

(Un)burnt flint artefacts as indicators of Late Palaeolithic and Mesolithic anticipation and curation? An exploratory study for the southern Netherlands

Erik DRENTH

1. Introduction

Burnt or heated flint artefacts have been studied from various viewpoints. In particular in Palaeolithic research they have been used to obtain absolute dates with the help of thermoluminescence (TL) dating (*inter al.*: Martinia *et al.*, 2001; Richter, 2007; Richter & Krbetschek, 2006). Mapping burnt flint, and more generally burnt artefacts and ecofacts, is furthermore considered by Sergant *et al.* (2006) a means to identify the (former) location of Mesolithic surface hearths. Worthy of mention are also the investigations by Larsson (e.g.: 2000) with their focus on the deliberate destruction of ground or polished flint axes from Scandinavia during the Neolithic with the help of fire. To give a final example of the various angles of research, heat treatment prior to the working of flint, meant to improve its knapping qualities, is a central issue of many studies (Weiner, 2013, with further references). To the author's knowledge, hitherto no unequivocal vestiges of such prehistoric practices on present-day Dutch territory have come to light.

The present paper wants to explore burnt artefacts from a different perspective. It is well-known that thermal contact leads to the alteration of flint (e.g.: Price *et al.*, 1982; Purdy & Brooks, 1971). One of the changes is the development of cracks and even fractures; according to Price *et al.* (1982: 473) small cracks, referred to as crazing, develop around 350° C. In view of this mechanical weakening it is no wonder that burnt flint artefacts are usually regarded discarded tools or blanks unsuitable to make tools of (*f.e.*: Arts & Deeben 1981: fig. 25). This point of view implies that those artefacts may be a means to determine anticipation and curation in prehistoric societies. By counting frequencies of unburnt and burnt elements within lithic assemblages patterns may be looked for indicating that certain artefact types or artefact groups were handled and treated differently than others.

To test the afore-mentioned idea, the lithic ensembles of eleven sites of hunter-gatherers have been analysed. Their selection is a conscious one, prompted by the wish to discover meaningful patterns. That is why sites from a particular region, *i.e.* the southern Netherlands, were selected. Eight of them are located near Geldrop. Not only are they closely situated in space, but also to a high degree in time. They can be dated roughly between 11.900 - 8.500 BC. To be more precisely, the oldest one is probably Geldrop 3-4, because this site can in all likelihood be attributed to the Late Palaeolithic *Federmesser* Group (Deeben, 1999). The sites Geldrop 1, 2 and 3.1 represent the final stage of the Late Palaeolithic, since they belong to the Ahrensburg Culture (Deeben, 1994; 1995). Geldrop 3-2 West dates to the Early Mesolithic (*Idem*, 1996). The site of Geldrop 3-0 is probably of the same age (*Idem*, 1995: 18-19), whereas both Geldrop 3-2 East and Geldrop 3-3 are examples of Ahrensburgian or Early Mesolithic sites (*Idem*, 1996; 1997). Of the three other sites Vessem-Rouwven is an Ahrensburgian one (Arts & Deeben, 1981). The flint concentration excavated at Venlo-Raaieind is datable to Early Mesolithic and can be placed somewhere between c. 9.000 – 7.700 BC (Roymans, 2003). Lastly, site F at Gennepe that was investigated in 1994 (therefore dubbed 'Gennepe/site F/1994') is assignable to the Late Mesolithic (Deeben & Groenewoudt, 1999). Its absolute age must therefore be sought between c. 6500-4200 BC.

2. Results

The main results of the analyses of the tables 1-11 (see Appendix), listing the number of unburnt and burnt flint artefacts per site, are the following:

- As far as retouched artefacts are concerned, no homogenous overall picture emerges. So, to give an example, if the assemblages under consideration are examined as a whole, scrapers do not appear to be burnt statistically more often than burins.
- The afore-mentioned also holds for the category of unretouched artefacts. The only exception to this rule is the difference found when blades are compared to flakes. In eight of the eleven instances the former are statistically less frequent burnt (Tab. 12 in the Appendix). Deeben (1997: 45, note 1; 1999: 16, note 2) already reported a discrepancy between the actual and expected number of burnt blades for the sites Geldrop 3-3 and Geldrop 3-4. Thermally altered specimens are significantly underrepresented.
- For none of the sites a statistically significant result was found, when the unretouched component was set off against the retouched one. This was already noted for the sites Geldrop 1 and Geldrop 3-2 West (Deeben, 1994: 41; 1996: 19).

3. Conclusion

Though there are exceptions at site-level (and at the level of small groups), generally speaking the afore-mentioned analyses do not indicate that generally certain artefact groups and types were kept more often away from fire than others. The different pattern found for blades as opposed to flakes is therefore striking and needs explanation. All the more since this disparity cannot be accounted for by postdepositional processes; in that case the different components of the assemblage would have been affected to more or less the same degree. Instead, it may very well be that the difference mirrors the original situation. Blades are known to have played an important role as blanks for tools, as illustrated by the sites Geldrop 3-3 and Vessem-Rouwven (see in this connection also Deeben, 1994: tab. 13; 1996: tab. 67). Of the retouched artefacts 69 % respectively well over 70 % are manufactured from blades (Arts & Deeben, 1981: 70, tab. 60; Deeben, 1997: 41, tab. 80). These frequencies make it understandable that blades were treated more carefully than flakes and kept more often away from the destructive force of fire. Thus assessed, the frequencies of unburnt and burnt blades and flakes may be seen as indicators of curation, which is to be considered a process rather than a tool type (Andrefsky Jr., 2009: 70-71, with further references). Accordingly, the way in which potential tools and blanks are handled is part of this process.

The present paper is of an exploratory nature. To scrutinise the ideas ventured here, it is needed to investigate other regions and periods as well. Or to put it differently: "To be continued".

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Abstract

The present paper argues that the frequencies of unburnt and burnt flint blades and flakes may point to anticipation and curation in the southern Netherlands during the Late Palaeolithic and Mesolithic. An analysis of eleven such sites, an exploratory study, reveals that in almost three-quarters of the instances the blades are statistically significantly less often burnt. The (preliminary) conclusion is that this difference relates to the importance of these blades as (potential) tools and as blanks for tools. Apparently blades were kept more often away from the destructive force of fire than flakes.

Keywords: Late Palaeolithic, Mesolithic, southern Netherlands, (un)burnt flint artefacts, anticipation, curation.

Samenvatting

Een verkennend onderzoek is uitgevoerd naar de aantallen onverbrande en verbrande vuurstenen artefacten van elf sites in Zuid-Nederland. Daarbij is geanalyseerd in hoeverre de frequenties aanwijzingen opleveren voor anticipatie en koestering (*curation*) in het Laat-Paleolithicum en Mesolithicum. Een positieve aanwijzing in die richting is gevonden bij een vergelijking van afslagen en klingen. De laatstgenoemde categorie blijkt in ongeveer drie kwart van de onderzochte sites statistisch significant minder vaak te zijn verbrand dan afslagen. De (voorlopige) conclusie is dat dit verschil samenhangt met het belang van klingen als (potentiële) werktuigen en als uitgangsvormen voor werktuigen. Kennelijk werden zij daarom meer uit de buurt gehouden van vuur dan afslagen.

Trefwoorden: Laat-Paleolithicum, Mesolithicum, Zuid-Nederland, (on)verbrande vuurstenen artefacten, anticipatie, koestering (*curation*).

Erik Drenth
Torenstraat, 4
NL - 3811 DJ Amersfoort
drenth.erik@gmail.com

Appendix: Frequencies of (un)burnt flint artefacts from several Late Palaeolithic and Mesolithic sites in the southern Netherlands

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	44	2
Borer	1	-
Burin	8	-
Combination tool	3	-
Scraper	16	-
Truncated artefact	6	-
Retouched artefact	6	1
Notched artefact	4	-
<i>Subtotal</i>	88	3
<i>Unretouched</i>		
Bloc	10	1
Decortification piece	32	1
Core	6	1
Rejuvenation piece	16	1
Flake	394	13
Blade	84	2
Burin spall	25	3
<i>Subtotal</i>	567	22
<i>Total</i>	655	25

Tab. 1 – The flint assemblage from Geldrop 1.
Source: Deeben, 1994.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Backed blade	1	-
Burin	-	1
Schraper	2	-
Truncated artefact	3	-
Retouched artefact	13	1
Notched artefact	2	-
<i>Subtotal</i>	21	2
<i>Unretouched</i>		
Bloc	1	-
Decortification artefact	3	1
Core	1	-
Rejuvenation piece	11	-
Flake	91	14
Blade	87	4
Burin spalls	2	-
<i>Subtotal</i>	196	19
<i>Total</i>	217	21

Tab. 3 – The flint assemblage from Geldrop 3-0.
Source: Deeben, 1995.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	46	4
Backed blade	1	-
Borer	1	-
Burins	31	3
Combination tool	2	1
Scraper	31	7
Truncated artefact	13	-
Retouched artefact	4	1
Notched artefact	3	-
<i>Subtotal</i>	132	16
<i>Unretouched</i>		
Bloc	-	1
Decortification piece	4	1
Core	8	1
Rejuvenation piece	5	3
Flake	6	9
Blade	37	7
Burin spall	4	-
<i>Subtotal</i>	64	22
<i>Total</i>	196	38

Tab. 2 – The flint assemblage from Geldrop 2.
Source: Deeben, 1994.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	73	4
Backed blade	11	-
Borer	1	-
Burin	29	-
Combination tool	7	-
Scraper	62	1
Truncated artefact	41	1
Retouched artefact	21	2
Notched artefact	6	1
<i>Subtotal</i>	251	9
<i>Unretouched</i>		
Bloc	3	-
Decortification piece	4	-
Core	23	2
Rejuvenation piece	58	-
Flake	108	9
Blade	377	6
Burin spall	14	1
<i>Subtotal</i>	587	18
<i>Total</i>	838	27

Tab. 4 – The flint assemblage from Geldrop 3-1.
Source: Deeben, 1995.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Points	129	8
Borer	4	-
Burin	31	-
Combination tool	1	-
Scraper	52	2
Truncated artefact	60	2
Retouched artefact	87	5
Notched artefact	11	-
<i>Subtotal</i>	375	17
<i>Unretouched</i>		
Bloc	72	24
Decortification piece	224	13
Core	44	1
Rejuvenation piece	334	12
Flake	3140	31
Blade	1209	9
Burin spall	43	1
<i>Subtotal</i>	5066	91
<i>Total</i>	5441	108

Tab. 5 – The flint assemblage from Geldrop3-2 East. Source: Deeben, 1996.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	3	-
Backed blade	-	1
Burin	6	1
Combination tool	2	-
Scraper	10	5
Truncated artefact	1	-
Retouched artefact	2	-
Notched artefact	2	-
<i>Subtotal</i>	26	7
<i>Unretouched</i>		
Blocs	1	1
Decortification pieces	8	-
Cores	3	1
Rejuvenation pieces	10	-
Flakes	36	20
Blades	20	5
Burin spalls	2	1
<i>Subtotal</i>	80	28
<i>Total</i>	106	35

Tab. 6 – The flint assemblage from Geldrop3-2 West. Source: Deeben, 1996.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	7	2
Borer	1	-
Burin	6	-
Scraper	-	1
Truncated artefact	2	-
Retouched artefact	12	2
<i>Subtotal</i>	28	5
<i>Unretouched</i>		
Bloc	4	2
Decortification piece	34	4
Core	1	3
Rejuvenation piece	51	2
Flake	484	48
Blade	233	11
Burin spall	3	1
<i>Subtotal</i>	810	71
<i>Total</i>	838	76

Tab. 7 – The flint assemblage from Geldrop 3-3. Source: Deeben, 1997.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	2	-
Borer	1	-
Burin	4	-
Scraper	7	7
Combination tool	2	-
Retouched artefact	9	6
<i>Subtotal</i>	25	13
<i>Unretouched</i>		
Bloc	9	14
Decortification piece	18	10
Rejuvenation piece	27	7
Flake	217	105
Blade	42	6
Burin spall	2	-
<i>Subtotal</i>	315	142
<i>Total</i>	340	155

Tab. 8 – The flint assemblage from Geldrop 3-4. Source: Deeben, 1999.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	7	6
Backed bladelet	2	-
Borer	1	-
Scraper	1	-
Retouched artefact	7	1
Notched artefact	3	2
<i>Subtotal</i>	21	9
<i>Unretouched</i>		
Bloc	26	82
Decortification piece	43	40
Core	5	-
Rejuvenation piece	18	9
Flake	544	361
Blade	70	24
Potlid	-	386
Pseudoburin	4	-
<i>Subtotal</i>	710	902
<i>Total</i>	731	911

Tab. 9 – The flint assemblage from Gennepe/site F/1994. Source: Deeben & Groenewoudt, 1999.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	9	2
Combination tool	1	-
Scraper	8	-
Retouched blade	2	-
Retouched flake	3	-
Notched blade	3	-
Notched flake	1	-
<i>Subtotal</i>	27	2
<i>Unretouched</i>		
Bloc	48	49
Core	2	1
Core preparation piece	1	-
Rejuvenation piece	6	1
Flake (including chip and decortification flake)	529	194
Used flake	6	-
Blade (including decortification blade)	96	18
Used blade	4	-
Burin spall	3	1
Pseudoburin	3	-
<i>Subtotal</i>	698	264
<i>Total</i>	725	266

Tab. 11 – The flint assemblage from Venlo-Raaieind. Source: Roymans, 2003.

Artefact type	N unburnt	N burnt
<i>Retouched</i>		
Point	236	15
Backed blade	19	4
Borer	6	-
Burin	66	1
Combination tool	5	-
Scraper	99	11
Retouched blade	130	5
Retouched flake	69	3
Retouched Rejuvenation piece	4	1
Notched blade	3	-
Notched flake	1	-
Truncated blade	24	2
Truncated flake	1	-
Used blade	48	1
Used flake	18	-
<i>Subtotal</i>	729	43
<i>Unretouched</i>		
Bloc	7	2
Core	24	2
Rejuvenation piece	354	28
Flake	3809	618
Blade	2412	212
Burin spall	47	1
Pseudoburin	10	-
<i>Subtotal</i>	6663	863
<i>Total</i>	7392	906

Tab. 10 – The flint assemblage from Vessem-Rouwven. Source: Arts & Deeben, 1981.

Site	Probability
Geldrop 1	.7540
Geldrop 2	.0020
Geldrop 3-0	.0307
Geldrop 3-1	.0022
Geldrop 3-2 East	.4543
Geldrop 3-2 West	.1573
Geldrop 3-3	.0276
Geldrop 3-4	.0046
Gennepe/site F/1994	.0065
Venlo-Raaieind	.0133
Vessem-Rouwven	<.0001

Tab. 12 – Statistical comparison of the frequencies of unburnt and burnt blades and flakes with the help of a two-tailed Fisher Exact Probability Test or a (non-directional) Pearson's Chi-Square Test. The tests were executed with VassarStats (<http://vassarstats.net/>). The statistically significant results are in cursive ($\alpha = .05$).