Research Article

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Critique of Lithic Reason

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Abstract: In this article, the author would like to raise the attention on some structural problems at the bottom of past and present approaches within lithic studies, specifically the classificatory enterprises, thus contributing to the theoretical discussions around it. As a stepping stone towards the future resolution of these issues embedded in the current typological classification methods and in the technological approach, a proposal is made that from one side suggests uniforming and regularising the formal representation of lithic analyses in a more systematic and less erratic way and from the other side praises a more inclusive approach and better integration of typological analysis within current lithic studies.

Keywords: lithic artefacts, typology, theory, digital turn

1 Introduction

Lithic artefacts are the primary and most relevant remains of pre-neolithic material cultures, spanning a time period of more than 3 million years (Harmand et al., 2015), and seeing the almost complete loss of tools and items made on perishable materials (e.g., wood, vegetal fibres), stone tools also represent the sole complex of objects used by hominids that covers continuously such a long period, from the beginning until the appearance of ceramic. The study of lithic artefacts therefore has formed the backbone of stone age archaeology since its constitution as a science in the modern sense of this word, and being typology one of the main and foremost methods of analysis in archaeology since its first inception, lithic artefacts have undisputedly been one of the main objects of typological investigations *tout court*. Despite this central role though, typology of lithic artefacts has known a down of fortune and it has gone through a severe and prolonged lack of interest among prehistorians, one that in different guises continues until today.

2 Typology in Lithic Studies: A Short Overview

In the history of archaeology, typology has been applied to findings and the most common ones on top of all the others to investigate the existence of groupings of a kind within a chronological timescale, via a process of classification and seriation. Heinrich Dressel, for instance, is a good example of this, with the seminal work he completed on Roman amphoras at the end of the nineteenth century (Dressel, 1879).

Lithics were no exception. First, typology was used to create a classification of the stone artefacts according to their external shape or formal characteristics (for instance, size, localisation of the retouch,

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and supposed function); based on the conclusion of this preliminary operation, the researchers then have been using typological classifications to compare items or groups of items and try and find the point of contacts and separations in their production, style, and function. This second operation had a double aim: on a synchronic level, the goal was to use material cultures to separate and discern traditions and groups' identities (cultural–historical paradigm), of which the archaeologists had often no or only scarce information. On a diachronic level, the goal was that of the establishment of a progressive, evolutive sequence (developmental–evolutionary paradigm): for decades, before the discovery and widespread application of absolute methods of dating at the half of the twentieth century, seriation of material culture has been used as the sole available method in the attempt of creating a chronological sequence of human cultures (Renfrew & Bahn, 2020). In a field like prehistoric archaeology where the possibility for an absolute dating has often been scarce at the very best, the use of a chrono-typology was almost a necessity, and this situation has turned only after the advent of absolute methods (Renfrew, 1973). Even after this moment though, typology has continued to represent an important mean for dating purposes: in given contexts, even if less and less every day, using typology as a dating system still remains the only applicable method. Unfortunately, as it is now become clear (Davidson, 1997, p. 148), such a method can never be considered entirely reliable and in the best cases is only just a good approximation, while for the vast majority has created more confusion than not (e.g., Di Maida, Mannino, Krause-Kyora, Zetner Trolle Jensen, & Talamo, 2019).

If the developmental/evolutionary paradigm with its chrono-typological approach has been proved to be not entirely reliable, the cultural–historical one too did not come devoid of issues, although it took several decades for archaeologists to realise it.

Modern archaeology is considered to have appeared in Europe at the end of the eighteenth century (Everill, 2009, 2010), around the same period that saw the birth of nationalism and the myth of nation-states (Anderson, (1983 [2016]). It was in those very same years in which such ideas rose to a paroxystic level, between the two World Wars, that archaeology became a mature discipline. Archaeology then, since its inception, has been heavily influenced by concepts, such as ethnicity, state and nation, and it has often projected and integrated them on the very objects of its study. The set of items that would be attributed to a given "culture" through a typological analysis was thus used to create clear borders, as touchstone to build a map of nations, in every way similar to the one that were struggling for self-determination (or fighting for prevarication) on the European stage of the nineteenth and twentieth centuries. As the poet says, talking about one of these nations (it could be any):

> *Una d'arme, di lingua, d'altare,*
> *Di memorie, di sangue e di cor.*
>
> [United in weapons, in language, in faith,
> In memories, in blood and heart.]
> (A. Manzoni, Marzo 1821, my translation)

By the comparison of similarities and differences with other sets, both coeval and from previous or following periods, the objects collected during excavations and archaeological campaigns were used exactly to build a map of cultural and ethnical kinships – the weapons, the language, the religion, the history, the blood, and the aspirations of the just-mentioned verses. In addition, such use of typology was often driven by a series of ideas or scopes (whether explicitly or not) that were those of the contemporary European society as a whole: archaeology thus found itself searching for the "first Italians" in the Middle Palaeolithic, a statement that might make people smile today, but which was expressed with great seriousness at the time, when some Neanderthal remains were found in the Guattari cave in 1939 and were solemny taken as the first specimens of an imagined Mediterranean "race" (Guidi, 1996). Even worse than such cheap sensationalist attitude, archaeology found itself in the position of justifying colonialists or warmongering behaviours, when not directly endorsing ethnical superiority and genocides. The consequences of such ideological drifts have been already heavily and thoroughly criticised from different perspectives (e.g., Jones, 1997) and this partisan use of typological investigations is now a well-recognised bias in the archaeological research of the nineteenth and twentieth centuries.

As it has been correctly noted, while the cultural–historical and the developmental–evolutionary paradigms deplete much of past concern with typology, the typological classificatory enterprise, though, still serve today at least "two important purposes for archaeology. First, they impose an order on art[e]fact variability, which facilitates the description of prehistoric objects among researchers. Second, the groupings defined in a typology represent analytical units that can be compared with other variables in an attempt to explain variability between those units" (Debénath & Dibble, 1994, pp. vii–4, *passim*).

Before moving on, it may be worth specifying that when we all talk of the typology of lithic artefacts, we refer primarily to Bordes' classification (1961 [2005]) that still constitutes the basis today (although it was modified with various contributions from various authors throughout the years): "Bordes' typology is, like most lithic typologies, primarily a morphological typology. That is, the overall form of the object and the location of retouch or modification are the principal criteria used in classification, although technological criteria (i.e., processes of manufacture) are considered to some extent" (Debénath & Dibble, 1994, p. 5).

Over the years, Bordes' typology has been object to a series of critics and issues (summarised for instance in Debénath & Dibble, 1994):

1. subjective character;
2. potential lack of ideal type, which will make the groundings of such a typological classification tremble;
3. inconsistency across the classes and the types: e.g., side scrapers are differentiated according to the location of the retouched edge(s), while, for instance, notches and denticulated are not.

Concerning subjectivism, it is surely true that there is a relatively high level of it in Bordes' typological method, but other than being a common situation among other branches within archaeology, this is a common situation as well in several other scientific disciplines. An illuminating example is that of philology. Although it may attract critics, often ferocious, the activity of philologists in the process of *emendatio* – the act of conjecturing a possible solution for a corrupted text – is not only tolerated but also required by the discipline's methodology itself: a text published by its editor without conjectures is regard as odd (Tarrant, 2016, p. 68). It comes therefore as no surprise that philologists regard objectivity as "an illusion" (Gorni in Tarrant, 2016, p. 65). Not without a dose of self-irony, the very word used to describe their job (*divinatio*) represents the subjectivity at its highest, super-human degree, sublimated into the most important tool in the researcher's arsenal: subjectivity is not thus a problem to eliminate, but a resource, or at the very least an unavoidable necessity. In archaeology, as in philology, while it is important to keep subjectivity as much as possible outside of the documentary stage (in many cases, also a very difficult task), it is impossible to keep it out of the interpretative one (Di Maida, Hatterman, & Delpiano, 2022). Archaeologists, as the colleagues from other disciplines, must therefore embrace this subjectivity and the inaccuracies surely embedded in their analytical methods as an opportunity to further build upon, in a potentially infinite routine (an operation that constitutes *per se* the definition of the scientific method, Feyerabend, 1975 [2010]). In addition, objectivity in the interpretation – or better, according to what we just said, the claim thereof – might actually be a dangerous chimaera to chase, often also quite detrimental for research (Di Maida, 2020, p. 30ff).

Concerning the two other raised issues, the situation is more blurred and probably less fortunate altogether. The question about the ideal type – more specifically valid for Lower and Middle Palaeolithic assemblages – is a crucial one: any typological classification, and Bordes' one too, is based on the hypothesis that an ideal form exists in abstract for each type and that the items that we classify in one or another class are just concrete variated realisation of that form: something in the direction of the platonic world of ideas (or forms, indeed). If this hypothesis is wrong, as for instance Dibble himself says to believe (Debénath & Dibble, 1994, p. 6ff.), the very same basis of the typological enterprise would receive a potentially fatal blow. Let it be said here in passing, that the writer's opinion is that, although such a hypothesis should not be easily dismissed, it might be overstretched in its relevancy in concrete applications: if, in fact, it can surely apply to given pieces or even classes of items, it can difficultly be valid for the Palaeolithic record as a whole, including some very focused and highly standardised production methods, suggesting the existence of mental schemes by the knappers.

Finally, concerning the third point of critic, archaeologists must once again, and in this case even more drastically, confess their inability to fully understand the record they are dealing with: this unjustified unbalance in the classificatory system among different classes of objects means that we are overestimating the relevance of one class over another? Or that indeed more importance was already given by their makers to those objects that appear therefore also to us worthier of more attention (and therefore have a wider typological diversity)? We simply do not know at the moment, how things stand in this respect.

In additional to all these crucial aspects, one other problematic habit has since its inception colonised typological classification, making things more difficult: regionalism. Typology naturally serves the purpose of describing and classifies assemblages that are relevant in a given area for a given period: this is a perfectly understandable state of things and there is nothing bad in it. It is also normal for every researcher interested in a specific period and area to fill what one might consider to be gaps in the system with new types and classes relevant in a given area of study: this is something that happens all the times in other similar fields (as for instance, in the Linnaean taxonomy – often cited, and rightly so, in relation to archaeological typology). New species in all realms are discovered due to new researches with a high frequency, and new types in the classificatory scheme are therefore created. It might also be given the case in which a sub-species is discovered and reported to its parent entry in the very same taxonomical scheme. As it is naturally in science, this scheme in neither perfect (only perfectible) nor immutable: changes to its structure are done continuously. It is though in the nature of this taxonomical scheme itself to have room for changes to its structure, without having to find a new scheme every time. Such capital changes happen only in the occasion of major scientific revolutions that lead to a paradigms' change (Kuhn, 1962 [2012]). The issue with lithic artefacts is that archaeologists never managed to create a paradigmatic scheme so far, to welcome the newcomers in an organic and logic structure. The consequences of this are both a centre-less proliferation of regional types that do not, or only partially, relate with the overall system and of similarities and relationships between the various branches of the classification that in most case are much more arbitrary and unjustified than researchers would hope.

An example might help better understand these problems. Few cases are so intricate and fascinating, other than illuminating, as that of the Font-Yves point type. Luckily enough, this case has been reconstructed in a richly detailed paper that traces all the stages of its development (Pesesse, 2011).

The first mention of the Font-Yves points is made by the Abbé Breuil in his contribute on the Upper Palaeolithic (1912) and then in the first publication of the Font-Yves site (Bouyssounie, Bouyssounie, & Bardon, 1913). Garrod (1934, p. 140), instead, was the one to first associate the near-East and the European pieces: "a characteristic implement is a small finely retouched sharp flint point; this is already well-known from Krems in Lower Austria, and from Font-Yves near Brive, and I have named it the Font-Yves point." More recently, Otte and colleagues (2007, p. 87) added another piece to the extension of the distribution, by mentioning the "Arjeneh points[: t]hese are bladelets with a nearly rectilinear section, with short direct retouch limited to the edges to produce a fusiform contour. They are identical to Krems and Font-Yves points found in Europe." In a more recent and well-documented overview of the Palaeolithic of the Levant, came out after Pesesse's paper (Shea, 2013, p. 140), the author mentions only in passing the fact that the El Wad points were once also called Font-Yves points, without any additional information.

As it might seem from the literature, some Proto-Aurignacian sites on a vast area (from Iberia to Iran) have in their assemblages a lithic tool in common: a slim, straight point with a bilateral short direct retouch. The problem is that the points first found at Font-Yves (that we will call *sensu proprio* from now on, to try and avoid terminological ambiguity) are not the same type as those from Austria, Czechia, or the Levant, and also not as other "Font-Yves points" (that we will call Pseudo Font-Yves, following Pesesse) from France itself (e.g., the ones from Le Piage and Arbreda): these are instead Protoaurignacian point with direct retouch and do not shown the characters of the points *sensu proprio* that are instead "très homogènes dans leur morphologie, si l'on considère leur élancement, leur rectitude et leur régularité. La principale source de variation concerne la latéralisation et l'intensité de la retouche" (Pesesse, 2011, p. 206).

During the scientific investigation of such artefacts then, something must have gone wrong and a persistent, but nonetheless plainly wrong assumption was passed down, from expert to expert, for 70 years, causing a harmful series of erroneous and quite relevant conclusions that depended on it. This extremely

confused situation was only possible due to the constitutive issues embedded in the typological classificatory system and its descriptive methods that were clearly insufficient to clarify the substantial diversity of the Pseudo Font-Yves points from the Font-Yves points *sensu proprio*. It might be objected that this is one single unfortunate case: but in truth, similar cases can be found for many other types and classes, at the point to raise more than one doubt concerning the efficacy and scientific soundness of the typological classificatory system *tout court*.

In conclusion, the inception of absolute methods of dating, the intrinsic and unresolved theoretical issues, the frequent practical inadequacy, the acknowledgment of strong bias, when not directly the discovery of politically driven agendas embedded in the use of typological investigations in the archaeological researches of the past, all together caused an understandable loss of relevance and credibility of typology in lithic studies. One other aspect though additionally contributed to the dethronement of typology as principal investigative method in stone age archaeology.

3 The Technological Turn and the State of Typology Afterward

A major change in the history of lithic studies took place starting around the '60s of the last century, when a technological approach was developed by the French school (Soressi & Geneste, 2011): this change in perspective, with the implementation of the concept of *chaine opératoire*, and the progressive abandonment of that of the *fossil directeur*, has represented probably the most relevant innovation in the lithic branch of studies of the following decades (de Beaune, 2004).

While, in fact, typology of lithic artefacts consists of a description of their exterior characteristics (like size, location of specific traits) and supposed function (scraping, cutting, perforating, etc.), technology studies the reduction sequence of a nodule (from the collecting of the raw material to its abandonment), trying thus to reconstruct how this process was realised, by starting from the moment in which this sequence was first conceived, as a mental scheme. Due to the very nature of those two methods, while typology favours the analysis of tools (which are the most diversified items, due to the specific extra process they undergo – the retouch), technology instead focusses on the whole sequence of reduction, thus including also blanks (un-retouched flakes) and cores. The advantages that came with such an approach are immediately evident, for it assumes the analysis of complete lithic assemblages, and not only single classes of objects: by dealing with the whole reduction sequence (instead of only the final products), it manages to go at the very base of technological traditions, thus having more changes to find meaningful connections among different "cultures" (today, also thanks to the successes of this technological turn, more correctly defined as techno-complexes). After this revolution in the perspective, the use of typology as principal method of investigation in lithic studies was slowly reducing (but, as it is often the case, with different paces in different national traditions: see for example the case of Italy, where the Laplace typological approach was used for a longer period, well into the '80s, e.g., Bietti, 1990; Di Maida, 2020, p. 62ff; or again the case in African lithic studies, Conard, Soressi, Parkington, Wurz, & Yates, 2004).

Despite all these issues though and the rise of alternative, more effective methods of analysis, typology was not abandoned nor could have been, seeing the crucial role that it played and still does in several vital aspects: to mention just one, the creation of a taxonomy, a common vocabulary for archaeologists – an aspect that rests at the core of a discipline and is therefore essential to the progress of the scientific work. To continue to justify then the use of typology on a theoretical plane, despite its constitutive issues, typology was forced to get a very peculiar status, for such a core section of a scientific discipline: from Bordes onward, it was used as a uniquely practical instrument, not connected with any theoretical foundation nor with a formality of any kind (Vialou, 2004, s.v. *Typologie*). This specific situation has been seen as a necessity but does not eliminate the issues at hand: without a theoretical background, typology has been practically forced to remain nothing more than a semi-private enterprise, within which each researcher can freely establish boundaries and descriptors useful for their specific, regional- and period-limited goals, making it difficult to re-use it (an otherwise common requirement of any scientific enterprise), while often

forcing other researchers interested in their subjects to just adapt and deal with it, or to make another classification of their own (thus extending the very same behaviour and contributing to further extend the issue). Due to all these reasons, typology has begun to be treated like the evil twin hidden in the attic one doesn't want the neighbours to know about. Even though typology was ubiquitously used, many problems lying at the bottom of it have been rarely addressed, or just brushed under the carpet, as M. Otte has sharply noted and nicely put some 20 years ago, "la typologie n'est plus à la mode. Pourtant, comme la prose de M. Jourdain, nous l'utilisons quotidiennement, perpétuellement" (Demars & Laurent, 1989 [2000], p. 9). This state of things also caused typology to be left to run even wilder than before, with a hypertrophic growth of local and regional classifications, that would often end up in the creation of a jargon, often impenetrable to the non-initiates and obscure even for the experts (e.g., the classes in use for the middle palaeolithic central European record, with *Halbkeile*, *Faustkeilblätter*, *Fäustel*, etc.). On top of this, typology kept on bringing with itself the issues that were already there also before its turn of fortune: for instance, the casual and irregular mixing of parameters used in the definition of types.

4 After the Technological Turn, Another Turn

This situation has become even more striking in the last few years, after the so-called digital turn has stormed archaeology (e.g., Huvila, 2018), and lithic studies with it. In particular, the process of digitation of large collections has brought back into the spotlight the question of classification, but on an even bigger scale. As several such digital enterprises (e.g., Di Maida & Hageneuer, 2022) have shown, the growth in both number and size of data sets naturally justifies a renewed interest towards the analyses of existing or new assemblages, thus possibly leading to novel perspectives and results. To guide this operation though, it is crucial to have a solid theoretical and classificatory background.

As we have seen, the technological methodology thrives when dealing with assemblages that consist of the most complete possible reduction sequence (ideally a whole one, from the collection of the raw material to the phases of use and discard), for it really excels in explaining a complete chain of production in its single steps and the decision processes behind them. In the case of pre-existing lithic collection though, artificially created along the course of several decades, if not centuries, with often unique pieces coming from several sites and dubious stratigraphy, thus detached from their natural context, the concrete help of technological-only analytical parameters in guiding a renewed cataloguing process is by nature difficult and in concrete only partial. The technological approach then, instead of solving those issues embedded within the typological analysis, instead of dedicating time and energies to improve typological classifications at the light of its own discoveries – as it should be expected from any healthy progress in science – seems to have decided in a rather surprising way to leave behind the development of theoretical reflections or consolidation of an overarching classificatory system applied to lithic artefacts, and to proceed from there in no particular order: the most diffused and ubiquitous classes of objects as well as new and old regional-only relevant types, that are used on a daily basis in the lithic studies, remains mainly nothing more than postulates and in a few cases only a re-analysis on more solid bases of given types' definitions has been successfully completed or even initiated (e.g., the mentioned Pesesse, 2011; the well-known case of carinated end scrapers, Belfer-Cohen & Grosman, 2007; Kolobova, Krivoshapkin, & Pavlenok, 2014; for the Keilmesser case, see below). In a situation like this, digital archiving or cataloguing and similar digital-based enterprises are currently left to fill the gaps of the most modern lithic analysis via tools that pre-date the technological turn, and this means often relying mostly on outdated references. This poses a crucial problem at the epistemological level, and it might be even argued that it could constitute an obstacle to the healthy development of this branch of study as a whole. In addition, typology and typological studies might still have their own relevant questions to pose that, in combination with the advancements made possible by the technological studies, could really represent a breakthrough (as for instance in the study of knowledge transfer and the possible modes of diffusion of production techniques or specific end products).

To help and bring every aspect of the lithic studies together from the present state of things, a starting point should be that of uniforming its theoretical and practical approaches, by regularising the processes' description and creating a shared and widely accepted routine for their representation. In this sense, creating a modular and universal schematic that can be applied to potentially all situations is the first step. Similar enterprises have in the past served as foundation for many disciplines, as they came to constitute themselves as such in a modern sense of the word. In many technological analyses, such schematics are also used, but always as in a private enterprise, different form each other and not standardised – an aspect that seems to be a recursive characteristic in lithic studies. Instead, it would be more profitable for the discipline, to uniform such graphical representations, to allow for instance a faster overview over the technological analysis done and its results, a comparison among different ones and possibly having the possibility to include and discuss typological and morphological descriptions of relevant tools. For this purpose, a tree-like structure might offer the best solution, for it has the advantage to mirror the sequence of actions (the single steps of the *chaine operatoire*) by the artefacts' maker. It should be read as a pedagogical aid in the representation of the cognitive operations involved in the production phases (similarly to the case of natural language, Berwick & Chomsky, 2015, p. 135). The model should contain the fewest number of categories possible but still be exhaustive in its description (minimalist). In addition, such a scheme should allow the presentation of specific assemblages as well as of hypothetic reduction sequences, both in the form of production complexes and single objects (universal). To give the readers an idea of such a representation, a practical example of a possible scheme is presented (Figure 1).

Despite this disturbing lack of interest towards standardised foundations the discipline, there are approaches, within the most recent developments in lithic studies, that have greatly profited from the digital turn. Geometric-morphometric (GM) is the one that has surely made the most out of the newly available digital inputs and therefore it lies the greatest hope for bringing together morphological analyses, digital methods, and the results of technological studies. GM is a method borrowed from evolutionary biology studies, where it was originally developed to analyse ontogenetic sequences and phylogenetic relations based on morphological measurements. Its use in archaeology has seen a remarkable increase in the last two decades (Okumura & Araujo, 2019). How relevant are the obtainable results when applied integrally and consistently, relying on a wide spectrum of the available methodological tools, is shown in several publications, as for instance the work on the Keilmesser by Weiss, Lauer, Wimmer, and Pop (2018). Keilmesser are well-known bifacially worked backed knives related to handaxes, typical of the Middle Palaeolithic of central Europe, even though some early ones can be found also in other regions (Jöris, 2006). Other than for showing the potential of such methodology when applied to lithic artefacts, the case of Keilmesser is instructive also for another reason. Although the idea of type fossil, as mentioned above, has been strongly and successfully challenged already since decades, specifically Keilmesser can make a good case for actually maintaining it, at least in specific situations, thus showing that even flagship targets of recent scientific advancements might require a more nuanced and articulated approach.

5 Discussion and Conclusions

Generally speaking, typology of lithic artefacts, as it is now, does not seem to be a fully functional system, for it misses, among other things, the characters of modularity and universality. The technological turn even though has revolutionised the analysis of lithic for the better, has had the demerit of partially leaving some unfinished businesses behind, and more often than not also that of practically ignoring the relevance of typology in the daily practice of the discipline, stopping *de facto* any theoretical and practical reconnection with it. It might be argued that, if lithic studies have survived and even thrived in the past decades, there would not be need of a newer scientific paradigm. Actually, however, if the current position of typology within lithic studies does not represent an obstacle (as it was instead here suggested), it surely represents an impairment to an easier and more effective classification process and therefore to a more efficient progress of the scientific enterprise. The fact that the current techno-typological classifications of

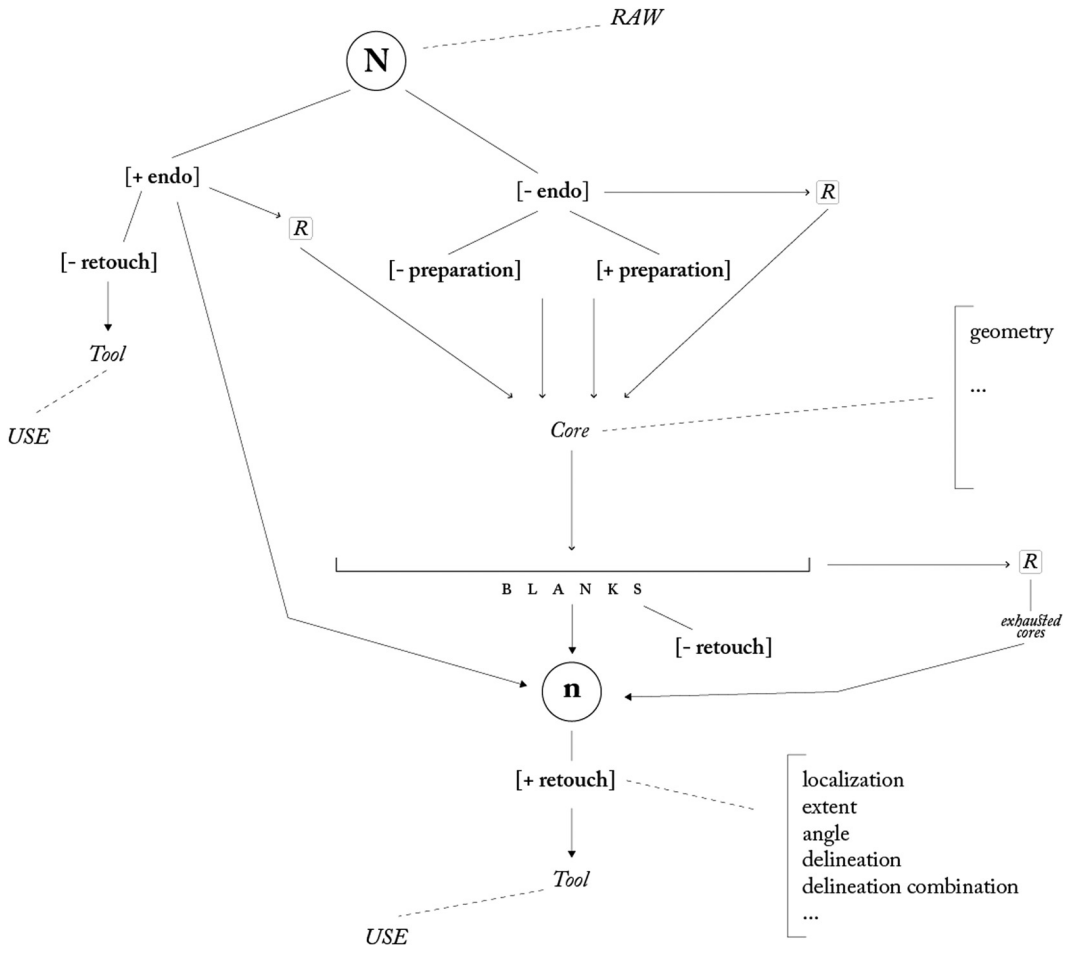

Figure 1: A possible scheme for standardised representations of lithic artefacts' analysis. (N) – represents the zero point, the nodule in its raw state. RAW – information about the raw material may be added here. [±endo] – reports the first and foremost separation, between *façonnage* (shaping), where the removals are the residual part and the focus is on the "core", and *débitage* (reduction), where instead the focus is on the detachments, and the core are the residual. [±retouch] – indicates the presence or absence of retouch. (n) – seeing the substantial equivalence between the knapping and the retouch processes (retouch on blanks might be described as a small-scale knapping), the objects of this activity are marked with a "n." (R) – it stands for "residue" and indicates the by-products of a reduction's sequence, whose main products are different. Please note that this material, despite it is not the primary goal of a given production workflow, can be used both as it is, without undergoing any further modification, or re-enter the cycle of production as blank, thus being indicated again with (n). [±preparation] – marks the presence or absence of a preparatory work in the setup of the core geometry, preliminary to the production of the wanted blanks (e.g., +preparation: Levallois, discoid; – preparation: bipolar, Quina; additional details diversifying the nature of the preparation can be added here). It applies to – endo production sequence only. *Core/Tool* – indicates specific types or classes of cores or tools. These are accepted as postulate within the model with indication of a reference literature or explained separately in their defining characteristics. Please also note that some of their constitutive characters might be deducible from the schematic itself. Information about use wear can be added also here (see next). *USE* – information about use wear is described here: it can be added where most opportune within the scheme. Defining characteristics – here are listed the defining characteristics of cores (striking platform geometry, morphology of the end product, etc.) or tools (characters of the retouch: localisation, extent, angle, delineation, etc., see Inizan & Féblot-Augustins, 1999). BLANKS – describe the morphology of the end products of a given reduction sequence (e.g., flake and blade).

lithic artefacts are not entirely satisfactory is in fact evidenced by the many attempts in the production of new techno-typological models, to bring order to the matter. Some of those are obviously excellent and go towards a desirable direction (e.g., Shea, 2013). What they do not deliver, though, is the fusion of the technical advancement with the unavoidable confrontation with the thousands of existing typological definitions of end products, combined together in a clear and logically arranged synthetic sequence, that

is also uniform, recursive, and expandable, including all the steps of the reduction processes, from raw material to final production, use, and abandonment.

In this continuously and somewhat tumultuously developing picture, the creation of large digital datasets might truly represent a game changer and definitely push towards a more integrated and holistic approach in lithic studies. As the case built here hopefully showed, the intricate but unavoidable intertwinement between morphology, production's sequence and technical aspects, seriality, cultural relevance of lithic artefacts is a complex reality that is not always possible nor wise to oversimplify.

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