From shaping techniques to gender prehistory: Bone technology

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Abstract:

Abrasion and scraping are techniques universally used in shaping operatory sequences. They respond to the same morphological objectives, but their implementation varies according to chronological, cultural, and geographical gradients. While abrasion becomes more important from the Pre-Pottery Neolithic in Near East and well developed in the European Neolithic (area for which we have statistics), it is barely used in the Arctic Pre-Inuit and Inuit contexts, where scraping always largely predominates. We would like to discuss this variability by the scope of the mobility, subsistence and gender habitus. To address these questions, we compared data obtained from different socio-economic and environmental contexts, on one side the Neolithic and Epipaleolithic groups from Europe, Near East and Maghreb and on the other side, the American and Greenlandic Arctic societies. Based on ethnographical comparisons, we suggest that the use of scraping versus abrasion may reflect human habitus influenced by lifeways and gender patterns. Indeed, Arctic societies are characterised by high mobility and a gendered distribution of production: soft materials are worked by women, while hard materials are worked by men. However, both groups share the same technical register, which allows them, if necessary, to compensate for the absence of one or the other gender. Conversely, in the Neolithic, and since the Pre-Pottery Neolithic (PPN), sedentary life has gradually changed the use of technology, and with it, the division of labour between men and women. This is the hypothesis we put forward here. The manufacture of numerous bone objects used in daily life, involved in skin and soft plants processes for example, would be carried out in or near the house, *i.e.*, attached to the domestic sphere and mainly associated with female activities. K. Wright, for example, has noted that the distinction between men and women tasks becomes more pronounced as the Neolithic develops, with women tasks increasingly limited to the domestic sphere (Wright 2000). Scraping becomes more frequently used for sharpening. We therefore propose to see in this the expression of differences in location between (domestic) manufacture and (non-domestic) use of tools. Scraping characterizes movements or mobility lifestyle when abrasion is an evolution rather linked to sedentism. We therefore suggest to interpret the use of these universal techniques (abrasion and scraping) in Prehistory as indicators of gender and lifestyle.

Keywords: archaeology of techniques; gender archaeology; abrasion; scraping; Arctic; Neolithic; Epipaleolithic; Near-East; Europe; Maghreb

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1. Introduction

Following the pioneering work of H. Camps-Fabrer (1966) and S. Semenov (1964), the systematic analysis of osseous artifacts (bone, antler, and teeth) quite significantly enriched and renewed the field of the organic material culture studies. The link between technical and social facts constitutes the pivotal principle of the "*Anthropologie des techniques*" and *in fine* of technology (Cresswell 2003; Gille 1979; Latour & Lemonnier 1994: 11-360; Lemonnier 1980: 10-222). It structures our studies of the techniques associated with bone materials, with focus on understanding how social practices may influence bone manufacturing techniques (Houmard 2011; Sidéra 1993: 104-182; 2000). The identification of the different social aspects through which techniques can operate, in terms of practices, division of labour, specialisation, functional activities and, ultimately, gender, can result from such analyses. The question here is to explore the relevance of the technological approach to archaeological gender studies (Augereau 2021: 19-66; Knittel & Raggi 2013: 11-21; Moen 2019; Peterson 2010; Sørensen 2000: 1-45; Trémeaud 2018: 1-36).

Probably because both techniques are considered as ordinary and common techniques, neither scraping nor abrasion have yet been historicized or problematized. However, they have played a certain role in the changes that occurred in the technical practices between the Epipaleolithic and the (Proto-)Neolithic, both in the Near East (Campana 1989: 3-10) and the Maghreb (Petrullo 2014: 36-43; Sidéra 2022). This role might be of importance and deserves further study.

In this paper, we will compare data from different socioeconomical and environmental contexts in order to propose an overview. American Arctic populations -including Pre-Inuit and Inuit- have been compared to Epipaleolithic and Neolithic groups from the Near East, North Africa and Europe. We propose that the shaping techniques implemented by a given society are not only dictated by constraints imposed by the raw material and learned gestures, but also by individual's *habitus* (*sensu* Bourdieu 1980: 86-110), including subsistence practices and gender role within the social group.

2. Methods and questions: Implementation and characteristic of the marks

As a reminder, we first describe the actions, effects and objectives involved in each shaping technique, so as to clearly identify how abrasion and scraping differentially imprint the raw material. The mechanisms involved in the formation of the different traces are important to understand as they allow for a better identification of the techniques.

Abrasion is a process that consists in removing material by rubbing back and forth on a grained lithic material (Figure 1a). Sand can be added for a greater efficiency (Campana 1989: 24; de Beaune 1993; Orlowska *et al*. 2022; Sidéra 1993: 139) (Figure 1a). The use of water is continuous and has the effect of softening the surface of the bone. It also leads to the formation of a paste that combines bone powder, abrasive particles, and sand, thus optimizing the working time, the energy, and the efficiency of the technique (Campana 1989: 33; Sidéra 1993: 139). Campana implemented an experimental program related to this technique to characterize the traces left by the process (Campana 1989: 33). He specifically examined the consequences of movements on the formation of volumes and traces left on the artifacts, as well as the superposition of the traces. Recently Orlowska and collaborators (Orlowska *et al.* 2022) experimentally investigated the possible relationship between the variability of the shape of the abrasion lines left on the bone material and the tools used, with or without additives as water and sand.

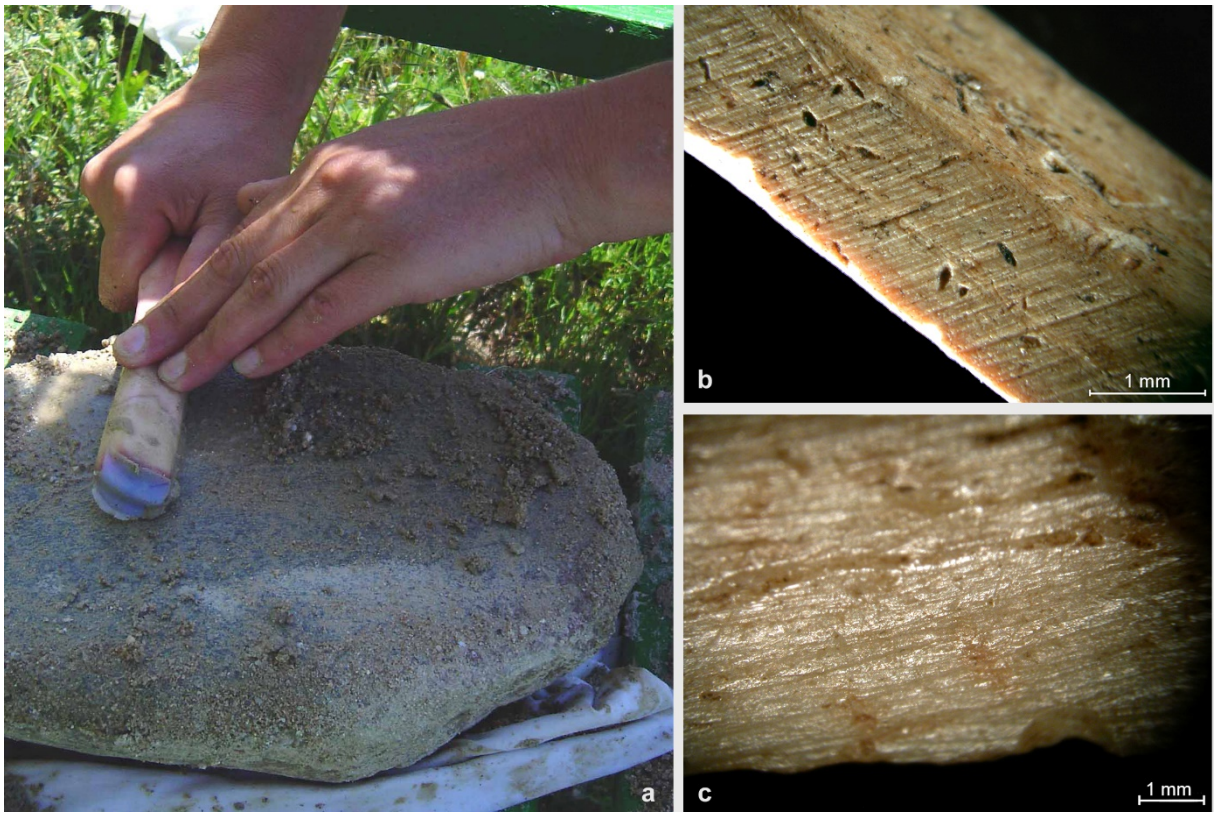

Figure 1. Abrasion: 1a: device and gesture (Experimentation: I. Sidéra; Credit Lichardus-Itten) and marks on archaeological items from Cuiry-lès-Chaudardes with a moderate magnification (x20 to x50) (6th Millennium BCE, France) (1b: oblique wear; 1c: longitudinal wear; Credit Sidéra).

Scraping is a technique implemented with the edge of a tool, which can be of stone, metal or ivory. In contrast to abrasion, the tool is active while the worked surface is fixed. The material is removed as thin chips and more often as “fine particles” (Stordeur-Yedid 1979: 142) (Figure 2a). The action is linear, unidirectional, and almost always axial (Campana 1989: 33). Campana has also carried out experimental work on this technique in order to differentiate between abrasion and scraping striations (Campana 1989: 28-34).

Despite their differences in instrumentation, movements, *modus operandi* and design of the transformations, scraping and abrasion can be equally used for shaping and maintaining tools (resharpening), with almost the same efficiency, and regardless the purpose of the transformation to obtain a point or a bevelled, flat or curve surface (Campana 1989: 95-97; Sidéra 1993: 155-171; Stordeur-Yedid 1979). Bevels, for example, would almost always be shaped or re-sharpened by abrasion in European Neolithic, while in Upper Palaeolithic Magdalenian, they would be shaped by scraping or adzing (Houmard 2008). When both techniques coexist on the same artefact or inside an assemblage, the use of each is then partially guided by functional considerations. Scraping is preferred for shaping or refining depressions where abrasion is more difficult to implement on such relief (Sidéra 2010: 31-32). In the Neolithic (Europa, Anatolia and northern Syria), spoons and hooks have complex reliefs and are frequently shaped by scraping in addition to other techniques including abrasion (Sidéra 1997; Taha *et al.* 2017).

The archetypal pattern of abrasion marks consists in short, parallel striations. Each strip is unique and corresponds to the bite of an abrasive grain. The striations have a U or V cross section. Another specificity of abrasion is the excoriation of the osseous surface between the striations; the material looks as it has been torn off (Figure 3a). The scraping leaves striations of varying widths and depths. They are long and parallel to each other. Irregularly spaced,

they draw like a bar code. The striations and the irregularity of the relief correspond to the chipping of the edge of the stone, which occurs when it acts on the raw material. The sharp edges of the removals scratch or dig into the material differentially depending on their size (Figure 2).

Figure 2. Scraping: 2a: experimental gesture and technique (Experimentation: I. Sidéra; Credit Lichardus-Itten) and marks on archaeological items from Cuiry-lès-Chaudardes with a moderate magnification (2b: x20 to 2c: x50) (6th Millennium BCE, France) (Credit Sidéra).

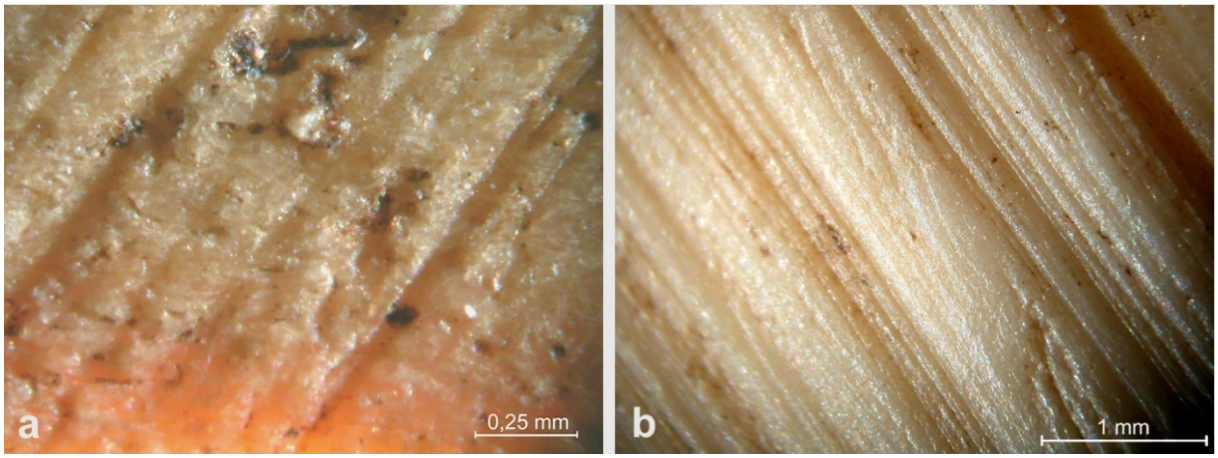

Figure 3. Abrading (3a: x50) and scraping (3b: x20) marks on archaeological items from Cuiry-lès-Chaudardes (6th Millenium BCE, France) with a moderate magnification (x20 to 50) (Credit Sidéra).

As stated by Danièle Stordeur, even though “it is quite obvious that the traces of these two techniques (abrasion and scraping) are different, the result is the same; this is where the whole problem of identifying the techniques arises...” (Stordeur-Yedid 1979: 142).

Differentiating the traces left by each technique can sometimes be tricky, especially when the striations are very fine, or partially erased or damaged by use-wear or taphonomy. The use, at least, of a stereoscopic microscope (Figure 3), and in some difficult cases of a light microscope at x100 magnification, is a prerequisite to accurately detail the shape of the striations and ensure identification.

Scraping and abrasion are universal techniques, easy to implement, that mobilise the motor skills learned by most people since childhood (Allard *et al*. 2006). These two techniques, applied on osseous materials as early as the Lower and Middle Palaeolithic (d'Errico *et al.* 2003; Vincent 1993: 10-331), were developed in the Upper Palaeolithic (de Beaune 1993; Mons 1980: 319). Leaving characteristic striations on the osseous material, it can be identified in the manufacturing or maintenance processes of objects in human societies on all continents, regardless of their ecosystem (Figures 1 to 3). Most often, whatever the type of assemblage, both techniques are used, but one is generally or even almost exclusively used. This means that the technical practices are different and deserves to be questioned. Why is a clear election made for only one technique when both scraping and abrading are applied within a single assemblage? What might have been the motivation for the artisans to choose one over the other techniques? Are there many factors leading to these technical choices and if so, how do they combine? In other words, are these technical choices linked to structural complexity or not? Do lifestyles and sexual division of labour interfere with these technical choices and how?

3. Results

3.1. Scraping predominates in arctic contexts

Pre-Inuit peoples were the first to settle in the northernmost areas of the world around 5000 BCE (Friesen 2016; Mason & Friesen 2017:673-691). Their nomadic lifestyle based on tents and semi-subterranean houses and on a subsistence almost exclusively focused on animal exploitation, mainly marine mammals such as seals and walruses, as well as cetaceans later during the last Millennium (Friesen & Mason 2016: 827-849). In their ice-covered environment for more than three quarters of the year, they primarily hunt marine animals with harpoons and land-based spears. They work seal and caribou skins for clothing, boats, and housing (Mason & Friesen 2017: 133-143).

In the Arctic context, osseous equipment offers a very high diversity in terms of function, particularly in the Canadian Eastern Arctic where trees are nearly absent and driftwood scarcely present: weapon items (*e.g.*, harpoons, spears, arrows, fishspears, bolas, foreshafts), tools (*e.g.*, knife handles, adze handles, snow knives, scrapers, punches, wedges), transportation items (*e.g.*, sled runners, trace buckles, whip shanks), utensils (*e.g.*, bowls, spoons, combs, containers, meat forks) or ornaments (*e.g.*, beads, pendants, buttons), as well as miniatures, ritual objects or toys (*e.g.*, figurines, masks). Abrasion is virtually absent from the work of osseous materials (Table 1). Its use only occurs when scraping does not allow to produce an equivalent result, to regularize or consolidate the edge of certain objects for example, or when the Inuit artisan sought to produce a flat surface (Houmard 2011: 214-220). Abrasion was also used sometimes for shaping small bird figurines, sometimes including a human-like representation (Figure 4). This technique was first dedicated to the manufacture of burin-type tools (called pseudo-burins) in the lithic industry during the Pre-Inuit period (800 BCE-1400 CE). Then, it largely predominates during the last millennium in the Thule or Inuit context (1200-1900 CE), for shaping weaponry, knives or adze blades (Desrosiers 2009: 47-68; Sørensen 2012: 139-186; Sørensen & Gulløv 2012).

Table 1. Abrasion (A), scraping (S) and knapping (K) marks occurrences on archaeological Arctic osseous and lithic artefacts made during the shaping process (knapping statistics are not exhaustive).

			Bone				Lithics			
Country	**Culture**	**Site**	**A**	**S**	**A + S**	**Total**	**A**	**K**	**A+K**	**Total**
Canada	Pre-Inuit	Parry Hill	-	552	-	552	1	327	-	328
	2500 BCE		-	100%	-	100%	0%	100%	-	100%
	- 1400 CE	Tayara	10	620	13	643	73	20149	60	20282
			2%	96%	2%	100%	1%	98%	1%	1%
		Qaersut	-	174	3	177	-	111	-	111
			-	98%	2%	100%	-	100%	-	100%
		Freuchen	-	446	-	446	5	476	-	481
			-	100%	-	100%	1%	99%	-	100%
	Thule	Naujan	9	208	15	232	17	22	15	54
	13-19th c. CE		4%	90%	6%	100%	31%	41%	28%	100%
Greenland	Thule	Nuulliiit	9	218	6	233	-	-	-	-
	13-19th c.		4%	94%	2%	100%	-	-	-	-
	CE	Cape Harry	13	79	7	99	47	5	17	69
			13%	80%	7%	100%	68%	7%	25%	100%
Alaska	Yup'ik	Nunalleq	34	759	46	839	1005	254	35	1294
	17th c. CE		4%	91%	5%	100%	78%	20%	2%	100%

Figure 4. Arctic bird figurines shaped by abrasion, Naujan Thule site (Canada) 13th-19th century CE (Credit: Houmard).

3.2. Abrasion development from Epipaleolithic to Neolithic in the old world

From the Near Eastern Protoneolithic (11th millennium BCE) to the sedentary and agricultural European Neolithic (7h millennium BCE) (Lichardus *et al.* 1985), abrasion develops until it dominates the shaping of the bone, teeth and antler artefacts, whatever the morphology or functionality of the objects: pointed and cutting-edge tools, handles, pendants, beads, hooks, spoons, *etc*. (Campana 1989: 37-44; Sidéra 1997). The change is probably gradual or irregular depending on the sites and regions until the European Neolithic when abrasion becomes overwhelming in proportion. For Campana: "The Zagros Protoneolithic bone objects, in contrast to those of the Natufian, were almost entirely manufactured using abrasive techniques. These objects were ground to shape against an abrasive surface with a moderately fine grit, probably sandstone or a similar material" (1989: 130). Scraping marks are scarcer except in certain sites or cultures, where they can occur in unexpected proportions. The counting of occurrences for the different techniques is not always done except for some examples (Table 2). Bone objects of Pre-Pottery Neolithic sites in the Southern Levant, for example, appear till the end of this period, not to be shaped by scraping more than abrasion, as at Motza, Israel (Khalaily *et al*. 2007: 31; Le Dosseur 2010a: 11-884; 2010b; 2011). At Beaumont "Le Crot aux Moines" (Yonne, France, 5th mill. BCE), the use of scraping in the fashioning sequence is unusual and exceptionally high compared with other sites. Scraping is as well applied to the fashioning of common categories such as pointed tools (20%) (see Table 2). Thus, the flat-faced pointed tools, characteristic of the *Chasséen* Culture in Burgundy, can be shaped by scraping whereas elsewhere abrasion would have been used (Benito 2016; Sidéra & Legrand-Pineau 2024: 157;) (Figure 5).

Table 2. Abrasion (A) and scraping (S) marks occurrences on Epipaleolithic and Neolithic osseous artefacts made during the processes of shaping and maintenance.

Country	Date BCE	Site	Reduction			Shaping			Rejuvenation		
			A	S	A+S	A	S	A+S	A	S	A+S
Tunisia	7th-6th mill.	Hergla	0	0	0	9	16	2	1	0	0
			0%	0%	0%	33%	59%	7%	100%	0%	0%
Bulgaria	6th mill.	Balgarčevo	0	0	0	41	0	3	13	1	1
			0%	0%	0%	93%	0%	7%	87%	7%	7%
Bulgaria	6th mill.	Kovačevo	28	0	0	603	32	35	225	87	221
			2%	2%	0%	90%	5%	5%	42%	16%	42%
France	6th mill.	Cuiry-lès-Chaudardes	21	0	0	145	3	14	80	50	27
			7%	7%	0%	90%	2%	9%	51%	32%	17%
France	5th mill.	Corbères-les-Cabanes	0	0	0	64	1	4	39	1	5
			0%	0%	0%	93%	1%	6%	87%	2%	11%
France	5th mill.	Beaumont	0	0	0	32	8	1	1	12	1
			0%	0%	0%	78%	20%	2%	7%	86%	7%
Bulgaria	5th mill.	Drama	0	0	0	664	10	22	18	11	20
			0%	0%	0%	95%	1%	3%	37%	22%	41%

Figure 5. Archaeological flat-faced pointed tools, with the epiphysis intensively worked by abrasion (contour and faces) and the point sharpened by scraping, Beaumont (France, 5th Millennium BCE) (Credit S. Ouboukhoff, from Sidéra & Pineau 2024).

Abrasion and scraping are central to the changes from Epipaleolithic to Neolithic contexts, both in the Near East (Campana 1989: 129-130; Le Dosseur 2010a: 82) and the Maghreb (Petrullo 2014: 158; Sidéra 2022). While scraping is almost exclusive in the Natufian and Capsian cultures, abrasion gains importance in the Protoneolithic, and then in the Neolithic (Campana 1989: 129-130; Le Dosseur 2010a: 11-884). In the Maghreb, which is an interesting laboratory for studying the neolithization, abrasion practices change between the Epipaleolithic and Neolithic periods (Table 2). The material's grain size of the abrading tool in the Capsian differs from that used in the Capsian Neolithic tradition. The abrading techniques also largely differ between the two periods. Abrasion can be detected in the Neolithic period by wide and deep striations. In contrast, in the Epipaleolithic, abrasion is discrete leaving extremely thin striations; it thus has a limited impact on the transformation of the volume of the objects (Petrullo 2014: 12-376; Sidéra 2022). In European Neolithic, abrasion is consistently applied and may reach high ratios (Table 2).

3.3. Are techniques indicators of mobility?

A dualism between the cultures massively adopting either scraping or abrasion seems to emerge which, beyond the technical aspects, distinguishes nomadic societies associated with scraping from sedentary societies associated with abrasion (Figure 6). The Natufian, rather sedentary and pre-agricultural culture (Aurenche 2010; Bar-Yosef 1998), forms an exception. Indeed, according to Campana (1989: 130), its technical traditions would be rooted in the Upper Palaeolithic. It is therefore relevant to consider whether mobility might not be a determining factor in the choice of techniques.

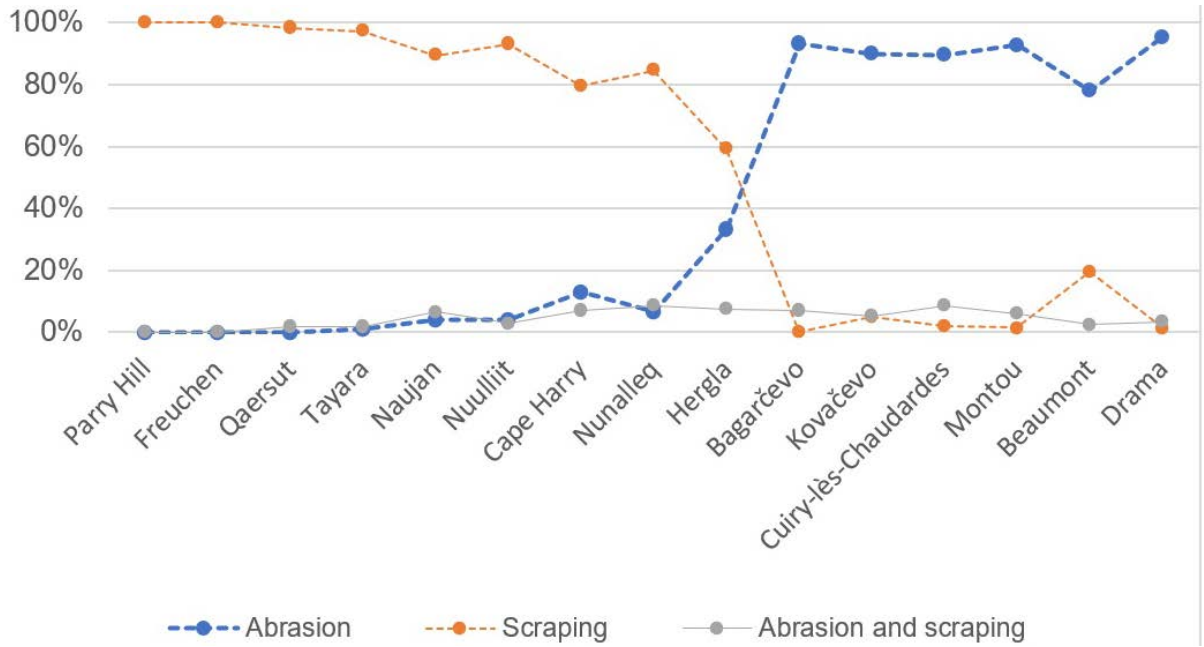

Figure 6: Occurrence of abrasion and scraping shaping marks on Arctic and Old-World Epipaleolithic and Neolithic osseous artefacts: bone, antler and teeth (all technical sequences combined).

The example of resharpening during the Neolithic enriches the previous proposal. While abrasion is the preferred technique for shaping objects, scraping is preferentially used in the process of resharpening (Table 2). At Cuiry-lès-Chaudardes (Aisne, France), for instance, it was applied to nearly 80% of the pointed tools produced on the long use awls made with ruminant metapodials (n = 58). Abrasion and scraping alternate in 30% of cases, in distinct resharpening sequences (up to three sequences perceptible on some objects) (Sidéra 2010: 39) (Figure 7). The question of the differential use of shaping and resharpening techniques is therefore worth asking. Time necessarily separates the manufacturing and use processes, but is this a sufficient factor for explaining a shift in the techniques implemented? Rather, is the place where the bone tools are respectively manufactured and used, an operating criterion to account for a change in techniques between the production and re-sharpening processes? As a reminder, scraping is performed using handy lithic tools, lightweight and transportable. In this respect, it differs from abrasion, whose use, is associated, on the one hand, with a lying and fixed station, and on the other hand, with a device less transportable because it is usually heavier and more cumbersome. The use of the abrasion could then depend on the place where the technique is performed: inside the house or its immediate environment, *versus* outdoor in working sites. The choice of scraping could thus reflect the need to use tools better suited to activities disconnected with the house system, farther from the village, somehow related to the movement of individuals (Sidéra 2010: 39-40).

The fundamental question remains the relevance of changes in technical practices - abrasion *versus* scraping. We here propose to link abrasion, scraping and lifestyle within the past societies, and that the massive use of either scraping or abrasion could be an indicator of mobility. The axiom would become: dominant scraping for mobile groups of hunter-gatherers *versus* dominant abrasion for sedentary groups (of farmers), as suggested in the example presented here (Figures 6 and 8).

Figure 7. Superposition of abrasion (parallel striations on the left) and scraping (longitudinal striation on the centre and right) marks at the base of the tip of an archaeological pointed tool, relates to different sequences of resharpening (Cuiry-lès-Chaudardes, France, 6th Millennium BCE) (Credit Sidéra).

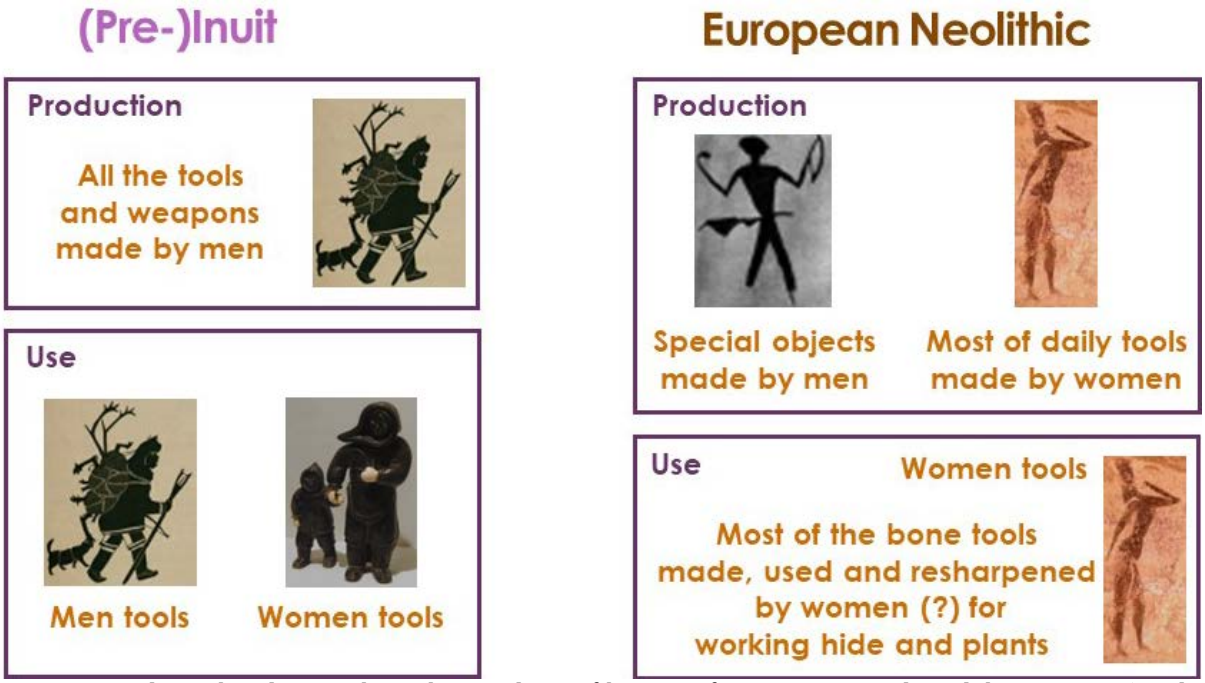

Figure 8. Gender archaeology in the making and use of bone artefacts in Arctic and Neolithic contexts (Credit Houmard & Sidéra).

3.4. Sexual divisions of labour: Towards a gender archaeology?

According to Peterson, with Neolithic, “changes in the sexual divisions of labour and task specialization occur” (2010: 252) (Figure 8). This is also the question at work in this paper, integrating elements that are never considered in the light of the gender. What can we infer for the Neolithic from the techniques of reduction, shaping and maintenance that are implemented?

Functional analysis shows that the work of hide and plant materials, as well as sewing, is performed with ordinary tools, often made of bone, which require only a standard skill (Legrand 2007: 10-178; Sidéra 1993: 529-563; 2010: 49-52; 2012: 21-23). These tools are produced by male and female users according to their respective tasks, or in small series regardless of an immediate need (Sidéra 2010). In most reported ethnographical cases, the women took over the work on soft materials, and the men that of the hard materials (Murdock & Provost 1973; Tabet 1979; Testart 2014: 37), as observed in the Arctic. In the Neolithic contexts, we can infer the gender of the manufacturers for some productions (Figure 8). Some models of spoons, hooks, pointed tools and anthropomorphic figurines, highly sophisticated and codified, could have been socially valued and manufactured by men (Sidéra 2012: 90-91). Tabet (1979) observed that the demanding and repetitive tasks that might be realized with a simple toolkit are usually associated with women. Skin work falls into these categories of exhausting repetitive tasks. We would therefore tend to consider that many daily bone tools are made and used by women as part of their usual domestic production activities. As abrasion is in a high proportion to the Neolithic, would it be unrealistic to think that women promoted the use of this technique? Thus, shaping techniques, and abrasion, in particular, could not only be an indicator of mobility, but also an indicator for gender.

The domestication and exploitation of plants, and cereals in particular, could have encouraged the development of abrasion through the grinding activities. The similarities in the technical gestures, tools, and materials between the grinding of various materials and abrasion applied to bone and lithic materials are striking. Since the Middle PPNB - Pre-Pottery Neolithic B, around 8500 BCE (Neolithic “first generation”), the polished stone toolkit becomes generalized (Aurenche 2010). The term "Neolithic" itself, "(Neo+lithic)", adopted in the 19th century in Europe, follows from these abrasion activities which, likely by a transfer of the techniques of grinding and milling of cereals, may have encouraged the widespread application of abrasion to the production of bone and lithic tools.

Based on the regularity of ethnographic examples in Asia, America, and Africa, prehistorians studying the grained lithic tools have recurrently proposed to associate women and grinding activities (Bonfill 2020; Hamon 2006: 170; Wright 2000). From a gender perspective, Paola Tabet's anthropological survey, based on the monumental ethnographic work of Murdock and Provost (1973) argued that the manual milling of cereals is an “exhausting task, the rhythm of which prefigures the movements of the machine [...] and requires several hours a day” (Tabet 1979: 42), and concluded that it is implemented by women in most societies. Echoing this, Molleson's study on the bone lesions of female skeletons from Abu Hureyra (Syria), in Pre-Neolithic (11th and 10th Mill. BCE) and Neolithic (8th to 5th Mill. BCE), reports long and frequent kneeling stations which are consistent with a manual milling (wear and lesions on the big toe, knees and metatarsals, as well as hypertrophied deltoid muscle insertions) (Molleson 2000, 2006). Results from bone, as well as lithic technology from archaeological examples, would thus tend to associate the milling activity to the women in the Neolithic period. By widening Molleson’s data, in the geography and the chronology examined (Near East, Eastern Europe and likely Maghreb in the first and second Neolithic generations - roughly between 8500 and 5500 BCE, *sensu* Aurenche 2010), one can wonder if abrasion, for both bone and stone, would not be mostly a feminine

technique. The polishing of the stone could be done by women as part of a division of labour, after the stone knapping made by men. According to anthropologists such as Murdock and Provost, Tabet and Testart, the technical practice of abrasion, repetitive, long, slow, and without use of sophisticated or sharp tools, is indeed an ideal candidate for women's activities. In the same vein, there are examples of bone pointed tools for which the "c*haîne opératoire*" process relies exclusively on abrasion, with no further interference from any other type of tool (Figure 9). These objects, elaborated on ruminant metapodials, have a completely unusual design. Rather thin, they are completely flat, both front and back faces, with a rectangular cross-section that results from the intensive abrasion on both sides until the bone canal is reached (Poplin 1977). They are entirely shaped by abrasion, wearing the bone both sides for getting a "flat-sided pointed tool" (Figure 9). This technical practice appears in Turkey in the 7th Millennium BCE (Sidéra 2012: 64) - Can Hassan III (French *et al.* 1972: fig. 1), Suberde (Bordaz 1969: fig. 12), and Çatal Höyük (Martin & Russell 1996: fig. 11.8, no. 3) - and spreads in Mediterranean and continental Europe from the end of the 6th Millennium until the early 5th Millennium BCE (Sidéra 2012: 64-65).

Figure 9. Left: Flat-sided pointed tool integrally made by abrasion, Cuiry-lès-Chaudardes (VIth Millennium, France) (Credit Oboukoff). Right: experimental half-finished product, on which the medullar canal appears (Credit Sidéra, Taha).

From ethnographical sources, in the Arctic societies, men are mainly responsible for the food supply and the making of objects from hard materials, whether lithic, vegetal, or osseous (Giffen 1930: 40; Guemple 1986; 1995; Gullason 1999: 1-8). On top of the maternal and domestic burdens, women are engaged in the work of soft and flexible materials, both from animal and plant. They prepare skins for houses, clothes, and boats, and carry out basketry activities. Schematically, men provide, women transform, both produce (Gullason 1999: 99-102). Being performed on a hard material, the osseous industry is therefore a male task. The use and maintenance are achieved by both male and female, depending on the category of tools. Women supplement or help males in their work if the need arises, and *vice versa*. A "female" tool requiring prolonged work will be repaired by a male, if present in the vicinity, otherwise she will do it herself. The distribution of roles is in fact based on interdependence

and complementarity. It rarely induces a social hierarchy based on gender (Gullason 1999: 124-125). The social status of each individual is most often defined by personal skill (Bodenhorn 1990). The homogeneity of the techniques could therefore mean that both genders use the same gestures and technical registers. The use of scraping *versus* abrasion therefore does not depend on the economic sphere or gender, but rather on technical habits. For example, no abrasion has ever been noted for the maintenance of any bone tools. Conversely to what is observed for the Near Eastern and European Neolithic, in the Arctic the dichotomy between these two techniques (abrasion *versus* shaping) lies in an assignment of techniques to materials: flaking and abrasion for lithic materials, and for the organic materials scraping with, additionally, drilling for the specific case of the northeastern coast of Greenland (Figure 10). All these techniques are mainly used by men (Table 1, Figure 11).

Figure 10. Object delineated by a series of perforations, and shaped by scraping, Cape Harry (North-East coast of Greenland) (Credit Houmard).

On the northeastern coast of Greenland, for example in Cape Harry, very harsh climatic and environmental conditions between 1450 and 1850 CE regularly interrupted the communication pathways that allowed the procurement of the metal objects used to process bone materials (Sørensen & Gulløv 2012). This recurrent shortage of metal is probably at the origin for a more important lithic production there than elsewhere. Lithic objects represent 40% of the total assemblage, whereas they form a maximum of 16-17% at Naujan, on the northwestern coast of Hudson Bay (Canada). However, slate tools (drills and knife blades obtained by abrasion) are not the most suitable for working bone material. New technical processes were then developed for the debitage of bone material. Instead of the usual grooving, the osseous raw material was regularly segmented by perforations (n = 48, 27%) all over the length (Figure 11). Consequently, the abrasion technique that could have been applied in this context of scarcity was not used as a substitute: there was no technical transfer from lithics to bone. Scraping, drilling, and adzing remain the preferred techniques for the organic materials. The mental representations of the artisans prevented the transfer. The few abraded bone objects from Cape Harry correspond either to hunting or symbolic activities; abrasion then probably meets specific requirements for the modelling of given portions. The requirements could be either technical (search for regularity or resistance on certain parts of objects) or symbolic (realization of bird figurines).

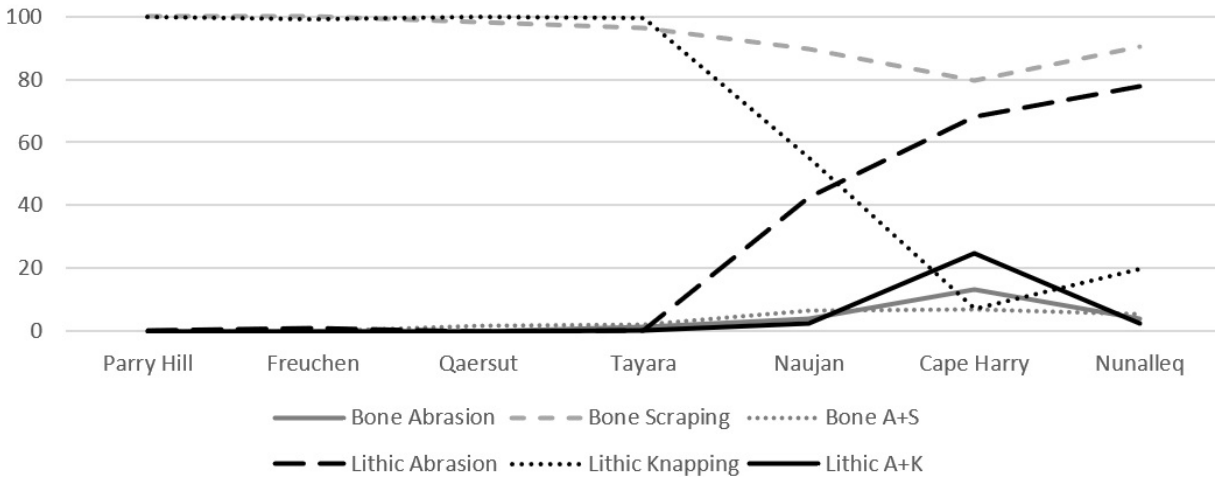

Figure 11. Bone and lithic manufacturing techniques (in percentage).

4. Discussion and conclusion

Studying the variability and recurrence in the use of the simplest and most common techniques such as abrasion and scraping, bring up new questions and opens unexpected paths of research. As suggested in this paper, studies on the differential use of abrasion and scraping over time highlight new invariants relative to their use and point to potential indicators of lifestyle. The technical practices are not only linked to the constraints imposed by the raw material, but maybe more importantly by deep cultural *habitus* (*sensu* Bourdieu 1980: 86-110), including subsistence practices and gender role. *De facto* the importance of the use of abrasion *versus* scraping, would reveal a more general dichotomy between hunters-gatherers and farmers. The first group is highly mobile and places the animal at the centre of its lifeways, with men manufacturing most of the hard-osseous materials by scraping, the manufacturing techniques probably being ungendered. Conversely, the farmers, more sedentary, would separate manufacturing techniques into male and female, with a strong association of grinding and abrasion with the female gender.

The duality of scraping and abrasion is emphasized when considering on one hand the Upper Palaeolithic, the Scandinavian Mesolithic (David 1999: 10-425), the Maghreb

Epipaleolithic (Capsian), where scraping is largely dominant, and, on the other hand, the Near Eastern Neolithic, where abrasion is ultimately imposed from the Pre-Pottery Neolithic to the Early and Middle European Neolithic - in the sense of I. and M. Lichardus *et al.* 1985 -, gradually or irregularly through time and space. Scraping is used when abrasion is not operatory. It applies to a lesser extent to the Capsian Neolithic tradition in the Maghreb (Petrullo 2014: 10-376). The heavy use of scraping would then be an indicator of mobility, while abrasion would be the one of sedentary lifestyle. The axiom would then be: scraping dominant for mobile groups (and movements), especially of hunter-gatherers, *versus* abrasion dominant for sedentary farmer-breeder populations.

In addition to being indicators of mobility, abrasion and scraping could also be considered as gender indicators. Thus, the generalization of abrasion could result from a feminisation of hard material work which occurs in Neolithic, via a transfer of cereal milling techniques to the production of bone or stone artefacts, *i.e.*, a gendered implementation of techniques. Repetitive, long, slow, and using simple tools, the practice of abrasion corresponds in all respects to the tasks assigned to women in many traditional societies if we follow the anthropologists. The Natufian, "at the threshold of the origin of agriculture" (Bar-Yosef 1998), with its sedentary lifestyle and grinding activities, would constitute an exception. Indeed, although anchored in Palaeolithic technical practices, scraping dominates in the manufacture of the bone tools (Campana 1989: 310). Reluctance to the use of abrasion could as well be gender-related, as in Cape Harry Greenlandic site where iron scarcity does not lead to adopt abrasion, craftspersons preferring to use drilling techniques instead of abrasion.

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Data accessibility statement

All data generated or analysed during this study is available from the authors upon request.

References

Allard, P., Hamon, C., & Sidéra, I. 2006, Investissement technique et degrés d'élaboration des productions lithiques et osseuses du Rubané dans le Bassin parisien. In: *Normes techniques et pratiques sociales : de la simplicité des outillages pré- et protohistoriques. Actes de la 26e rencontres d'Antibes, octobre 2005* (Astruc, L., Bon, F., Léa, V., Milcent, P.-Y. & Philibert, S., Eds.), Association pour la Promotion et la Diffusion des Connaissances Archéologiques (APDCA), Antibes: p. 185-194 (in French)

("Technical investment and degrees of elaboration of lithic and bony productions of the Rubanum in the Parisian Basin") URL: https://hal.archives-ouvertes.fr/hal-00200123

Augereau, A. 2021, *Femmes néolithiques. Le genre dans le premières sociétés ("Neolithic Women. Gender in early societies")*, Paris, CNRS, coll. « Le passé recomposé », 302 p. (in French) DOI: https://doi.org/10.4000/lectures.50925

Aurenche, O. 2010, La néolithisation du Proche-Orient. In: *La révolution néolithique dans le monde*, (Demoule, J. -P. Ed.), CNRS Éditions, Paris: 33-48 (in French) ("The Neolithization of the Near East")
DOI: https://doi.org/10.4000/books.editionscnrs.15629

Bar-Yosef, O. 1998, The Natufian culture in the Levant, threshold to the origins of agriculture. *Evolutionary Anthropology*, 6(5): 159-177.
DOI: https://doi.org/10.1002/(SICI)1520-6505(1998)6:5<159::AID-EVAN4>3.0.CO;2-7

Benito, J. L. 2016, Unas técnicas muy neolíticas: ranurado y abrasión para la elaboración de punzones a partir de metapodios de ungulados. *Trabajos Varios del SIP*, 119: 147-158. (in Spanish) ("A technique very Neolithic: grooving and abrasion for the production of punches from ungulate metapodials")

De Beaune, S.A. 1993, Approche expérimentale de techniques paléolithiques de façonnage de roches peu aptes à la taille. *Paléo*, 5: 155-177 (in French) ("Experimental approach to Paleolithic techniques for shaping rocks unsuitable for cutting")
DOI: https://doi.org/10.3406/pal.1993.1109

Bofill, M., Chondrou, D., Palomo, A., Procopiou, H. & Valamotti S. 2020, Processing plants for food: Experimental grinding within the ERC-project PLANTCULT. *Journal of Lithic Studies*, 7(3): 1-26. DOI: https://doi.org/10.2218/jls.3079

Bodenhorn, B. 1990, I'm Not the Great Hunter, My Wife Is: Iñupiat and anthropological models of gender. *Etudes/Inuit/Studies*, 14(1-2): 55-74
URL: https://www.originalwisdom.com/wp-content/uploads/bsk-pdf-manager/2019/03/Bodenhorn_1990_im-not-the-great-hunter-my-wife-is.pdf

Bordaz, J. 1969, The Suberde excavations. Southwestern Turkey, an Interim report. *Türk Arkeoloji Dergisi*, 17(2): 43-71.

Bourdieu, P. 1980, *Le sens pratique*. Editions de Minuit, Paris, 480 p. (in French) ("The Practical Sense")

Campana, D.V. 1989, *Natufian and Protoneolithic Bone Tools: The Manufacture and Use of Bone Implements in the Zagros and the Levant*. British Archaeological Reports International Series Vol. 494, BAR Publishing, Oxford, 156 p.
DOI: https://doi.org/10.2307/282235

Camps-Fabrer, H. 1966, *Matière et art mobilier dans la préhistoire nord-africaine et saharienne*. Mémoires du Centre de Recherches Anthropologiques, Préhistoriques et Ethnographiques, Paris, 574 p. (in French) ("Material and furniture art in North African and Saharan prehistory")

Cresswell, R. 2003, Geste technique, fait social total. Le technique est-il dans le social ou face à lui?. *Techniques & Culture*, 40 (in French) ("Technical gesture, total social fact. Is the technical within the social or in front of it? ") DOI: https://doi.org/10.4000/tc.1576

David, E. 1999, *L'industrie en matières dures animales du Mésolithique ancien et moyen en Europe du Nord. Contribution de l'analyse technologique à la définition du Maglemosien*. Ph.D. Thesis at the departement of Anthropology and Prehistory , Paris Nanterre University, Nanterre, 426 p. (in French) ("The Early and Middle Mesolithic animal hard material industry in Northern Europe. Contribution of technological analysis to the definition of the Maglemosian") URL: https://www.sudoc.fr/060040173

Desrosiers, P.M. 2009 *À l'origine du Dorsétien / Apport de la technologie lithique des sites GhGk-63 et Tayara (KbFk-7) au Nunavik*. Ph. D. Thesis at the Paris 1 Panthéon-Sorbonne University, Paris, 502 p. (in French) ("At the origin of the Dorset culture / Contribution of lithic technology from GhGk-63 and Tayara (KbFk-7) sites in Nunavik") URL: https://www.researchgate.net/publication/288841182

D'Errico, F., Backwell, L.R., Wadley, L., Lila Geis, L., Queffelec, A. William E. Banks, W.E., Luc Doyon, L. 2022, Technological and functional analysis of 80-60 ka bone wedges from Sibudu (KwaZulu-Natal, South Africa). *Scientific Reports*, 12, 16270. DOI: https://doi.org/10.1038/s41598-022-20680-z

French, D., Hillman, G. C., Payne, S. & Payne, R.J. 1972, Excavations at Can Hasan III 1969-1970. In: *Papers in Economic Prehistory, Studies by Members and Associates of the British Academy Major Research Project in the Barly History of Agriculture*, (Higgs, S., Ed.), Cambridge, Cambridge University Press: p. 181-197. DOI: https://doi.org/10.1086/ahr/79.5.1522-a

Friesen, T.M. 2016, Pan-Arctic Population Movements: The Early Paleo-Inuit and Thule Inuit Migrations. In: *The Oxford Handbook of the Prehistoric Arctic*, (Friesen, T.M. & Mason, O.K., Eds.), Oxford University Press, New York: p. 673-692. DOI: https://doi.org/10.1093/oxfordhb/9780199766956.013.45

Friesen, T.M. & Mason, O.K. 2016, *The Oxford Handbook of the Prehistoric Arctic*. Oxford University Press, New York, 1000 p. (online content) DOI: https://doi.org/10.1093/oxfordhb/9780199766956.001.0001

Giffen, N.M. 1930, *The Roles of Men and Women in Eskimo Culture*. The University of Chicago Publications in Anthropology, Ethnological Series, Chicago, 113 p. DOI: https://doi.org/10.1525/aa.1931.33.4.02a00190

Gille, B. 1979, La notion de système technique, essai d'épistémologie technique. *Techniques et culture*, 1: 8-18. (in French) ("The notion of technical system, an essay in technical epistemology")

Guemple, L. 1986, Men and women, husbands and wives: the role of gender in traditional Inuit society. *Etudes/Inuit/Studies*, 10(1-2): 9-24. URL: https://www.jstor.org/stable/42869538

Guemple, L. 1995, Gender in Inuit society. In: *Women and Power in Native North America* (Klein, L.F. & Ackerman, L.A., Eds.) University of Oklahoma Press, Normann: 17-27.

Gullason, L. 1999, *Engendering interaction: Inuit-European Contact in Frobisher Bay, Baffin Island*, Ph.D. Thesis at the Department of Anthropology, McGill University, Montreal, 669 p. URL: https://escholarship.mcgill.ca/concern/theses/pk02cc590

Hamon, C. 2006, *Broyage et abrasion au Néolithique ancien. Caractérisation technique et fonctionnelle des outillages en grès du Bassin parisien*. British Archaeological Reports International Series Vol. 1551, BAR Publishing, Oxford, 342 p. (in French) ("Grinding

and abrasion in the Early Neolithic. Technical and functional characterization of sandstone tools from the Paris Basin") DOI: https://doi.org/10.30861/9781841719801

Houmard, C. 2008, Antler exploitation at Laugerie-Basse: a typo-technological approach of the Magdalenian artefacts from the "abri Classique". In: *Technology in Archaeology. Proceedings from the SILA Workshop: The study of Technology as a method for gaining insight into social and cultural aspect of Prehistory, Copenhagen, November 2-4 2005*, Volume 14, (Sørensen, S. & Desrosiers, P.M., Eds.), Publications from the National Museum (PNM), Studies in Archaeology & History, Copenhagen: p. 65-72.

Houmard, C. 2011, *Caractérisation chrono-culturelle et évolution du Paléoesquimau dans le Golfe de Foxe (Canada). Etude typologique et technologique des industries en matières dures d'origine animale*. Ph.D. Thesis at the department of Anthropology and Prehistory, Paris-Ouest Nanterre & Laval (Québec) Universities, Nanterre, 350 p. (in French) ("Chrono-cultural characterization and evolution of the Palaeo-Eskimo in Foxe Gulf (Canada). Typological and technological study of the hard material industries of animal origin") URL: http://hdl.handle.net/20.500.11794/23002

Khalaily H., Bar-Yosef O., Barzilai O., Boaretto E., Bocquentin F., Eirikh-Rose A., Greenhut Z., Goring-Morris A. N., Le Dosseur G., Marder O., Sapir-Hen L., Yizhaq M. 2007, Excavations at Motza in the Judean Hills and the Early Pre-Pottery Neolithic B in the Southern Levant. *Paléorient*, 33 (2): 5-37.
DOI: https://doi.org/10.3406/paleo.2007.5218

Knittel, F. & Raggi, P. 2013, *Genre et Techniques (XIX^{e}-XXI^{e} siècles).* Presses universitaires de Rennes, coll. « Histoire », Rennes, 274 p. (in French) ("Gender and Technology (19th -21st centuries)")

Latour, B. & Lemonnier, P., Eds. 1994, *De la préhistoire aux missiles balistiques. L'intelligence sociale des techniques.* La Découverte, coll. « Recherches », Paris, 360 p. (in French) ("From prehistory to ballistic missiles. The social intelligence of technology") DOI: https://doi.org/doi.org/10.3917/dec.latou.1994.01

Le Dosseur, G. 2010a, *La néolithisation au Levant sud à travers l'exploitation des matières osseuses : étude techno-économique de onze séries d'industries osseuses du Natoufien au néolithique précéramique B recent*. Ph.D. Thesis at the Anthropology and Prehistory department, Paris 1 Panthéon-Sorbonne University, Paris, 884 p. (in French) ("The Neolithisation of the South Levant by the exploitation of the osseous materials: Techno-economic study of eleven bone industry series from Natufian to Recent Pre-Ceramic Neolithic B")

Le Dosseur, G. 2010b, Les migrations et les relations interculturelles dans le Levant au Néolithique précéramique B (PPNB). *Bulletin du Centre de recherche Français à Jérusalem* 21 (in French) ("Migrations and Intercultural Relations in the Levant in the Pre-Ceramic Neolithic B (PPNB)") URL: http://journals.openedition.org/bcrfj/6390

Le Dosseur, G. 2011, L'industrie osseuse de Jerf el-Ahmar durant le PPNA et la transition PPNA/PPNB: une déroutante simplicité. *Syria*, 88: 181-206. (in French) ("The bone industry of Jerf el-Ahmar during the PPNA and the PPNA/PPNB transition: A disconcerting simplicity") DOI: https://doi.org/10.4000/syria.911

Legrand, A. 2007, *Fabrication et utilisation de l'outillage en matières osseuses du Néolithique de Chypre: Khirokitia et Cap Andreas-Kastros*. British Archaeological Reports, International Series Vol. 1678, BAR Publishing, Oxford, 178 p. (in French)

("Manufacture and use of bone tools from the Neolithic of Cyprus: Khirokitia and Cap Andreas-Kastros")

Lemonnier, P. 1980, *Les salines de l'Ouest : logique technique, logique sociale*. Éditions de la Maison des sciences de l'homme, Presses Universitaires de Lille, Lille, 222 p. (in French) ("The salt mines of the West: Technical logic, social logic") DOI: https://doi.org/10.3406/rural.1984.2986

Lichardus, J., Lichardus-Itten, M.A., Bailloud, G, Cauvin, J., 1985, *La protohistoire de l'Europe: le Néolithique et le Chalcolithique*. Nouvelle Clio, Presses Universitaires de France, Paris, 640 p. (in French) ("The protohistory of Europe: The Neolithic and the Chalcolithic") DOI: https://doi.org/10.3917/puf.licha.1985.01

Martin, L. & Russel, N. 1996, Surface material: Animal bone and worked bone. In: I. Hodder, *On the Surface: Çatal Höyük 1993-1995* (Hodder, I., Ed.), British Institute of Archaeology at Ankara, Monographs 22, Cambridge: 199-214.

Mason, O.K. & Friesen, T.M. 2017, *Out of the Cold. Archaeology on the Arctic Rim of North America*, The Society for American Archaeology Press, Washington DC, 294 p. DOI: https://doi.org/10.1017/S0032247418000517

Moen, M. 2019, Gender and Archaeology: Where are We Now? *Archaeologies*, 15: 206-226. DOI: https://doi.org/10.1007/s11759-019-09371-w

Molleson, T. 2000, The People of Abu Hureyra. In A. T. Moore, G. D. Hillman, A. Legge (Eds.), The Village on the Euphrate: From Foraging to Farming at Abu Hureyra, Oxford University Press, Oxford: 301-324.

Molleson, T. 2006, Le Néolithique d'après les os. *Pour la science*, 50: 16-21 (in French) ("The Neolithic from the bones")

Mons, L. 1980, Essai d'analyse et de classification des poinçons des gisements solutréens et magdaléniens du Placard (Charente), de Laugerie-Basse et de la Madeleine (Dordogne). *Bulletin de la Société préhistorique française*, 77(10-12): 317-327 (in French) ("Analysis and classification of punches from the Solutrean and Magdalenian deposits of Placard (Charente), Laugerie-Basse and La Madeleine (Dordogne)") DOI: https://doi.org/10.3406/bspf.1980.5223

Murdock, G. P. & Provost, C. 1973, Factors in the Division of Labor by Sex: A Cross-Cultural Analysis. *Ethnology*, 12(2): 203-225.

Orlowska, J., Ćwiek, M., Osipowicz, G. 2022, Was it ground? A closer look at various prehistoric bone grinding techniques - An experimental and traceological study. *Journal of Archaeological Science*: *Reports*, 46(11): 1-16. DOI: https://doi.org/10.1016/j.jasrep.2022.103675

Peterson, J. 2010, Domesticating gender: Neolithic patterns from the southern Levant. *Journal of Anthropological Archaeology*, 29(3): 249-264. DOI: https://doi.org/10.1016/j.jaa.2010.03.002

Petrullo, G. 2014. *Produzione in materie dure animali dell'Olocene antico e medio da contesti pre-pastorali e pastorali del Maghreb orientale - studio tecnologico e funzionale*, Ph.D. Thesis at the department of Anthropology and Prehistory department, University of Paris Nanterre & African Archaeology department, University La Sapienza (Roma), Paris & Rome, 376 p. (in Italian) ("Productions in animal hard material of the early and middle Holocene from pre-pastoral and pastoral contexts of the eastern Maghreb - Technological and functional study")

Poplin, F. 1977, Deux cas particuliers de débitage par usure. In: *Premier colloque international sur l'industrie de l'os dans la Préhistoire* (Camps-Fabrer, H., Ed.), Université de Provence, Aix-en-Provence: 84-92 (in French) ("Two cases of debitage by usewear")

Semenov, S.A. 1964, *Prehistoric Technology: An Experimental Study of the oldest tools and artefacts from traces of manufacture and wear*. Cory, Adams and Mackay, London, 211 p. DOI: https://doi.org/10.1017/s000358150005160x

Sidéra, I. 1993, *Les assemblages osseux en bassins parisien et rhénan du VI^e^ au IV^e^ millénaire B.C. Histoire, techno-économie et culture*. Ph.D. Thesis at the departement of Anthropology and Prehistory, Paris 1 Panthéon-Sorbonne University, Paris, 918 p. (in French) ("Bone assemblages in the Paris and Rhine basins from the 6th to the 4th Millennium BC. History, techno-economy and culture") DOI: https://doi.org/10.13140/RG.2.2.33119.10404

Sidéra, I. 1997, Nouveaux éléments d'origine proche-orientale dans le Néolithique ancien balkanique. Analyse de l'industrie osseuse. In: *Actes du Colloque international Préhistoire d'Anatolie. Genèse de deux mondes* (Otte, M., Ed.), ERAUL 85, Liège: 215-239. (in French) ("New elements of Near Eastern origin in the Balkan Early Neolithic. Analysis of the osseous artefacts")

Sidéra, I. 2000, Animaux domestiques, bêtes sauvages et objets en matières animales du Rubané au Michelsberg. De l'économie aux symboles, des techniques à la culture. *Gallia Préhistoire*, 42: 108-194. (in French) ("Domestic animals, wild animals and objects made of animal materials from the Rubané to the Michelsberg. From economy to symbols, from techniques to culture") URL: https://www.persee.fr/doc/galip_0016-4127_2000_num_42_1_2172

Sidéra, I. 2010, *Nouveau regard sur la néolithisation. Les industries osseuses de l'Anatolie au Bassin parisien via la Méditerrané*. HDR de l'Université Paris Nanterre, Thesis of the department of Antrpopology and Preshistory, vol. 2 : *étude monographique de l'industrie osseuse de Cuiry-lès-Chaudardes.* 163 p. (in French) ("A new look at Neolithization. Bone industries from Anatolia to the Parisian Basin via the Mediterranean") URL: https://halshs.archives-ouvertes.fr/halshs-01549934

Sidéra, I. 2012, *Nouveau regard sur la néolithisation. Les industries osseuses de l'Anatolie au Bassin parisien via la Méditerranée.* Paris, de Boccard, 106 p. (in French) ("A new look at Neolithization. Bone industries from Anatolia to the Parisian Basin via the Mediterranean")

Sidéra, I. 2022, Borrowings and exogenous contacts in the Eastern Maghreb during the Holocene: examination of the bone industry. *Revisita Tabona*, Universidad de La Laguna. DOI: https://doi.org/10.25145/j.tabona.2022.22.14

Sidéra, I. & Legrand-Pineau, A., in collaboration with Oboukhoff S. & Bridault A. 2024, Analyse de l'assemblage osseux: outils et parures. In: *Le site Chasséen de Beaumont « le Crot aux Moines »* (Garmond N. & Sidéra I., Eds.), Presses Universitaires de Paris Nanterre, collection Ensemble de la MSH Mondes, Nanterre: 151-184 (in French) ("Analysis of the bone assemblage: Tools and ornaments")

Sørensen, M.L. 2000, *Gender Archaeology*. Polity Press, Cambridge, 248 p.

Sørensen, M. 2012, *Technology and Tradition in the Eastern Arctic, 2500 BC - AD 1200: A Dynamical Technological Investigation of Lithic Inventories in the Paleo-Eskimo*

Traditions. Museum Tusculanum Press, Copenhagen University, Copenhagen, 418 p. DOI: https://doi.org/10.1080/00293652.2015.1039569

Sørensen, M. & Gulløv H.C. 2012, The Prehistory of Inuit in Northeast Greenland. *Arctic Anthropology*, 49(1): 88-104. DOI: https://doi.org/10.1353/arc.2012.0016

Stordeur-Yedid, D. 1979, Les aiguilles à chas au Paléolithique. *Gallia préhistoire,* Suppl 13, Paris, 215 p. (in French) ("Eyed needles in the Palaeolithic") URL: https://www.persee.fr/doc/galip_0072-0100_1979_sup_13_1

Tabet, P. 1979, Les mains, les outils, les armes. *L'Homme*, 19 (3): 5-61 (in French) ("The hands, the tools, the weapons") URL: https://www.persee.fr/doc/hom_0439-4216_1979_num_19_3_367998

Taha, B., Molist, M. & Sidéra, I. 2017, Tell Halula, Syria: Pre-Pottery Neolithic, Pre-Halaf and Halaf bone objects. From technology to typology. *Paléorient* 43 (2): 53-67. DOI: https://doi.org/10.3406/paleo.2017.5766

Testart, A. 2014, *L'amazone et la cuisinière. Anthropologie de la division sexuelle du travail*. Paris, Gallimard, 192 p.

Trémeaud, C. 2018, *Genre et hiérarchisation dans le monde nord-alpin, aux âges du Bronze et du Fer*. British Archaeological Reports International Series Vol. 2912, BAR Publishing, Oxford, 251 p. (in French) ("Gender and hierarchy in the North Alpine world during the Bronze and Iron Ages")

Vincent, A. 1993, *L'outillage osseux au Paléolithique moyen : une nouvelle approche*. Ph. D. Thesis at the department of Anthropology and Prehistory,Université Paris X-Nanterre, Nanterre, 331 p. (in French) ("Bone tools in the Middle Palaeolithic: a new approach")

Wright, K.I. 2000, The social origins of cooking and dining the early villages of western Asia. *Proceedings of the Prehistoric Society*, 66: 89-121. DOI: https://doi.org/10.1017/S0079497X0000178X

Des techniques de façonnage à la préhistoire du genre : Technologie des matières osseuses

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Résumé :

L'abrasion et le raclage sont des techniques banales, très anciennes et universelles, mises en œuvre pour le travail des matières osseuses dès le Paléolithique moyen. Elles sont le plus souvent associées à l'étape de façonnage des objets, en terme opératoires, mais aussi, dans certains cas, appliquées au débitage. Quand ces deux techniques se trouvent utilisées conjointement par les artisans, leur proportion varie en fonction de gradients chronologiques, culturels mais aussi géographiques. Ainsi, dans le Vieux monde, à partir du Pre-Pottery Neolithic B moyen au Proche-Orient (PPNB moyen - fin du IX^{e} millénaire) (Aurenche 2010), au Néolithique ancien européen (fin du VII^{e} - début du VI^{e} millénaires), et, dans une moindre mesure au Maghreb oriental (VII^{e} - VI^{e} millénaires), l'abrasion est majoritairement employée pour le façonnage des objets, quels que soient leur type, sauf exception. Le raclage est plus régulièrement appliqué à l'entretien des outils et à leur raffûtage, au cours de leur utilisation. A l'opposé du Néolithique, dans le contexte arctique du Nouveau monde, le raclage prédomine très largement ; l'abrasion n'est utilisée que de façon exceptionnelle, pour obtenir une surface plane, renforcer le bord d'un tranchant ou pour la confection d'objets à valeur symbolique.

Quelles sont les raisons pour lesquelles les proportions de ces deux techniques varient pour aller jusqu'à une quasi-exclusivité pour l'une ou l'autre pratique selon les contextes ? Une division genrée du travail, différente selon les cultures, peut-elle rendre compte d'un lien entre sphères technique et sociale ? Pour traiter ces questions, nous avons comparé les données provenant de contextes socio-économiques et environnementaux différents.

Les résultats issus de la comparaison conduisent à proposer un lien entre techniques, mobilité et genre des individus. Ainsi, les sociétés arctiques se caractérisent par une forte mobilité et une répartition genrée des productions : les matières souples sont travaillées par les femmes, alors que les matières dures le sont par les hommes. Les deux groupes partagent cependant un même registre de techniques, ce qui permet, au besoin, de toujours suppléer à l'absence de l'un ou l'autre genre. Les matières osseuses, travaillées par les hommes, font l'objet d'un traitement spécifique, distinct de celui des autres matériaux tels que le bois végétal ou la pierre, avec un façonnage quasi-exclusif effectué par raclage. A l'inverse, dans le Néolithique, et ce depuis le Pre-Pottery Neolithic B (PPNB moyen), la sédentarité et le développement des activités de mouture ont probablement bouleversé la répartition du travail entre hommes et femmes, et accessoirement l'usage des techniques. La fabrication de nombreux objets en matière osseuse employés au quotidien y serait associée aux activités féminines, travail des peaux et des végétaux souples, et attachées à la sphère domestique, dans ou à proximité immédiate de la maison. Le raclage est plus fréquemment employé pour le raffûtage des outils pointus. Nous proposons d'y voir l'expression de différences de lieux entre la fabrication (domestique) et l'usage (hors du contexte domestique) des outils. De même, à l'échelle culturelle, nous soutenons l'idée de l'emploi du raclage versus abrasion, comme l'expression de sociétés mobiles, associées à un

mode de vie nomade, versus sociétés sédentaires, associées à l'agriculture. Ainsi, malgré des conditions environnementales et climatiques imposant parfois des adaptations techniques, ce transfert ne s'est cependant pas opéré en contexte arctique où les artisans, toujours mobiles, ont parfois préféré substituer le raclage à la perforation plutôt qu'employer l'abrasion. De même, l'abrasion étant employée dans la fabrication et le maintien des outils, et par analogie de la gestuelle de l'abrasion et des activités de mouture ou de broyage, le développement et la prédominance de l'abrasion, au Néolithique, pourrait ressortir de la féminité. C'est en tout cas une hypothèse que l'on peut poser et travailler à l'avenir.

Mots-clés: archéologie des techniques ; archéologie du genre ; abrasion ; raclage ; Arctique ; Néolithique ; Épipaleolithique ; Proche-Orient ; Europe ; Maghreb