High magnification use-wear analysis of lithic artefacts from Northeastern America: Creation of an experimental database and integration of expedient tools

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ABSTRACT

Use-wear analysis on prehistoric lithic artefacts makes it possible to identify the real function of the tools. To identify the nature of the technical activities practised on a site increases considerably the interpretative potential of the archaeological collections, since it is then possible to define the behaviors and the choices which characterize the socio-economic organization. However, use-wear analysis necessitates access to an experimental referential specifically representative of the context in study (and the nature of subsistence activities), the raw material used and the types of tools identified. It is in this perspective that we decided to build a specialised database (made of objects, notes, descriptive forms, drawings, films and thousand of pictures) adapted to the prehistoric context of the American North-East. The first two phases of this project already made it possible to document the use of expedient tools (raw flakes), manufactured on lithic raw materials regularly found in the archaeological assemblies (various varieties of chert and quartzite). Experiments carried out to date allowed us to document: 1 – characteristic combinations of traces associated with the use of tools made on flakes for various functions connected to the activities of subsistence of hunters-gatherers (work of bones, antler, hide, cutting-up); 2 – the variability of dynamic of wear of five varieties of Appalachian cherts (St.Nicolas, Munsungun, Touladi, Normanskill, Onondaga) and of two varieties of quartzites (Mistassini and Ramah); 3 – the modality of use and the process of wear of the expedient tools, which will make it possible to locate and identify adequately this category of tools in the archaeological collections. Access to such a reference database will make it possible to identify the true function of the tools from this context and to integrate the category “ad hoc tools” into the inventory and go beyond the premise « form-function » in the interpretation of the activities practised on the prehistoric sites.

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1. Introduction

The ultimate goal of prehistoric studies is to explain the past of our ancestors. But understanding every day life address the notion of cultural variety and help to define the thin line that distinguishes one group from another. This is why it is relevant to shed light on and understand as much as possible the archaeological remains. Nowadays, it seems we are still trying to explain tools and sites functions from our own perception, instead of trying to decode what artefacts themselves can reveal. We have to understand what occurred effectively on a site, in order to replace this site in its socio-economic strategy (Knutsson, 1990; Thorsberg, 1990; Bamforth, 2010; Van Gijn, 2010). Many questions have to be solved and there are methods to achieve this. Which processing phase was performed and where on the site and who did it? If we consider our actual state of knowledge of the lithic toolkit from the Northeastern America prehistory, it is even more relevant to develop an adapted database for this specific context, in order to understand better the tools themselves, their functions and the archaeological representation of subsistence and production activities. The use-wear database project of the Archaeological Laboratories of Université Laval (2013–2014) is therefore a start-up contribution to achieve this goal. The generated database has both a scientific and educational mission (Chabot et al., 2014). However,
the concrete results of this experimental program go way beyond the “traditional” creation of a traceological database. In fact, it is now obvious that the integration of functional data to the interpretation of stone tools and archaeological sites gives access to a more comprehensive view of the identified lifestyles. By doing so, functional studies bring a “plus-value” to our knowledge of North American prehistory. These elements deal with: finding the true functions of the tools, upgrading the tool corpus by integrating expedient tools and the entire operating process (chaîne opératoire) let us reach and understand better their social organisation.

2. Our understanding of the lithic toolkit from Northeastern America prehistory

Our current definition of North American prehistory is still strongly related to the study of lithic tools, while it is often the main material remains available to explain technical activities that occurred at the site. However, the analysis of these tools has often been limited to their morphological characteristics, according to the principles of classical typological classification (Fig. 1). Even today, lots of archaeologists think single macroscopic observations are sufficient to determine if an artefact was used or not and even sometimes they try to evaluate its function this way. The abandoned tool demonstrates the purpose of manufacturing its own “chaîne opératoire”, but also the choices about conducting technical activities on site (Inizan et al., 1995). Furthermore, use-wear analysis at high magnification is the best proven method to find tools’ functions (Yerkes and Kardulas, 1993; Anderson et al., 2004), and since it not necessarily recognizable by its form, therefore, typological classification has to be completed by subcategories based on functional data from use-wear analysis (Fig. 2) (Keelley, 1980; Gurova et Chabot, 2007; Van Gijn, 2010). These subcategories come from diagnostics of wear patterns, at different interpretative levels: use certified, texture of the worked material, type of material processed and mode of use. Then, it is the accumulation of the interpretative levels that leads to the identification of the specific function of the tool (Estevez and Urquijo, 1996; Bamforth, 2010; Van Gijn, 2010; Dionne, 2013).

Consequently, in order to resume the development of use-wear analysis applied to Northeastern America prehistory, it has become essential to build specific experimental database made on raw material most often found at archaeological sites from this context. Indeed, in depth access to the knowledge hidden into these functional data will depend on the understanding of wear processes related to the raw material used and the kind of subsistence activities done in each specific studied context (Semenov, 1964; Keelley, 1973, 1980; Estevez and Urquijo, 1996). From here, our main concern is to offer a new design and interpretation of the North American prehistoric toolkit, by improving the classical typology with the integration of functional data and expedients tools.

3. Expedient tools: beyond the premise form/function

The archaeological remains are direct results of activities at the site, in a given socio-economic system. The application of these activities induces social interactions and individual decision-makings framed by cultural conventions. Thus, these social interactions may be examined. In addition to collecting material and spatial data on an archaeological site, it is essential to identify the function of tools and activities performed at the site. To this end, the question to ask is: what does the function means? In addition to its effective usefulness, the function includes the efficiency and the operating process of a tool, the needs and purpose linked to its utilisation and the significant value of the tool within its cultural system. Then the use-wear data obtained reveal the function of the tool and also become an archaeological representation of lost material (ex: wood) and activities performed with it (Knutsson, 1990; Bamforth, 2010; Van Gijn, 2010).

Use-wear analysis is also the only way to identify expedient tools. Expedient tools are everywhere, but most often hidden among knapping flakes. In fact, a lot of manufacturing flakes were used as tools, due to their availability and the efficiency of their raw cutting edge (Young and Bamforth, 1990; Yerkes and Kardulas, 1993; McCartney, 1996; Chabot, 2002; Faivre, 2003; Gassin and Binder, 2004; Gassin et al., 2006; Chabot and Eid, 2007, 2010; Van Gijn, 2010; Dionne, 2013; Claud, 2015; Knutsson et al., 2015). The use of flakes as tools could indicate not only re-use or recycling of debitage waste, but also the existence of a real intentional production of blank supports for an immediate use, without modification (Soressi, 2002; Faivre, 2003; Claud, 2015; Knutsson et al., 2015). Moreover, this kind of tool is probably more likely to have been used and abandoned in situ, and thus more representative of a specific task that needed to be performed (Dionne, 2013).

Our experimental program aim to study the wear process on a selection of raw material generally found in Northeastern prehistoric lithic collections, as well as the utilisation of expedient tools made on flakes (Fig. 3). So, from now on, this process will let us identify a large proportion of flake tools that were previously neglected and rarely considered in collections studies. So, tools made with flakes will no longer be limited only to specimens showing some alterations.

4. Experiments: documenting the function for North Eastern American contexts

Experimentations document various dimensions of the function of a tool: the type of wear that it is generated on its surface, the efficiency of the working tool itself and validity of ethnographic models usually applied to archaeological tools (Anderson-Gerfaud et al., 1987). In this context, the experiments presented here are aimed to document use-wear patterns that will let us identify the functions of the expedient tools, but also their multi-functionality and the various details of their utilisation. The types of rocks we chose, are representative of the varieties usually found in prehistoric archaeological assemblages (Codere, 1998, 1996, 1992), and this research will let us document the wear dynamics of these raw materials and the functions assigned to the tools. First of all, we