Going against the grain?: trends observed in Mesolithic and Neolithic flint assemblages from Norsminde in Denmark

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Figure 1. *Location of the Norsminde site.*

Introduction

This case study of lithic standardisation has two goals. From a broad perspective, it seeks to understand the trajectory of stone tools which, according to Parry and Kelly (1987), is expected to change from curated to expedient technologies over time. Such a trajectory appears to hold for prehistoric North America, but that may not necessarily be the case for northern European prehistoric contexts. More specifically, the analysis presented here examines the degree of standardisation of two flint assemblages from a shell midden at Norsminde in Denmark. One assemblage dates to the Mesolithic Ertebølle culture (EBK, c. 5400-3900 BC), the other belongs to the Neolithic Funnel Beaker culture or Tragtbæger Culture (TRB, c. 3900-3300 BC). In terms of methods, basic statistics and exploratory data analyses are used, along with measures of variation and specialisation of lithic assemblages. Binford (1968) has argued that curated tools are usually associated with mobile prehistoric societies who demand multifunctionality and a long use-life from their tools; expedient tools are associated with sedentary societies that make, use and discard tools as they are needed. Thus, the working hypothesis to be tested is: Mesolithic (more mobile) industries are associated with greater tool regularity (curated technologies), and Neolithic (more sedentary) industries with lesser regularity (expedient technologies).

The data

The data set consists of two lithic assemblages from the site of Norsminde in Denmark, a shell midden site located on the east coast of Jutland (Andersen 1989 & Andersen forthcoming) (Figure 1). The site has both Mesolithic and Neolithic components, which are stratigraphically isolated. The Norsminde flint material was subjected to scrutiny by M. Stafford (1999). Although Stafford assumed that Neolithic tools were more *regressive* (i.e. less standardised and more expedient) than Mesolithic tools, this statement was never statistically tested. This is undertaken here. Three distinct and complete tool types were chosen: debitage blades, retouched flakes and end scrapers. In total, 126 artefacts were analysed: 70 blades, 27 flakes and 29 scrapers, with two thirds of artefacts attributed to the Ertebølle horizon and one third to the Funnel Beaker horizon (see Table 1). Analysis relied on dimensional variables (e.g. length, width and thickness) and employed the Coefficient of Variation (CV=StDev/Mean*100) which measures standardisation *within* a sample by describing how much variation can be detected by the human eye (Eerkens & Bettinger 2001).

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Objects must display at least 1.7% difference to be detected by the human eye; at 57.7% variation, the objects are observed to be near random.

Blade Variables					
		N	Mean	Median	Mode(s)
Weight	EBK	53	15.4	8.7	5.5, 6.6
	TRB	17	13.1	13.3	-
Length	EBK	53	71.1	68.9	58.5, 77.6
	TRB	17	73.1	69.2	-
Width	EBK	53	22.5	21.4	16.7, 19.3, 29.1
	TRB	17	21.9	21.8	26.5
Thickness	EBK	53	6.7	6.1	4.8
	TRB	17	6.8	6	5.2
Flake Variables					
		N	Mean	Median	Mode(s)
Weight	EBK	11	33.5	28.4	28.4
	TRB	16	24.5	16.2	7.8
Length	EBK	11	65.2	72.5	-
	TRB	16	54.5	53	-
Width	EBK	11	30.5	38	-
	TRB	16	48.1	35.4	-
Thickness	EBK	11	11.2	9.8	-
	TRB	16	9	9	-
Scraper Variables					
		N	Mean	Median	Mode(s)
Weight	EBK	22	15.4	12.9	12.8
	TRB	7	27.4	14.4	-
Length	EBK	22	74	73.4	68
	TRB	7	76.7	84.5	85
Width	EBK	22	24.2	21.5	21
	TRB	7	24.6	23.1	33
Thickness	EBK	22	6.3	5.6	5
	TRB	7	6.5	5.9	6

Table 1. Measures of central tendency.

The correlation coefficient (Table 2) reveals that overall, Mesolithic blade and scraper variables display greater values of *r* than their Neolithic counterparts, suggesting that particular relationships between these variables were striven for during production. On the other hand, Neolithic blades show little indication of this relationship, apart from the mirrored trend of increasing weight/increasing length, width, and thickness. This finding is in keeping with the knowledge that TRB people utilised flake-based technologies. The T-test statistic (Table 3) reveals that the ranges of variation among Mesolithic and Neolithic tools are not similar, and thus the sample means of these components do not appear to come from the same population. So far, this data does not contradict the working hypothesis.

EBK	EBK	TRB	TRB
Blades (df = 51)	Actual r	Blades (df = 15)	Actual r
Length/width	58%	Length/width	-1%
Length/thickness	52%	Length/thickness	36%

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Width/thickness	75%	Width/thickness	26%
Length/weight	66%	**Length/weight**	63%
Width/weight	85%	**Width/weight**	60%
Thickness/weight	88%	**Thickness/weight**	78%
Flakes (df = 9)	Actual r	Flakes (df = 14)	Actual r
Length/width	8%	Length/width	27
Length/thickness	74%	Length/thickness	48
Width/thickness	39%	**Width/thickness**	65
Length/weight	-10%	**Length/weight**	59
Width/weight	-6%	**Width/weight**	58
Thickness/weight	6%	**Thickness/weight**	61
Scrapers (df = 20)	Actual r	Scrapers (df = 5)	Actual r
Length/width	49%	Length/width	38%
Length/thickness	18%	Length/thickness	43%
Width/thickness	53%	**Width/thickness**	95%
Length/weight	63%	Length/weight	37%
Width/weight	88%	Width/weight	-8%
Thickness/weight	72%	Thickness/weight	1%

Table 2. Correlation coefficients.

E/T blades	N	df	T-test statistic	*t*
Length	70	69	0.67	2.000
Width	70	69	0.76	2.000
Thickness	70	69	0.89	2.000
Weight	70	69	0.39	2.000
E/T flakes	N	df	T-test statistic	*t*
Length	27	26	0.16	2.056
Width	27	26	0.67	2.056
Thickness	27	26	0.25	2.056
Weight	27	26	0.43	2.056
E/T scrapers	N	df	T-test statistic	*t*
Length	29	28	0.74	2.048
Width	29	28	0.89	2.048
Thickness	29	28	0.84	2.048
Weight	29	28	0.30	2.048

Table 3. T-tests.

The display of dispersion and variance measures (Table 4) show that for scraper weight, the Coefficient of Variation (CV) differs considerably (EBK=67% vs. TRB=99%). Thus, Neolithic scrapers have a high degree of randomisation, as is expected for a culture that used expedient technologies. The main disparity in the CVs of flakes occurs in the width category (EBK=42%, TRB=26%); this result is again in favour of the working hypothesis, since TRB cultures focused more heavily on flake technologies and thus produced more standardised flakes than EBK cultures. However, in the weight category, Mesolithic and Neolithic blades show very different CV ranges: EBK=93% vs. TRB=52%. This disparity suggests a higher degree of randomisation in the Mesolithic blade assemblage and directly contradicts the working hypothesis of this study. In addition, when CV values are viewed overall for each assemblage, Mesolithic samples reveal more

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internal variation and greater range than their Neolithic counterparts. These results suggest that Neolithic, rather than Mesolithic, industries were more closely associated with greater tool regularity and curated technologies at the site of Norsminde.

Blade Variables					
		StDev	Quartile 1	Quartile 3	CV
Weight	EBK	14.3	5.5	21.8	93
	TRB	6.8	8.3	15.9	52
Length	EBK	17.4	60.2	80.4	25
	TRB	17.3	64.6	74.6	24
Width	EBK	6.8	17.1	37.3	30
	TRB	6.7	17	26.5	30
Thickness	EBK	3.1	5.1	8.3	47
	TRB	2.7	5.1	7	40
Flake Variables					
		StDev	Quartile 1	Quartile 3	CV
Weight	EBK	31.4	20.7	32.7	94
	TRB	23.8	9.2	24.1	97
Length	EBK	21.1	48.1	79.8	32
	TRB	15.3	44.6	64.1	38
Width	EBK	16.8	28.6	49.8	42
	TRB	10	31.8	43.4	26
Thickness	EBK	4.9	9.4	12.4	44
	TRB	4.1	5.2	12.7	45
Scraper Variables					
		StDev	Quartile 1	Quartile 3	CV
Weight	EBK	10.3	8.2	19.2	67
	TRB	27.3	11.9	32	99
Length	EBK	19	61.6	87.9	26
	TRB	18.3	78.4	85.3	24
Width	EBK	7.1	19.5	27.3	30
	TRB	6.3	19.9	28.9	26
Thickness	EBK	2.1	5	6.7	33
	TRB	2	5.2	7.2	34

Table 4. Measures of dispersion and variance.

Conclusion

Measures of CV suggest that some Mesolithic tools may have been less regular and more expedient than Neolithic tools, contrary to the commonly held notion that Neolithic stone tools are *regressive*. Of course, it is possible that Mesolithic tool producers made a wider variety of forms to exploit a more diverse range of subsistence activities. It is also possible that Mesolithic tools are more variable because of longer periods of hunter-gatherer occupation at Norsminde. Furthermore there may be contextual differences in the Ertebølle and Funnel Beaker midden deposits that could account for the trends observed. Be that as it may, the scenario outlined by Binford (1968), involving curated-mobile-Mesolithic and expedient-sedentary-Neolithic tools did not materialise in this study; the analysis points in a reverse direction. At present it seems that the flint technologies from this site go against the grain of expectations and more extensive research should

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provide interesting insights as to why this could be the case.

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