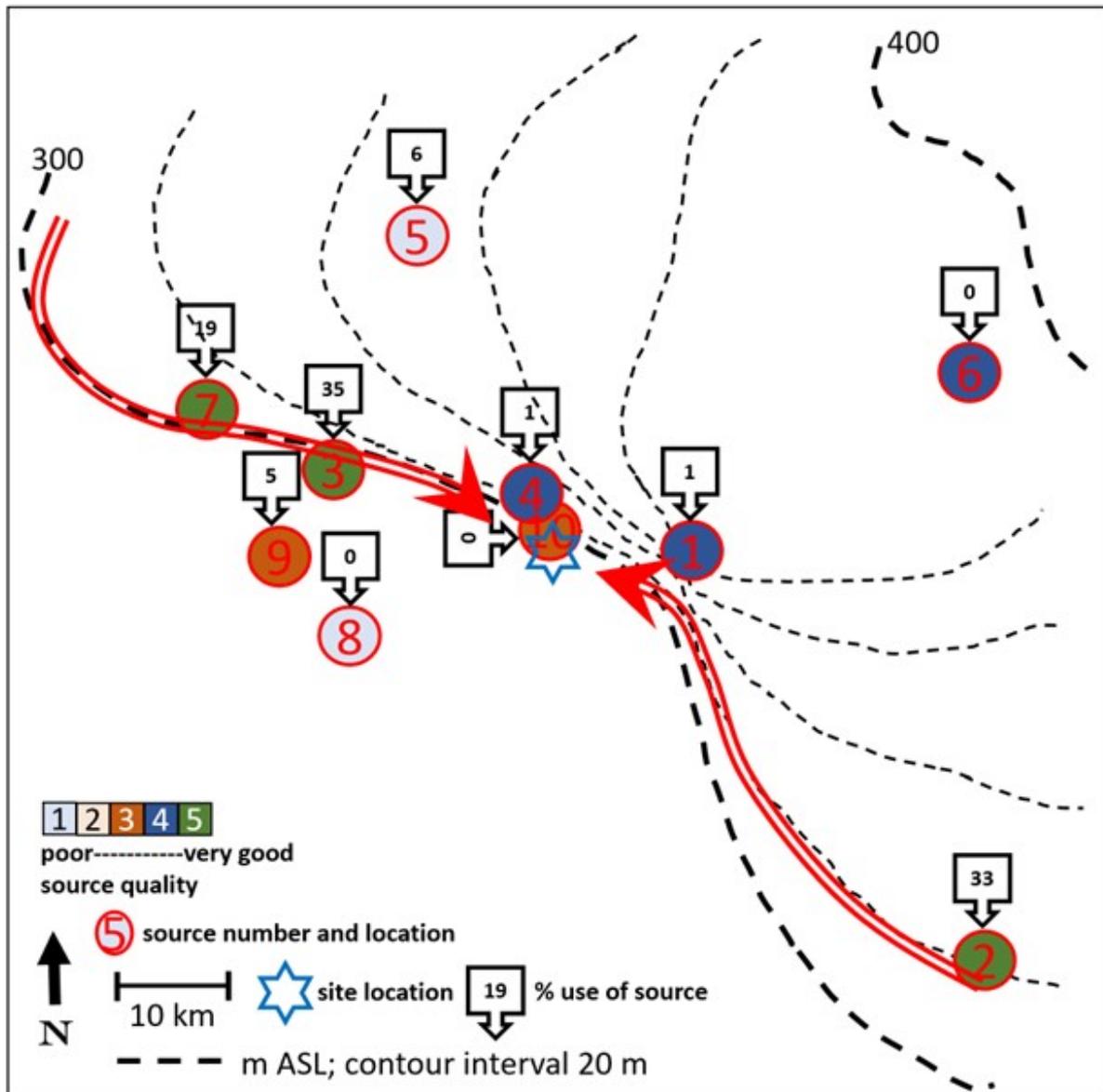


Figure 5. The map of the area, indicating directions of travel along the ridge.

On other occasions they must have followed the ridge base then looped up the slope and around to return to the site. The evidence of this is that 6% of the assemblage is made up of the poor quality material from source 5. They must have been looking for other resources (plants? animals?) because there would certainly be no reason to search out that raw material. Its use is evidence that they encountered it while obtaining those other resources, and it must have been used as a stop-gap measure.

It is noteworthy that the assemblage contains no raw materials from the upper plateau, source 6, even though it is of good quality. Perhaps the hominins never ventured into that area, or else when they did they were on their way somewhere else, and either did not return to our site, or only returned after they had completely exhausted and discarded any raw materials from source 6. It would be interesting to know what raw materials are found in the lithic assemblages from sites outside of this map area.

The final point to make about the use of raw material sources by these hominins is that they very rarely used the rocks available at the sources closest to the site. The assemblage contains 1% each from the two nearby good sources (sources 1 and 4), and none from the

medium-quality source which is closest of all (source 10). This indicates several things. First, they had a good knowledge of the resources available, and were able to exploit the better quality material in the areas they travelled through while hunting and gathering. Second, they were highly mobile, and carried their toolkits with them as they passed through this area. They arrived with very good material (sources 3, 2 and 7 collectively account for 87% of the assemblage), obtained while exploiting the natural faunal and floral riches of the lower slopes of the ridge. They probably also left with some of that material, carrying it on with them to other (as yet undiscovered) sites. They may have refurbished and replenished their toolkits with material from the good sources close to the site, but if so they carried almost all of that away with them. All in all, this is a clear case of embedded procurement carried out by hominins acting in a very logical and knowledgeable manner.

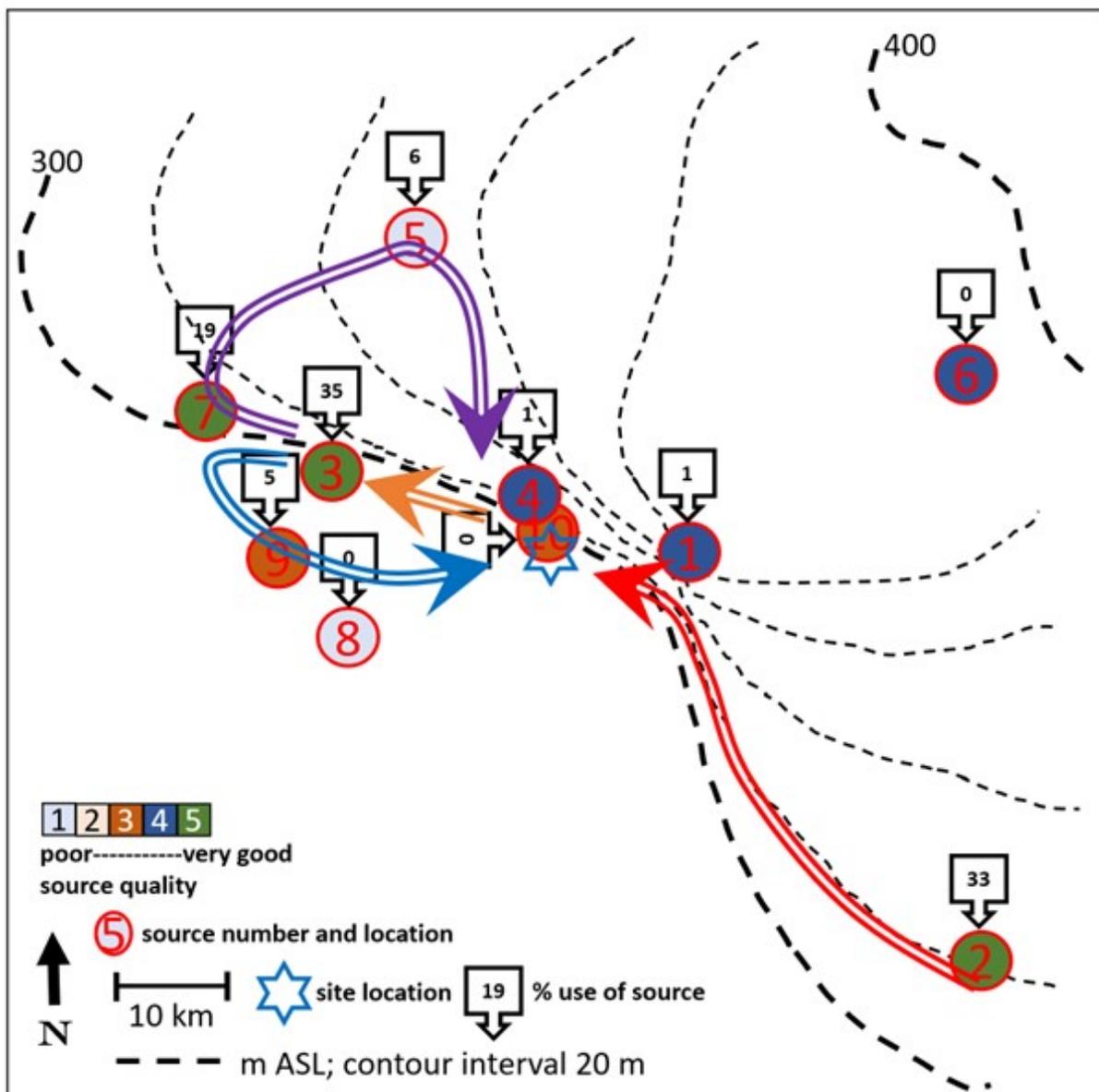


Figure 6. The map of the area, showing travel beyond the base of the ridge.

4. Discussion

What did we learn from this? First of all, sadly, it is entirely possible to make up two completely different yet plausible scenarios based on the same data, confirming what we

suspected: we may be finding what we expect to find, because we expect to find it. This was even without specifying many extraneous factors that affect real sites, such as a definitive time period, stone tool typology, or even how the value or “quality” of each source is judged. These factors might offer important insights into other aspects of human behaviour, but including them in our data would have made our interpretations no less open to a reading both ways in terms of embedded and direct procurement. For example: if artefacts made in material from source 3 (21 km away) were found at a later stage of reduction, we could say that this was a curated technology, and we might be led to believe that the rock had been directly sought out, owing to its importance. Conversely, the presence of flint nodules might make us prefer an interpretation of embedded procurement - taking the opportunity to stock up on a chanced-upon valuable resource without knowing when you might return to the area. Selective exploitation of a raw material type for use in a specific typo-technological category is often used as evidence to support a hypothesis of direct procurement (see Wilson *et al.* 2016; Agam 2020), and if we had stipulated typological details, this scenario might have been applied to our Source 3. While it may be convenient (and occasionally useful) to relate the ideas of curation vs. expediency with procurement methods, getting material does not necessarily bear any direct relevance to what was done with it. So although our scenario was unrealistic in its exclusion of important archaeological factors such as typology, we do think the exercise was worthwhile in its examination of procurement ideas, because it led us to dissect each scenario and find flaws in it. Also, the fact that some aspects of the data could not be explained by one procurement method or the other suggests that as long as we keep our minds open and look for such clues, there is some chance of correctly interpreting prehistoric lithic resource procurement strategies.

Direct procurement offers a superficially robust interpretation, underpinned predominantly by just two key metrics: distance and quality. While the simplest answer is often the correct answer, and parsimonious explanations are usually preferable, this can also come at the expense of a plausible “bigger picture”. We know from studying extant species that provisioning behaviour can be complex, influenced by many competing factors, and often difficult to describe succinctly. Likewise, the archaeological record shows a great variability among hunter-gather lifeways, reflecting the evolved hominin behavioural plasticity to factors such as changing environmental conditions and the distribution of resources, *etc.* (Coddington & Bird 2015). With this in mind, direct procurement seems too reductive to fully explain a provisioning strategy - let alone what might have motivated it.

Distance can be a problematic concept when considering a strategy of direct procurement, mostly because the notion is deeply reliant on “the site” being at the centre of everything. Binford (1980; 1982) frequently refers to the notion of a foraging radius; however, outside of the context of ethnoarchaeological studies, we cannot know that a site was a starting point to seek out raw materials. When we refer to a tool having been manufactured using material from a distant source, this is only in reference to one place where abandoned tools have been discovered. Therefore, attributing significance to the measures of distance we have in our data is not straightforward, because we *do* know that hominins were in most cases highly mobile. While distance might be a good indicator of range, it does not necessarily reflect a mode of mobility (Wilson 2008), which is really the metric under consideration (more difficult to acquire = more valuable and therefore more likely to have been procured directly). As such, studies that use indices of local vs. non-local material to identify procurement strategies rarely classify these meanings satisfactorily (notable exceptions include: Ekshtain *et al.* 2014; Ekshtain & Zaidner 2022).

The matter of all things being relative to the site could also be an issue that obscures the identification of direct procurement, however. For example, Binford (1979) describes an instance of embedded procurement among the Nunamiut, where a fishing party leaves a lake

to visit a nearby quarry for raw material because the fishing had been slow. From the point of view of their campsite, the excursion to the quarry was embedded in the fishing trip. However, looked at differently, it was a deliberate excursion from the fishing place to the source, in order to get rock - so, surely this is direct procurement? Based on what we might find in the archaeological record alone, it is very difficult to say which of two (or many) resources may have been the ones that were “directly” sought out. It is conceivable that the direct procurement of lithic resources led to the incidental procurement of other things. This would still be a direct procurement of the stone but, based on the archaeological evidence we would be left with - say, the fossil of a horse that was chanced upon and hunted - we could easily conclude that it was embedded in another task. This might especially be the case given the prevalence of embedded thinking in the literature, which comes even in spite of evidence for direct procurement strategies in the ethnographic record (Binford & O’Connell 1984; Gould & Saggers 1985).

Turning to embedded procurement: what could possibly be the problem? The idea is that multiple resources were obtained at once, or in one trip, rather than each resource in a single, separate, deliberate trip. This seems eminently plausible, and it must often have been true, as it still is in our modern lives. Since mobile resources, like prey items, are more difficult to capture, they require more planning and might be afforded a higher priority than lithic raw material, especially if the latter is abundant (Andrefsky 2009; Binford 1979). However, embedded procurement does have some inherent flaws when applied directly to the archaeological record. First of all, we know that hominins used plant and animal resources, but we do not know where they got them. One of the advantages of using lithic resource data to elucidate prehistoric landscape use is that we have some hope of identifying the sources of the rocks, and therefore knowing that someone went to that place: rocks do not move around by themselves. But animals do, so if we find their bones at the site, we know someone hunted (or scavenged) the animal, but we do not know where they did it. Individual plants do not move, but even abundant plants tend to be distributed patchily, and their habitat shifts over time, so we cannot know which patch might have been exploited in the past. Ranking the importance of different used resources is speculative and perhaps even futile given their dependence on one another. Still, we grant that food is an essential resource, and it is plausible that getting food might have been given priority over getting lithic resources, such that the rocks were picked up wherever it was convenient along the way to or from obtaining food - but only the rocks will tell us where the hominins went on the landscape. Interpreting behaviour through the lens of embedded procurement therefore adds complexity to our models, by requiring untested and untestable data.

Secondly, embedded procurement is more efficient - but is efficiency really a factor? From an evolutionary standpoint, if you save time and save effort, that is good. Wasting time and effort should have a price and be evolutionarily costly. Waste too much effort, and you are going to die. No species can persist if its individual members keep using more energy than they take in, but we have to ask: did the prehistoric hominins we deal with really live on such a knife’s edge? If they could satisfy their nutritional needs with a bit of hunting and gathering every now and then, and have plenty of time left over, why should they not have used it to explore for other resources? “Efficiency” is a false constraint in such a case.

In both of our scenarios, we were able to make a convincing argument by focussing on some data, and not mentioning other results. For instance, the embedded procurement scenario is based upon the (invented) importance of hominin travel back and forth along the base of the ridge, which happens to coincide with the locations of the best sources. The direct procurement scenario had to disregard to ecological importance of that ecotone, and the mobility pattern of the hominins, since in that case it was the sources themselves which mattered. There may be no way to choose between these options and perhaps the point is that

we do not have to. Since an assemblage is likely to reflect several strategies of procurement, whether by the same hominin group or simply owing to the low resolution of the data (assemblages spanning multiple generations of hominins, palimpsests, *etc.*), a flexible approach is required (Blades 2001; Ekshtain *et al.* 2014). Classifications with no reason to be mutually exclusive should not be applied as if they are.

For LW's embedded procurement scenario, she felt that she had to dance around the problem of the lack of use of nearby good sources. The scenario therefore focussed on other resources and hoped no-one would notice the skimpy discussion of nearby ones. This points to a potentially useful result. Lack of use of good, easily obtained resources requires some explanation: and an overarching strategy of embedded procurement might not be it. On the other hand, while the direct procurement scenario basically ignored the minor sources altogether, the embedded procurement scenario did point to the use of two minor sources that are out of the main path of travel, and are not good quality (sources 5 and 9). These show the value of considering raw material characteristics and locations, because they show us that hominins went to these areas, but surely not in order to obtain these raw materials. Some other resource must have drawn them there, and the rocks were just an expedient stop-gap. In a solely-direct procurement scenario, use of such poor quality sources would have to be explained by evocations of (for instance) the spiritual, ritual importance of these rocks: another untested and untestable assertion.

5. Conclusions

The lessons we have learned here are directly applicable to real archaeological sites. Although all of our data were generated randomly, the picture they paint is not unlike a real situation. For instance, LW has spent many years studying the lithics from a multi-layered Middle Palaeolithic site in France, the Bau de l'Aubesier (Wilson 2021), and at that site, several layers contain little or no local material, several layers do contain pieces of poor quality material from distant sources, and, of course, a large proportion of each assemblage consists of good quality flint. It is clear that neither a solely-embedded nor a solely-direct procurement scenario can explain this. We need to consider each assemblage on its own merits, and take into account indicators of mobility, the duration and type of use of the site, seasonality, and so on, in order to fully explain what we find. Embedded procurement is probably always part of the answer, but it cannot just be the default explanation.

A final thought: we can study raw material procurement - how much, from which sources, where? But when we talk about embedded vs. direct procurement, we are actually talking about intention: what did the hominins have in mind? Did they go to a source in order to get this rock, or were they there intending to get something else? We have no way of testing for intention: we know what they did, not what they meant to do. Direct and embedded procurement are useful concepts to consider as we try to understand our results, but we should be careful of believing that we have proven something that we cannot prove.

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Data statement

All data generated for the purposes of this study are included in this published article.

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Une partie à deux mi-temps: A la recherche de preuves de l'approvisionnement et intégré et direct dans un jeu de données simulées

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Sommaire:

Quant il est question de comment et pourquoi les matières premières lithiques utilisées dans un assemblage archéologique ont été obtenues, les préhistoriens ont souvent recours à deux idées: “embedded procurement” (l’approvisionnement incorporé ou intégré dans d’autres activités), et “direct procurement” (l’approvisionnement direct: un voyage au gisement était entrepris seulement et uniquement pour obtenir de la matière première). Depuis plusieurs années, cependant, ces deux idées semblent avoir acquis des sous-entendus additionnels. Selon Lewis Binford, l’utilisation de l’approvisionnement direct par les préhistoriques serait un signe qu’il y avait eu un problème, un manque d’anticipation, et que l’approvisionnement intégré aurait été la norme. D’autres chercheurs, par contre, ont trouvé de bonnes raisons pour suggérer que l’approvisionnement direct aurait pu être, au moins parfois, délibéré, planifié, et utile. Néanmoins, les deux idées sont souvent traitées comme étant opposées, et elles sont utilisées pour interpréter la mobilité des préhistoriques, et leur obtention des matières premières, comme si elles étaient mutuellement exclusive, l’une de l’autre. Elles ont également été confondues, de manière variable, avec différents concepts technologiques, l’obtention opportunistique ou sélectionnée, l’utilisation de matières premières locales versus importées de loin, *et cetera*. La vision des archéologues, qui est souvent centrée sur le site au lieu du territoire (il est pour nous souvent difficile de comprendre que le site aurait pu être un lieu de passage, et non une base d’activités), peut confondre nos interprétations encore plus. Le plus grand problème, cependant, est le suivant: comment est-ce que nous pouvons distinguer le type d’approvisionnement à partir de l’assemblage lithique fouillé au site archéologique?

Pour tester ceci, nous avons alors inventé le scénario d’un site avec un assemblage lithique comprenant différentes proportions d’outils lithiques provenant de différents gisements. Afin de ne pas influencer les caractéristiques du site par nos idées inconscientes, nous avons assigné les qualités des sources et les pourcentages de chaque source dans l’assemblage de manière aléatoire, de même que les distances et directions du site aux sources. Nous avons ensuite analysé ces résultats à partir de deux points de vue: LW convaincue à priori que les faits démontraient l’approvisionnement incorporé dans d’autres activités sur le terrain, et PM convaincu de sa part qu’une stratégie d’approvisionnement direct était évidente. Dans les deux cas, chaque auteur se croyait justifié dans son interprétation, trouvant assez d’arguments pour soutenir leur stratégie assignée. Il est donc inquiétant, mais non surprenant, que nous pouvons voir ce que nous croyons que nous allons (ou devons) voir. Cependant, et heureusement, il n’était pas toujours possible de tout expliquer d’un point de vue ou de l’autre. Par exemple, dans nos données inventées nous avons très peu d’utilisation de sources locales, près du site. Cette situation peut être trouvée dans de vrais assemblages aussi, et elle est difficilement expliquable selon une stratégie d’approvisionnement intégré dans l’obtention des autres ressources. Par contre, les explications de l’assemblage selon une stratégie directe prenaient pour acquis une vision de la région centrée sur le site, tandis que nous savons que les préhistoriques étaient plus mobiles que nous : notre

site n'était pas le centre de leur univers. Alors notre jeu nous a donné un meilleur aperçu des limitations, ainsi que de l'utilité, de ces deux concepts en tant que méthode heuristique pour influencer, sinon guider nos interprétations quant à l'approvisionnement préhistorique en matières premières.

Keywords: approvisionnement lithique; approvisionnement direct; approvisionnement intégré; stratégies de mobilité des hominidés; choix des matières premières.