

In the Eye of the Beholder: Using Microscopic Analysis in the Interpretation of Tuniit (Dorset Paleo-Inuit) Art

Matilda I. Siebrecht and Sean P. A. Desjardins

Abstract. How archaeologists classify and categorize artifacts has the potential to direct and bias interpretations before analysis has taken place. A clear example of this phenomenon in arctic archaeology is the analysis of material culture classified as “art” attributed to premodern Tuniit peoples (Late Dorset Paleo-Inuit, ca. AD 500–1300). Often, analyses of Tuniit art pieces are restricted by the use of customary typologies that can impose modern assumptions of how Tuniit groups would have perceived their material culture. In this study, we address this problem by focusing not on the meaning embodied in the finished objects but on the identification of decision-making patterns of the object carvers and users as reflected through microscopic traces of manufacture and use. We argue that through such trace-focused observation, certain newly observed patterns may suggest greater diversity in decision-making processes (with regard to manufacture and use) than would be suggested by traditional typological grouping alone. This work has wide-ranging implications for how arctic archaeologists approach artifact classification and typological organization.

The question of how to distinguish art (or symbolic) from non-art (or utilitarian) artifacts has long been contentious within archaeological discourse. It has been argued that the term “art” is semantically restrictive and that its use is too often burdened with modern, Western understandings of art as a physical representation of higher intellectual understanding or multilayered symbolic meaning

(Robb 2017). The debate of art versus craft is a perfect example of this, where the term “craft” is often used to refer to pieces that have predominantly utilitarian or practical functions, whereas “art” pieces are purely aesthetic and evocative (Markowitz 1994). Therefore, archaeological objects that are classified as art are generally limited to those pieces that whoever was classifying the collection

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considered to embody their perception of an appropriate “art” aesthetic.

It should be said that there is understandable logic in using the term “art” as an organizational or classificatory category for material culture assemblages, and we do not wish to exclude the term from assemblage catalogs completely. However, there also exists the very real possibility of obscuring the less-obvious symbolic value inherent in otherwise-utilitarian objects, such as hunting and fishing equipment and domestic/household objects. In short, categorizing certain objects as artistically or symbolically separate from others can imply—and perhaps subconsciously reinforce—that they are imbued with special (or symbolic) qualities not found in non-art pieces. Because classification is often done in the field immediately after excavation and thus is the first step in analysis, convention in classifying these objects as art may establish and perpetuate interpretational biases before finer-grained analyses are undertaken.

It has been suggested that art pieces should be subjected to the same methodological and theoretical scrutiny as any other piece of material culture (Gell 1998). The idea is that in the case of a utilitarian object—a knife, for example—archaeologists are generally less likely to give significant thought to its symbolic value than to the functional relationship it had with its maker(s) and user(s). Therefore, one way of mitigating interpretational bias is by actively resisting—as much as possible—the traditional understanding of art as purely visual, “finished” symbols and instead considering them as representations of social interactions between and among persons (both humans and nonhuman animals), as well as between persons and objects (cf. Jones 2017; Sjöstrand 2017). We believe that as much or more useful information about the intended significance of any piece of material culture can be drawn first from an analysis of the *process* of its creation and use rather than solely from a culturally biased interpretation of its final form.

An apt example of both common biases in classification, as well as potential pathways to mitigate said bias, lies in the interpretation of Tuniit (or Late Dorset Paleo-Inuit, ca. AD 500–1300) material culture from the North American Arctic. These assemblages are often characterized by a substantial proportion of objects traditionally classified by archaeologists as art, including a wide variety of anthropomorphic and zoomorphic forms (Hardenberg 2013). In this article, we use microscopic analysis to investigate the process of creation and use of objects classified in previous studies as “art.” We argue that such an approach can complement traditional typological approaches and shed significant light on the maintenance of social interactions with these objects over time.

Research Context

Tuniit art pieces can be classified in several ways. Common subcategories include miniature carved figurines depicting humans and nonhuman animals (and parts thereof), miniature tools, spatulas (objects of unknown use with one flattened and one perforated end), pendants, discs (round, flattened, perforated objects), and utilitarian tools with decorative accents (see Hardenberg 2013; Taçon 1983). These often intricately carved objects are made from a range of raw materials, such as walrus ivory, caribou antler, bone from various arctic species, wood, and soapstone (Hardenberg 2013). Depictions of nonhuman animals include polar bears, seals, walruses, caribou, and birds (Hardenberg 2013; Maxwell 1985). The categories we investigate are described in further detail in Figure 1.

We argue that using only superficial typological classifications—not only of art pieces but also of non-art pieces—may be limiting research into Tuniit material culture by reinforcing assumptions from which artifact analysis can now rarely diverge. In the words of Brian Hayden (1984:81), “Instead of typologies being taught as tools for solving specific problems, they often became deified classification.” Two important factors have influenced these assumptions. First, a defining characteristic of Tuniit material culture is its apparent stylistic uniformity across much of its wide geographic range, though the extent of this uniformity has been challenged through microwear analysis (see Siebrecht et al. 2021). This factor is particularly relevant considering the relative abundance of distinctive art pieces compared with other earlier phases of Dorset Paleo-Inuit culture or even later Thule Inuit culture (Appelt et al. 2016). Second, many of the human and nonhuman animal figurines are carved in a style generally classified as “abstract” or “stylized,” with the subject’s interpreted form often being impressionistic (see Betts et al. 2015; Hardenberg 2013). While it is possible to discern the species-form likely intended by the carver/creator in many cases, it is sometimes much more difficult. This leads to a “progression-of-realism” approach, whereby stylized pieces are compared to more objective forms in order to more easily see similarities and differences (Meldgaard 1959). This approach has since been critiqued by Hardenberg (2013), as it assumes modern etic interpretations are reasonably comparable to those of the original makers and users.

Another difficulty with using a purely typological approach is the relatively restrictive interpretations this offers of the various subcategories of art forms. Nearly all of the species-form depictions are approached from different interpretational standpoints. Several studies focus on just









<p>Figurine: A carved object with the final shape of a recognizable creature or creature part.</p>		
<p>Anthropomorphic Depicting human bodies, heads, or faces.</p> <p>1950.405</p>  <p>0 mm 20</p>	<p>Zoomorphic Depicting animal bodies, heads, or faces from one of the following species: bear, seal, walrus, bird, fox or weasel, and caribou.</p> <p>1950.406A</p>  <p>0 mm 10</p>	
<p>Tool: A functional item.</p>		
<p>Miniature tool A miniature version of a known, functional tool such as a harpoon head or barbed point.</p> <p>NgFv-6:21</p>  <p>0 mm 20</p>	<p>Decorated tool A full-sized tool of known function that had been decorated in some way.</p> <p>1950.437G</p>  <p>0 mm 20</p>	<p>Spatula An object of unknown use, with one (usually rounded) wide, flattened end and one (usually perforated) thin, blunt end.</p> <p>1950.371G</p>  <p>0 mm 20</p>
<p>Perforated object: An object that has been perforated with a hole and does not fall under the classification of “figurine.”</p>		
<p>Disc A flat, circular (or quadrangular with rounded edges) piece with a hole in the center, often also incised with lines carved out from the center.</p> <p>NjHa-1:140</p>  <p>0 mm 20</p>	<p>Pendant An object shaped as a large “drop” and generally not carved into a figure or other shape, although it can be decorated with incised lines.</p> <p>NgFv-8:17</p>  <p>0 mm 20</p>	<p>Bilobate A flat object in the form of a figure of 8 often classified under the term “goggles.”</p> <p>1950.370N</p>  <p>0 mm 10</p>
<p>Other: A piece that cannot fall into any of the categories described above (usually because its definition cannot be identified due to limited preservation or completeness).</p>		

Figure 1. Description of categories most often used during analysis in previous studies of art. Artifact images courtesy of the Canadian Museum of Nature (NiHg-1 and NgHd-1), Cambridge Museum of Archaeology and Anthropology (1950), Susan Lofthouse (NgFv-6/7/8), and Avataq Cultural Institute (JIGu-3).

one type of animal or depiction (e.g., Betts et al. 2015; Desjardins 2017). Even those that include a wider range of categories often apply varying levels of detail in their interpretation—for example, the focus on human expressions but not expressions of other nonhuman animals (Hardenberg 2013). If we assume Tuniit cosmology to have been animistic, or even perspectival (after Cohn 2007; Desjardins 2017; Viveros de Castro 1998, 2004, among others), moderated and administered by shamans (an assumption based on ethnographic analogy), even identification of species forms according to modern biological taxonomy may not adhere to the worldviews of Tuniit society.

An Alternative Approach

In order to better avoid interpretational bias in the analysis of these objects, we propose approaching the assemblages through an alternative methodological and theoretical framework that redirects focus from the superficial macroform of the object to its biography, from creation to use and eventual deposition (cf. Sjöstrand 2017). This approach would have the potential of emphasizing the choices and motivations of the creator(s) (represented as stages in the manufacturing process) and the object's interactions with Tuniit (represented as traces of use), in addition to more traditional investigations into design and style.

This approach is comparable to that of the *chaîne opératoire* (“operational sequence”), a common interpretive framework in archaeological research that traces the step-by-step “life-history” of an object from raw material to artifact (e.g., Akerman et al. 2002; Guzzo Falci et al. 2020; Mansrud and Kutschera 2020; Martín-Torres 2002). While the approach has previously been applied to arctic archaeological assemblages, the majority of these studies focused on lithic artifacts (e.g., Coulson and Andreasen 2020; Dionne 2015; Sørensen 2006). Even among the small selection of studies investigating organic material culture (e.g., Gates St-Pierre 2007; LeMoine 1994), a microscopic approach has, to our knowledge, not yet been applied to art pieces.

Importantly, our analyses have considered the assemblages in light of previously defined typological categories, as we wish this to be a complementary rather than replacement approach. However, while such “typology-focused” analyses acknowledge variation within an assemblage, they remain limited by top-down interpretations of the material. If we consider the process of artifact analysis as a progressive chain of interpretive decisions, a typology-focused analysis begins with a traditional category, considering all variation from that perspective. In contrast, a “trace-focused” (or bottom-up) approach, by which the assemblage is

considered in light of similarities between a pre-defined set of objective traits (e.g., dimensions, gouge shape, polish), limits the potential for interpretive restriction imposed by previous typological categories. In identifying entirely new categorical sets for Tuniit art pieces, we are not rejecting or arguing against typology-focused material culture research; indeed, such typological studies can and have been able to contribute significantly to our understanding of arctic population movements and the development of technologies over time (e.g., Houmard 2011; LeMoine 1994). Instead, we hope to demonstrate the great potential for also considering a rich “second layer” of distinct yet complementary interpretive data.

Materials

Pieces traditionally classified as art are found at sites dating throughout the entire Dorset Paleo-Inuit period and possibly emerged during what archaeologists refer to as the PreDorset period (ca. 3200 to 800 BC) (LeMoine et al. 1995). We have focused our analysis on assemblages dated to the Late Dorset (Tuniit) period (ca. AD 500 to 1300) due to a relative increase in artistic productivity during this time: To date, known assemblages from this period contain the largest number of miniature carvings across the greater Paleo-Inuit timeframe (Appelt et al. 2016; Hardenberg 2013; LeMoine et al. 1995; Taçon 1983).

The Tuniit material in the present study comes from Qulliipik (JlGu-3), the Needle Point site group (NgFv-6/7/8), Avvajja (also known as “Abverdjar”) (NiHg-1), Kapuivik (NjHa-1), and Pingiqqalik (NgHd-1), all of which are situated in northern Foxe Basin and northern Hudson Bay, Nunavut, Inuit Nunangat—the traditional Inuit territories of Arctic Canada (see Fig. 2).¹

The greater Foxe Basin region has long been considered an important biogeographic and cultural hub for many cultural groups, largely as a result of the so-called “Core-Area” model, which suggests that the resource-rich region was the locus of the emergence, substantive development, and regular replenishment of all Canadian Paleo-Inuit cultures (Maxwell 1976; McGhee 1976; Nagy 1994; Ryan 2016; Savelle and Dyke 2014). Desjardins (2018) has suggested that the region was similarly crucial to later Thule Inuit populations. A focus on such research over the past three decades has resulted in a rich supply of material culture from a large number of Tuniit sites, providing a sufficiently broad sample on which to conduct the present analysis.

While previous studies have suggested variation in art style between different regions across the Tuniit geographic range (e.g., Hardenberg 2013; LeMoine et al. 1995; Lyons 1982), the sites

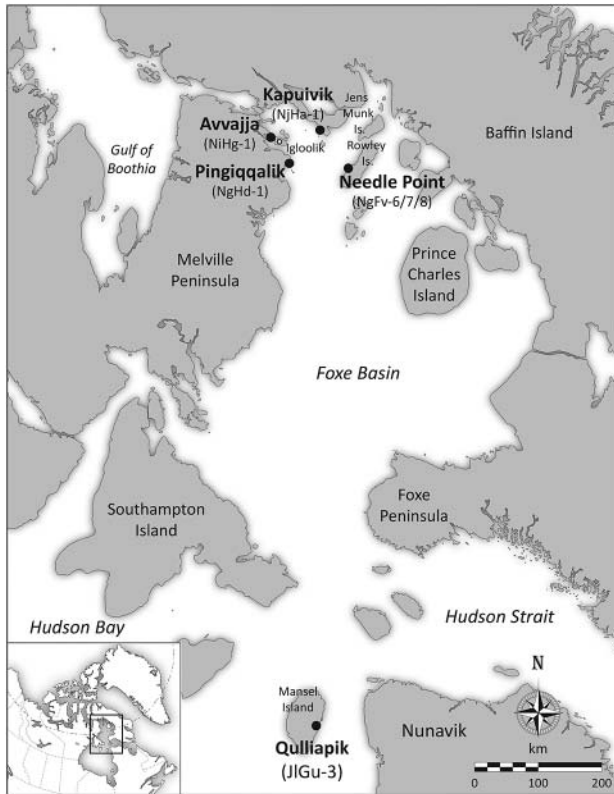


Figure 2. Map of the Foxe Basin and northern Hudson Bay regions of Nunavut, including the sites used in the present study.

we have chosen can be considered as part of the same general region; this is due to the similarity in ecological, geological, and cultural context across all sites. While all objects in our analyses were produced by Tuniit and date to within the same general period (between ca. AD 500 and 1300), we have not included the depositional context of the objects in our approach. This is mainly due to the lack of contextual data available for the majority of the pieces, particularly those from Avvajja, which were excavated at a time when the depositional context of artifacts within a site was rarely documented.

Although Tuniit pieces classified as art are made from a variety of materials, as mentioned in the introduction, the majority of the objects in the collections analyzed as part of the current project appear to have been carved from ivory. This material identification is based on existing information in the catalog and interpretations of the first author during the microscopic analysis. The exceptions to this focus on ivory are the 17 objects, which were classified as “unidentifiable” due to a lack of information in the catalog or issues of identification related to degradation of the material surface. Additionally, two of the pendants analyzed

(NgFv8-17 and JIGu3-736) were carved from walrus tooth, and two of the anthropomorphic carvings (NgFv7-132 and NgFv7-133, both of which depict only faces with no body) were carved from antler.

Methods

Typological classification of artifacts could be thought of as creating “sets” of objects sharing similar superficial traits that conform to a particular predefined category. Our aim in this study is to determine whether we will see similar or entirely distinct sets if we instead group objects according only to microscopic traces of manufacture and use. We first conducted a standard microscopic analysis of each object that had previously been classified as an art piece. This analysis created a database in which each object was investigated in relation to particular traits associated with style/design, manufacturing technique, and use.

The new sets we have created are designed to be somewhat more objective in their capacity to be recognized and recorded because our focus is on traces of manufacture and use that can be identified across all organic Tuniit artifacts, not only the art pieces included in the present study. Of course, the approach of microscopic analysis carries with it other issues of subjectivity influencing the interpretation of results (as discussed in González-Urquijo and Ibáñez-Estévez 2003). One way of avoiding such bias is by creating a distinction between *interpretation* and *identification* (see Bradford 2016; van Gijn 2014). By identifying traces based on clearly observable traits, such as a faceted object surface or the presence of a U-shaped groove, we can mitigate the most egregious biases of interpretation.

Investigating objects using a trace-focused approach is an indirect way of identifying the possible creative decisions made by both the maker and the user of the object, as with the *chaîne opératoire* approach. The definition of an object is influenced by how we perceive that object’s function and associated interactions. Sjöstrand (2017) provides the example of a modern coffee cup, which would only be considered a piece of art if we actively perceive it as such, and therefore its classification as an art piece is based purely on our maintenance of this perception:

Since maintenance is a practice and practices always leave traces, we can study an art-world separate from our own by mapping what the community did in order to make an item function as art (Sjöstrand 2017:385).

More importantly, this approach can suggest alternative interpretive dimensions to the material when added to a purely typological approach. The

Table 1. Types of carvings present in the five site assemblages investigated in this study and the number of realistic versus stylized carvings.

Typology	Needle Point	Qulliapik	Avvajja	Kapuivik	Pingiqqalik	Total Number
Spatula	1	—	18	—	—	19
Pendant	1	1	—	4	—	6
Disc	—	—	—	2	1	3
Bear	—	—	3	1	—	4
Seal	—	1	8	1	—	10
Bird	—	—	8	1	—	9
Walrus	—	—	3	—	—	3
Fox or weasel	—	1	1	—	—	2
Caribou	—	—	3	—	—	3
Human	2	—	2	—	—	4
Bilobate	—	—	3	—	—	3
Decorated tools	1	1	2	1	1	6
Total number	5	4	51	10	2	72
Stylized	—	2	13	2	—	17
Realistic	—	—	13	1	—	14

traits we identify still include those related to physical attributes (as in Betts et al. 2015) but also include those related to stages of manufacture and traces of use. They are incorporated into three stages of analysis: a) an analysis of the style/design, b) a technical analysis, and c) use-wear analysis. The first two stages of analysis were conducted using a low-power AM7115ZMT Dinolite USB microscope, while the third stage was conducted using a high-power Olympus BX-51 metallographic microscope with an SC50 camera attachment.

Analysis of Style/Design

This stage of analysis is comparable to that implemented in traditional studies of these assemblages, as it includes the identification of decorative motifs (Fig. 3). However, while those studies often used these motifs within a typological classification, we view them instead as physical representations of the decisions made during the creative process and not as *defining* characteristics. Additionally, references have often been made in previous studies linking certain motifs with cosmological views of shamanic practices. For example, the “skeletal” or “X-ray” motif is interpreted as an integral part of an animistic worldview (LeMoine et al. 1995; Rasmussen 1929; Taçon 1983). Our aim is to investigate whether these motifs are comparable across the broader art

object categories (Table 1) and also whether there are observable patterns between those pieces with/without decoration.

Technical Analysis

The technical analysis is divided into two stages. First, we investigate the tools and techniques used in the creation of these objects. It is generally assumed that the majority of Tuniit objects made from organic materials would have been worked with stone tools, as lithic tools such as blades and burins are commonly found in Tuniit contexts, whereas metal objects are rarely discovered (Appelt et al. 2016; Cooper 2016; Maxwell 1985). However, recent research has highlighted that the relative absence of metal tools in the archaeological record may not necessarily correlate with a more limited use of this material in the past (cf. Jolicouer 2021). Therefore, metal tools may also have been regularly used alongside lithic tools to carve the objects featured in the present study. Experimental archaeology has suggested that using a metal versus a lithic tool during manufacture leaves different microscopic traces (cf. Christidou 2008; Olsen 1988; Sebire 2016; Walker and Long 1977). However, many of these differences relate to the shape of the tool edges used, which, while often directly associated with the physical properties of the raw material being used, are not

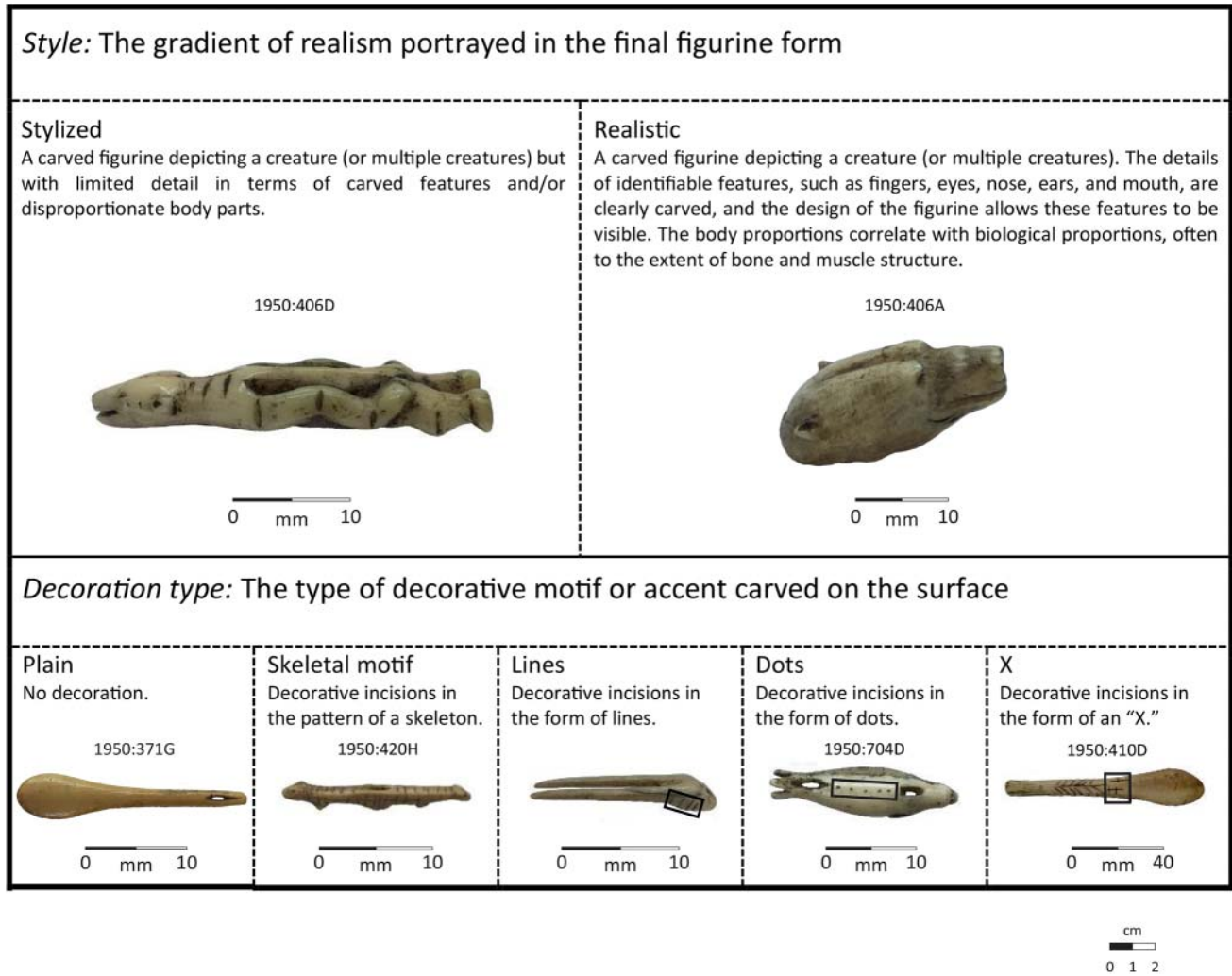


Figure 3. An overview of relevant definitions for the traits included during the first stage of analysis. Artifact images courtesy of the Canadian Museum of Nature (NiHg1 and NgHd-1), Cambridge Museum of Archaeology and Anthropology (1950), Susan Lofthouse (NgFv-6/7), and Avataq Cultural Institute (JlGu-3).

necessarily dependent on the raw material (Greenfield 2002 and experiments conducted by the first author). This is a particularly relevant point when considering the scarcity of metal tools in Tuniit contexts, which limits our understanding of the style and form of those tools possibly used for carving. We have therefore focused in the present analysis on possible identification of the shape of the tool edge rather than attempting to identify tool material (although future research should consider this point in further detail) (Fig. 4). Differentiation between different tool edge shapes can be achieved through an examination of the shapes and sizes of the grooves and carved lines on the object surfaces, both in the decorated patterns (such as the skeletal motif) and the shaping grooves used to create the final form (such as a mouth or leg of a human or nonhuman animal).

Similarly, we can also use this analysis to suggest the technique used when carving the object. Depending on the preservation of the object, it is possible to identify whether grinding or scraping was used as an initial shaping method, especially as several items in our dataset were previously identified as “unfinished” or “preform” on which these shaping traces are clear.

The second stage of the technical analysis focuses on the order of steps completed during the manufacturing process. For example, how much initial shaping was completed before the grooving of finer details took place? At what stage was a piece polished—before or after decoration was applied? And at what stage were any suspension perforations created? By identifying variation within these stages, it is possible to gain a greater understanding of the choices made by the carver during

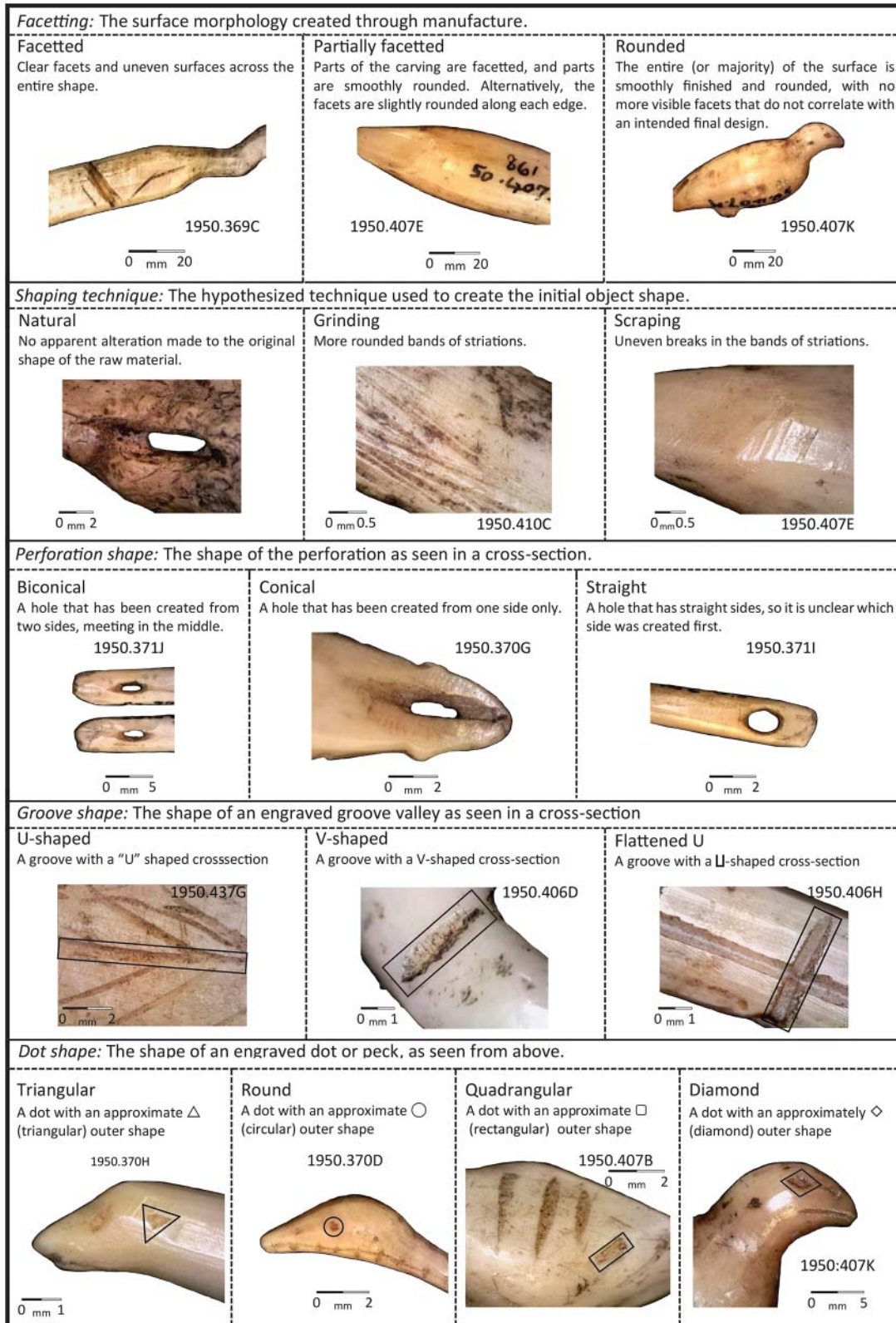


Figure 4. An overview of relevant definitions for the traits included during the second stage of analysis. Artifact images courtesy of the Canadian Museum of Nature (NiHg1 and NgHd-1), Cambridge Museum of Archaeology and Anthropology (1950), Susan Lofthouse (NgFv-6/7), and Avataq Cultural Institute (JIGu-3).

manufacture. If we assume that variations are the result of different creative decisions, then comparing patterns in different manufacturing techniques enables us to explore the possible reasons behind these decisions and whether they may be representative of practical restrictions (such as raw material properties) or are perhaps manifestations of social practices of learning (Jordan 2015; Lemonnier 1993). This can bring us closer to understanding the original intention of the creators. If there is a clearly established difference in the creative choices made (as observed in the manufacturing traces) between two sets of typologically defined Tuniit art pieces—for example, a bear figurine and a seal figurine—then it could be suggested that what these two species forms represented to Tuniit carvers also fell into two distinct categories.

Use-Wear Analysis

We also investigate traits associated with use-wear, which can help identify how the art pieces may have been worn, handled, or otherwise manipulated (Fig. 5). There remains some debate as to whether the *chaîne opératoire* approach can continue to be applied to investigate the life of an artifact after it is “finished,” as the initial application of this approach to archaeological discourse implied a focus solely on the steps of manufacture (Leroi-Gourhan 1964). However, we believe the intended final use of an object is an essential consideration in the manufacturing process, and therefore, *chaîne opératoire* can be applied to an analysis of the use-wear traces in the same way as in the technical analysis stage.

Unfortunately, the majority of the pieces in the present study—those from Graham Rowley’s 1939 excavations at Avvajja (Rowley 1940)—could not be analyzed for use-wear due to the presence of a layer of chemical preservative used during conservation. In most cases, this protective coating completely covers any microscopic traces. Even if it could be removed, it would be unclear whether the use-wear observed is original or the result of the preservative application and/or removal. Additionally, the scholarly and public interest surrounding the Avvajja art pieces usually results in them being more regularly handled by archaeologists and others, potentially creating postexcavation use-wear that is often difficult to distinguish from the predeposition traces.

Despite this, the consideration of use-wear—where observable—remains important, as any sets of objects that share similarities in how they were used can provide insight into Tuniit decision-making. For example, the degree to which a piece—particularly one with a perforation—is worn can provide clues as to the intentions of the Tuniit carvers. If a piece is perforated but

shows no evidence of wear, it may have been 1) deposited—either intentionally or accidentally—before being worn or 2) created without the intention of being worn. If all objects falling within one subtypology were worn, but those within a second subtypology were not, a clear distinction may have been made in the past between which forms were meant to be worn and which were not. We can also compare patterns in other traces of use, such as handling traces or the nature and level of contact with other materials during wear (seen through polish and striations, for example).

Trait Similarity

Once the database recording the results of this analysis was created, it allowed us to compare which objects shared the same kinds of traits: for example, which objects all had the same kind of polish, the same shape of gouge marks, etc. This tabulation then makes it possible to see the material from two perspectives:

1. How many traits are shared within a previously defined typology?
2. Can new sets be observed consisting of objects sharing identical traits?

In the first instance, we look at each object within the typologies stated in Table 1 and compare how much similarity there is between the different identified traits in comparison to the other objects in that typology. These traits are grouped according to different stages in the biography of the object: “traits of manufacture,” “use-wear traces,” “hole and handling,” and “decoration.” The separation between the latter three is due to the fact that not all of the objects included holes or decorations.

To enable a quick analysis, a custom-built MatLab script was used to identify a percentage of similarity of each different trait amongst all the objects within one typology. This percentage represents how identical these objects are in terms of microscopic traces of manufacture and use. For example, if all polar bears were to share identical traits of manufacture, the resulting percentage of similarity would be 100%, whereas if there were any discrepancies in any of the traits, this percentage would be reduced in accordance with the decreased level of similarity.

The secondary stage of this trace-focused analysis looks at the complete collection of objects and groups together those objects which are identical across several traits. In this way, we can invert the traditional way of grouping objects and set them together based solely on their shared traces of manufacture and use rather than any overarching typology. The same MatLab script was used to create these sets, using the information provided

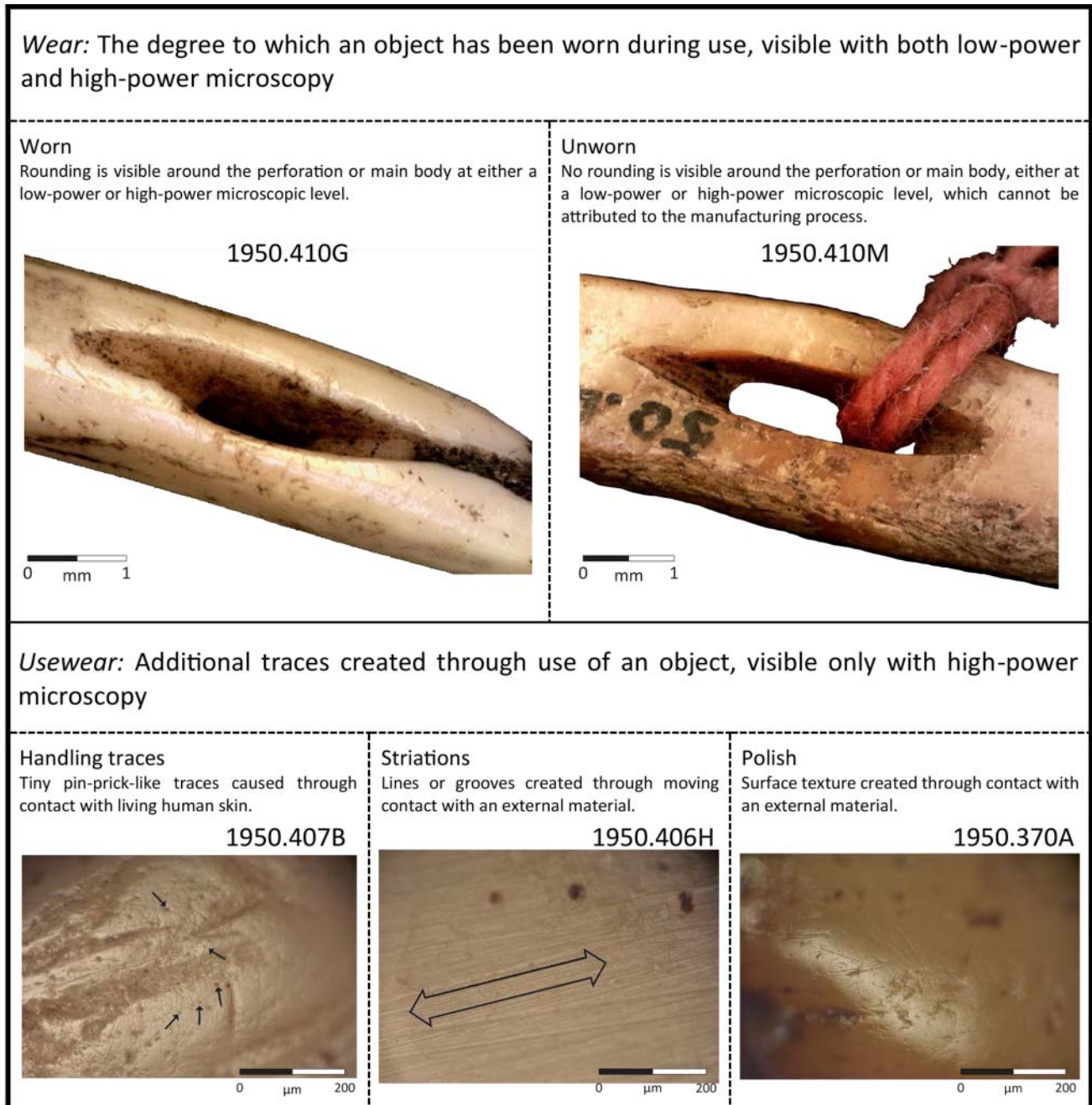


Figure 5. An overview of the relevant definitions for the traits included during the third stage of analysis. Artifact images courtesy of Cambridge Museum of Archaeology and Anthropology.

in the database to identify percentages of similarity across the entire dataset rather than within each object category.

Results

The percentages of similarity within the different traits (as defined above) are shown in Table 2. It could be argued that the high percentages of

similarity across all traits for the fox or weasel figurines are due to the low sample size, as there are only two objects. However, we have included them in the analysis for two important reasons. First, the two pieces are from two different sites (Qulliapik and Avvajja, approximately 900 km apart), making such a high degree of similarity in their manufacture, use, and decoration highly significant. Second, other categories including one

Table 2. The percentage of similarity within groups of traits related to style/design, technical stages of manufacture, and use-wear.

Category	Number of Pieces (n)	Similarity per Category (%)				
		All Traits	Traits of Manufacture	Usewear Traces	Hole and Handling	Decoration
Spatula	19	28	16	55	58	12
Pendant	6	36	31	57	65	22
Disc	3	19	14	33	42	22
Bear	4	38	45	30	33	11
Seal	10	27	15	44	47	17
Bird	9	29	27	39	38	31
Walrus	3	38	33	53	67	11
Fox or weasel	2	79	71	100	100	67
Caribou	3	45	38	53	67	11
Human	4	14	19	10	13	22
Bilobate	3	31	19	60	67	33
Decorated tools	6	17	18	21	20	24

more object (bilobate, walrus, disc, and caribou) have a significantly lower percentage of similarity across all traits despite a relatively small sample size.

These results allow us to identify which categorical distinctions of art within existing archaeological literature correlate with patterns in traits of manufacture and use. We define a correlation as a percentage of similarity over 50%, as is seen, for example, across all traits in the fox or weasel category. Although no other category shares such a high level of similarity across all traits, there is a relatively high level of similarity in terms of use-wear, including perforation wear and handling traces, within the walrus and caribou figurine categories, as well as among the pendants, spatulas, and bilobates. However, no significant similarity is observed in traits of manufacture or traits related to decoration type.

The secondary stage of our trace-focused analysis created several new sets that do not correlate with the common typological categories established in the archaeological literature but share a significant percentage of similarity within at least one trait from those described in Tables 2–4. We have chosen the four most significant examples of these sets: “significant” is classified, in this case, as sets that include objects sharing 100% similarity² of traits across multiple traits related to style and/or manufacture and/or use.

As can be seen in Figure 6, many of the new sets include objects from different typological groups, both in relation to the main categories

(e.g., pendant versus figurine versus spatula, as seen in Set 3), as well as the subcategories (e.g., bear figurine versus human figurine versus seal figurine, as seen in Set 4).

Discussion

The results of our analysis show that there is indeed some overlap in traditional typology and manufacture/use-wear, but a complete correlation is observed only within a few of the traditional categories. For example, the pieces traditionally classified as fox or weasel also share many traits of manufacture and use. However, other previously defined categories (e.g., polar bears, seals, and spatulas) do not share such a clear similarity across manufacturing and use-wear traces. Instead, by using a trace-focused analysis to investigate the collections with a focus on the traits specified in Tables 2–4—including aspects of design and style, stages of manufacture, and traces of use and handling—we can create new sets of objects sharing a high percentage of similarity across particular groups of traits. These new sets rarely correspond to one defined typology as categorized in previous studies and would, therefore, not be discernible through a purely typology-focused analysis.

Set 1

The dominant link between the objects within this particular set relates to use-wear. The hole in all is

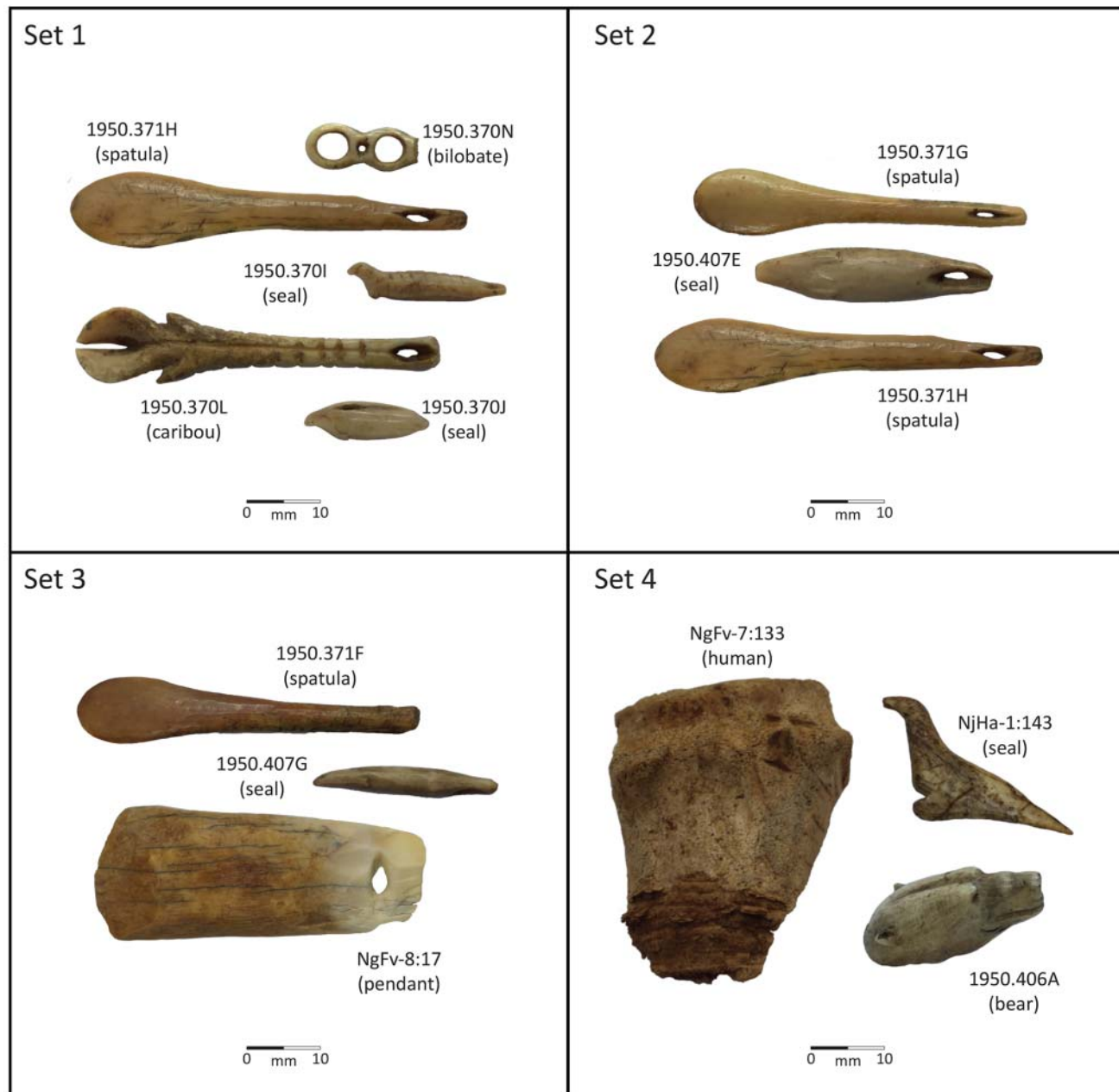


Figure 6. New sets created through a trace-focused analysis sharing 100% similarity in certain traits (specified within each set description). Set 1: 100% similarity in a high level of wear in the hole, presence of handling traces, presence of polish and striations, and biconical perforation. The material of the objects is ivory, apart from 1950-370N, which was classified as “unidentifiable.” Set 2: 100% similarity in scraping technique, shaping first, partially faceted surface, plain decoration, high level of wear in holes, biconical perforation, and the presence of handling traces. The material is ivory. Set 3: 100% similarity in faceted surface, no wear in holes, biconical perforation, absence of handling traces, plain decoration. Material is ivory, apart from NgFv-8:17, which is walrus tooth. Set 4: 100% similarity in plain decoration, V-shaped grooves, and triangular-shaped dots. Material is ivory apart from NgFv-7:133, which is antler. Artifact images are courtesy of the Canadian Museum of Nature (NiHg-1 and NgHd-1), Cambridge Museum of Archaeology and Anthropology (1950), Susan Lofthouse (NgFv-6/7/8), and Avataq Cultural Institute (JIGu-3).

very worn; many use-wear traces are visible on the main bodies, and there is evidence of handling. Therefore, the link between these objects is clear; they were all heavily used. The high level of wear within the holes suggests that they would have been attached to another material in some way, either sewn on clothing or similar materials or strung on a necklace or other ornamental piece. The shared trait of a biconical perforation could also suggest that they were intended for an attachment type that may have been better suited to this hole shape, for example, if the objects were intended to slide back and forth along a thread and so would need to be open from both sides.

If we were to consider this set from a purely typological perspective, it would be likely that the spatula and bilobate would be considered separately from the caribou foot and seal figurines. Additionally, the fact that one seal is decorated and the other is not could also automatically separate them during interpretation. However, by using a complementary trace-focused approach, we can see new relationships between the objects that may not have previously been considered. The fact that all of the objects included within this set share such a high level of identical use-wear suggests that they were used for similar purposes—likely as forms of ornamental attachment—and thus, new questions emerge on how the Tuniit would have perceived these objects. Especially when comparing the caribou foot carving with the spatula, we can see how similar in general shape these objects look, and so although we may wish to separate them based on typological classification, perhaps this similarity in shape was enough to consider them of equal value in the eyes of the Tuniit user.

Set 2

There are two main links between the objects in this set. The first focuses on manufacturing processes, including the use of a scraping (as opposed to grinding) technique to create the rough shape, a partially faceted surface, the step of shaping before perforation, no decoration, and a biconical perforation. The second link relates to use as a high level of use-wear observed in the holes and traces suggest that the objects were intensively handled.

Although this might be considered the least “exciting” of the sets described here, we would, nevertheless, argue that it reveals relationships between different typologies that might not be considered solely using a traditional approach. The inclusion of two spatulas conforms to a typological classification; however, the additional inclusion of a seal figurine prompts a secondary look. This second examination is especially needed because, al-

though there is a clear difference in overall shape, the biconical shape of the perforation, when combined with the other identical manufacturing techniques, makes all three objects within the sets quite visually similar in terms of texture and outline. This similarity, combined with the identical shared traits of manufacture, suggests that the same tools (most likely stone burins based on experiments by the first author, although as discussed in the introduction, further experiments on tool material are necessary) and approach were used in the creation of the three objects. Was this due to a shared experience between the carvers, in terms of the communities of crafting practices learned, or more personal relationships between the individuals? Were they made by the same carver? A more in-depth study encompassing a larger dataset would be necessary to explore these additional questions fully. However, the incorporation of a trace-focused analysis into the study of these Tuniit art assemblages again suggests alternative avenues of inquiry than may be found in a purely typologically focused approach.

Set 3

Within Set 3, it can be seen that two of the shared traits are a lack of wear within the perforation and a lack of handling traces. The link between these two traits is clear: It is safe to assume that those pieces that were not worn or used in some way may, therefore, also not have been handled, in which case the relationship between these two different traits is perfectly reasonable. (It should be noted here that although there have been many studies investigating the creation of handling traces on bone objects [e.g., D’Errico 1993, Maigrot 2003, van Gijn 2006], our understanding of the extent to which handling traces are created on ivory objects remains relatively unknown. Further experimental research on this topic is therefore necessary in order to gain a greater understanding of the way that these pieces were handled in the past.)

Nearly all Tuniit art objects are lightweight and portable, and the fact that they often were perforated and had no so-called “base” on which to stand has led to the suggestion that they were intended to be handled or interacted with in some way, rather than sitting passively on a static surface (MacRae 2013). If the objects in Set 3 were indeed not handled, then the question of intention related to the pieces within this particular set is another one entirely. Were those pieces without handling traces or any trace of use intended for a different purpose, such as intentional deposition? Or were they simply lost or misplaced before their full “purpose” could be achieved? In such cases, the consideration of site context would be

necessary, as it might be possible to differentiate between the deposited location of objects with or without handling traces and use-wear throughout a particular site and thus infer whether this deposition was intentional or accidental.

In the case of this particular set of objects, the shared trait of a faceted surface could suggest another reason. It could be suggested that the different surface shapes identified in Table 4 (faceted, partially faceted, and rounded) are directly related to different stages of finishing an object, with “faceted” linked to the first rough shaping and “rounded” linked to a fully completed object. In this case, the combination of a lack of use-wear, handling traces, and a faceted surface could suggest that these objects were still in the initial stages of manufacture. We can therefore suggest that this set includes examples of objects that were not yet finished, either because they were misplaced before the final stages could be completed or because they were forgotten or intentionally discarded.

Set 4

The central linking traits for the objects in this set are related to manufacturing in that they all have V-shaped grooves and triangular-shaped dots. With these particular traits, the link may be related to a simple case of practicality. Experiments conducted by the first author revealed that the different groove shapes observed in the archaeological material were heavily influenced by the shape of the tool used during manufacture. A sharp burin tip created a clear V-shaped groove, while a blunted or duller tip created a U-shaped groove, and a square tip created a flat-bottomed U-shaped groove. Sets based predominantly on these particular manufacturing traits could therefore be more indicative of the tools used to create those particular pieces rather than solely of the artistic intentions and influences of the carver. This avenue of inquiry—using experimental archaeology to gain a greater understanding of the tools and techniques used to create the different objects and the practical restrictions of the raw materials—is an essential one in terms of, for example, identifying individual carvers or perhaps communities of practice within particular sites, and requires further research.

One interesting result was the inclusion of both stylized and realistic figurines within a single set, as observed in Set 4 and Set 1. Although identification issues have often been associated with stylized pieces, as mentioned in the introduction, the general idea for this definition is that the final figurine is considered symbolic of the intended depiction rather than a direct reproduction, as seen in realistic figurines (Hardenberg 2013). Again, this definition of “stylized” is therefore highly de-

pendent on the perception of the individual viewer, as it involves the interpretation of symbols and subsequent associations, all of which are extremely subjective. The inclusion of both “stylized” and “realistic” figurines within a single set created by a trace-focused analysis highlights this point, as the similarities in the manufacture and use of these objects suggest that their creations were not perceived as two distinct processes in the mind of the Tuniit carver but rather as a continuum. By creating a defining separation between these two categories, archaeologists are therefore implying a distinction of intention on the part of the Tuniit carver and user that may not, in fact, have existed.

Additionally, by separating the figurines into those pieces that are realistic, and those that are stylized, the gradient of realism is excluded, as no distinction is made between objects that are only partially stylized or completely stylized. Imposing this bias within the initial stages of a research project (i.e., within the definition of material categories) can already influence the results of the study before any analysis or interpretation has even taken place. We would therefore suggest that such polarised distinctive categories of “realistic” versus “stylized” should be excluded from future analyses of Tuniit art to allow a less restrictive investigation into the continuum of realism.

Reflections on a Trace-Focused Approach

The sets created in the present study provide just a few examples of how a trace-focused approach to assemblages of Tuniit art could provide complementary interpretations to a purely typology-focused approach. We wish to make it clear that we are not suggesting this approach completely replace traditional typological studies but instead contend that it could provide a fresh insight into existing collections of Tuniit art. The topic of “art” in any context is an extremely complex one that is easily biased by modern interpretations related to subjective experience even before the application of potential further typological bias. As such, interpretations can often go around in circles. A complementing approach such as that proposed here can hopefully remove some of the interpretational stagnation, and by engaging with legacy data in new ways, arctic archaeologists can propose fresh avenues of inquiry. Though the results of our trace-focused analysis may not be altogether surprising, the approach we employ here demands that we interpret familiar material culture in an unfamiliar way. We believe such a change in analytical perspective has the potential to open new lines of inquiry not previously considered and encourage alternative perspectives on traditional typological categories.

Recent work by Siebrecht et al. (2021) indicates that needles, while typologically identical in terms of their macroscopic qualities, demonstrate variation in manufacturing traces and use-wear. If such morphologically identical pieces show this level of variation, it is logical that even greater patterns of variation might be found in an assemblage that already shows variation in form and style, such as those objects featured here. This variation offers us several insights into different aspects of Tuniit culture. As an example, the question of why and who among Tuniit communities made these art objects has long been a matter of debate (for examples, see Taçon [1983] and Taylor and Swinton [1967]). Identifying traces of manufacture and use-wear present a possible path towards identifying patterns of production both within and between sites and determining whether specific patterns emerge that may be related to culturally ascribed traditions or are otherwise the creation of a shared worldview on a local, regional, or cross-regional scale.

A final point that should be made when discussing the bias of perception when imposed on studies of art objects is the choice of which pieces are included within the overarching category of “Tuniit art.” This inclusion has often been limited by our own interpretation of the objects, which in the past has frequently been restricted to only the most aesthetically pleasing of identifiable pieces. For example, why has the distinction been created between undecorated full-sized tools (which are not included in the category of art) and undecorated miniature tools (which are)? Also, what was the purpose of spatulas, and why are they included within the art category? The inclusion/exclusion of all of these objects has been based solely on the selection criteria influenced by archaeologists’ perceptions of what they believe constitutes art.

The question also remains as to whether researchers themselves can agree on a clear idea of what is meant by the term “art,” as has been discussed in more detail in studies such as Corbey et al. (2004), Holbraad (2009), Robb (2017), and Sjöstrand (2017). The other issue is that it is too often simply an easy categorical term used to classify objects with an unclear purpose or that are aesthetically appealing. Conversely, objects may also exist that we would not consider art but were nevertheless incorporated into shamanistic practices by Tuniit peoples. Investigating the use of the more ambiguous objects, such as the spatulas, could offer further insight into their past purpose and how they fit within the broader category of Tuniit material culture. At the very least, archaeological researchers should be aware of the bias that is created through the application of assumptions that have been established within the discipline

and, therefore, not use arbitrary, subjective categories as the exclusive means of organizing or compartmentalizing Tuniit material culture.

Conclusion

Our aim in this article was to determine whether the typological categories previously assigned to Tuniit art assemblages correlate with patterns in microscopic traces of manufacture and use. The term “art” in any context is loaded with preconceived biases, which is no less the case when applied to archaeological assemblages. In the case of Tuniit material culture, there is the further issue of imposed typological categories within the broader assemblage of Tuniit art. The application of these typologies from before analysis has even taken place already restricts the data and biases any interpretation made from it.

We propose a complementary approach whereby the focus of analysis does not start just from the customary, overarching typological categories taken from previous studies but also considers the material in terms of the traces of manufacture and use created through the interaction of past communities with these objects. Through this trace-focused approach, we can gain a greater understanding of the decisions and choices made in the creation of use of these objects. When applied to Tuniit assemblages, this approach created new sets of objects organized by similarity in microscopic traces of manufacture and use, which do not always correlate with groups of objects organized according to previously defined typologies.

Our results suggest some interesting points for further discussion in regard to the intentions of Tuniit carvers and others that might have been handling the objects. For example, one discrepancy between traditional typologies and our new sets is the lack of distinction that Tuniit carvers apparently made between stylized and realistic design styles. This result leads to the question of how useful these distinctions are in more traditional, typologically focused analyses. Applying a trace-focused approach also suggests further avenues of inquiry that might not have been considered using a solely typologically focused approach.

The application of this approach, and the consequent discussion points that emerged from it, is an important contribution not only to the study of art in the context of Tuniit assemblages but to any material cultural assemblage that has been restricted by the predefined assumptions of modern, Western-focused interpretation. Only by approaching the analysis of these assemblages from a new perspective, such as that proposed here in relation to Tuniit material culture, can archaeologists refresh discussions that have been trapped by

assumptions and overly imposed typological categories.

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Endnotes

1. Susan Lofthouse excavated the Needle Point collections, and Elsa Cencig excavated the Qulliapik material (both researchers from the Avataq Cultural Institute). The Kapuivik material was excavated by a McGill University field crew led by James M. Savelle. Desjardins excavated the Pingiqaluk collection and some Avvajja material. Graham Rowley excavated most of the Avvajja material, which is currently held in the Cambridge Museum of Archaeology and Anthropology.
2. A 100% similarity rating from a trace-focused approach is defined here as each object within a set sharing 100% similarity of the defined traits with every other object in that set.

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