

Dear Editor,

We are pleased to resubmit the revised version of “For our world without sound. The opportunistic debitage in the Italian context: a methodological evaluation of the lithic assemblages of Pirro Nord, Cà Belvedere di Montepoggiolo, Ciota Ciara cave and Riparo Tagliente.”. We would like to thank the reviewers and we appreciated the constructive criticism of their comments. Please find below our new response, highlighted in yellow, to each of their comments (*blue italics* for the 2<sup>nd</sup> round of review, *italics* for the 1<sup>st</sup> one).

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Reviewer #1

*I suggest improving the figure of artefacts adding diacritic diagram (just adding arrows and numbers to the photographs or delivering the diacritic diagram that have been made as written by the authors). In fact, only with the photograph, it is hard to see the removal negative directions. Arrows or diacritic diagram will be helpful for readers.*

Thank you for the suggestion. All the photographs presenting cores have been implemented with arrows and drawings of the negatives.

*Ok, but it would be helpful to make the same for the flakes, as also recommended by the second reviewer (direction of the removal of the flakes and also on the negatives of the flakes for the previous removals).*

Thank you for the suggestion. All the photographs presenting flakes have been implemented as well with arrows and drawings of the negatives.

*If possible, the authors could add 3D schemes like fig. 1 to deliver a better view of the described chaînes opératoires. Or some examples of such a 3D scheme could be added to show the archaeological refits and the reconstructed chaînes opératoires.*

Unfortunately, no 3D schemes of the cores were performed. The experimental blocks were analysed with a 3D scanner but only to obtain a view of the initial morphology. An example of that has been reported in the supplementary data on Zenodo. The file is called “Experimental protocol”. Regarding the archaeological cores and experimental ones, diacritic schemes on power point were realized and photos has been taken. Since arrows and removal of the negatives have been added to the photos already present in the pre-print, we believe that more 3D or diacritic schemes would have made the file too difficult to follow.

*OK. I did not speak of 3D scan, but I think, like the second reviewer, that you could present at least a figure with 3D schematic view to sum up in single place the different schemas of exploitation you encountered, and you want to group into the label « opportunistic debitage » method. I think it would be a real added value for your paper. Just remind you what image comes to you when somebody tells you about Levallois, and you understand instantly that such a figure is essential in lithic technology paper and, most of the time, much more than long description (while necessary).*

Thank you for the suggestion, we recognize the importance and clarity of drawings the “exploitation’s schemes” for each site. However, since all contexts and their lithic assemblages have been already studied and published, we believe that adding further drawings could make harder to perceive the purpose of this work, not to mention a. Which is a methodological re-evaluation of a flaking method, also quantifying its chronological evolution (if there is any) from the Lower Pleistocene to the Upper Pleistocene. That is also why four contexts, covering such a large timespan, have been considered.

*And finally, I invite the authors to deeply explain and clarified the use of « opportunistic », is it a method, a concept, a debitage? The authors must give a detailed definition for these elements. It is a central question in the paper and the proposed definition and explanation are not enough clear and complete. I also suggest you discuss the concept of « affordance » recently introduced in lithic technology by Eric Boëda, or also his proposal of the type C debitage (Boëda, 2013). It could give you the opportunity to clarify your position comparing the two proposals.*

Thank you for this idea. The opportunistic debitage is a flaking method and the word “concept” used in the text has been removed (also from the title) in order to clarify its definition. A detailed explanation of the opportunistic debitage has been added in the text, in the introduction and conclusion chapter.

“The opportunistic debitage is described as “a method oriented to raw materials’ massive exploitation without implying either a core’s, or any surface, preparation. The striking platforms and knapping surfaces are created as far as the flaking activity is carried on. [...] The opportunistic debitage include an infinite range of variants always coming from the same common operative scheme” (traduced by Arzarello, 2003). The term opportunism is defined as “a behaviour in which someone adapts his actions to each context in order to gain from them the most advantage”.

Moreover, the definition of method used in the text has been reported and discussed. Regarding the concept of affordance and type C debitage introduced by Boëda the following sentence has been added in the text to contextualize the opportunistic debitage within the archaeological community:

“In this sense, the opportunistic debitage may be compared to the “Type C” one recently introduced by Eric Boëda (2013) with which shares the concept of subordination and adaptability to natural morphological criteria alongside the choice of natural suitable volumes for the start of flake production without any surfaces’ preparation. The variability of the operative schemes used is always depending on and according to the natural morphologies available and to the cores’ volume. In any case a surfaces’ hierarchization (Levallois likewise; Boëda, 1994) or a subordination of the morphologies to specific technical criteria (such as in the Discoid and Quina method; Boëda, 1993; Bourguignon, 1997) is implied in the opportunistic debitage.”

*The entire paper is focused on the question of the opportunistic debitage. But you just cite the work of Forestier (1993) and Arzarello (2003) without give us a clear and complete definition of “opportunistic debitage”. I encourage you to clearly define it here and explain deeply and in details why you consider it as a method, and more particularly as a single method (and not a “family” of*

*methods, or common features of methods). This complete definition is lacking and does not allow us to follow the authors in their demonstration.*

A complete definition of the opportunistic debitage has been added in the text (as shown previously). Concerning the definition of single method compared to the one of “family” we would like to clarify this point by adding that any flaking method is characterized by different technical behaviours (terms with which we mean the different ways of exploiting a knapping surface) such as unipolar, orthogonal, centripetal always responding to the same mental scheme.

The following sentence has been rephrased

“Therefore, the first evidence of Levallois production (Prepared Core Technology; Moncel et al., 2020b) and its earliest diffusion during MIS 12 and MIS 9 (Moncel et al., 2016; Pereira et al., 2016; Rocca, 2016) determined a shift in the flakes complex’s methodological analysis at the expense of the opportunistic debitage from this chronological phase onwards.”

*Don't you think it is just a problem of terminology and scholar terminological traditions?*

Certainly, there is a problem of terminology within the scientific community about the different ways used to describe and define some flaking method. However, as it concerns the opportunistic debitage’s contextualization within the cultural traditions of Middle and Upper Palaeolithic, there is a lack in the methodological analysis of these contexts which, often, do not mention, or consider at all, these types of productions.

*I answer here to the group of your previous answers, underlined in yellow. Thank you for your precision considering the central question of the definition for « opportunistic debitage ». These answers allow me to address you some remarks.*

*First, if I follow you in your definition, you cannot define the opportunistic debitage as a « flaking method characterized by different technical behaviours (terms with which we mean the different ways of exploiting a knapping surface) such as unipolar, orthogonal, centripetal always responding to the same mental scheme ». This is the definition of a concept/ « mental scheme » (opportunistic debitage) including different methods of exploitation/operative schemas (unipolar, orthogonal...), following the works of the lithic technology pioneers in France and I think they well defined it in « Technology and terminology of knapped stones » (Inizan, Reduron-Ballinger, Roche, Tixier, 1999; <https://www.researchgate.net/publication/241685228> Technology and Terminology of Knapped Stone).*

Thank you for this remark. We never defined the opportunistic debitage solely as a “flaking method characterized by different technical behaviours (terms with which we mean the different ways of exploiting a knapping surface) such as unipolar, orthogonal, centripetal always responding to the same mental scheme”. This definition alone would be reductive and yes it corresponds to what a mental scheme is, or practically, to how a concept is realized through its technical gesture. Both in the introduction part and the conclusion one, the definition of the flaking method is wide and contextualized within the concept of method. Moreover, below is a more detailed answer to such methodological definition.

*Second, I don't think it is a good idea to define a concept of « opportunistic débitage » with your following proposal* « The opportunistic débitage is described as “a method oriented to raw materials’ massive exploitation without implying either a core’s, or any surface, preparation. The striking platforms and knapping surfaces are created as far as the flaking activity is carried on. [...] The opportunistic débitage include an infinite range of variants always coming from the same common operative scheme” (traduced by Arzarello, 2003). The term opportunism is defined as “a behaviour in which someone adapts his actions to each context in order to gain from them the most advantage ». *This proposal implies a definition by the negative – the absence of predetermination and structuration of the cores. The story of the lithic technology reminds us as useless and ineffective is a definition by the negative (see the example of the Levallois/non Levallois cores, the handaxe/without handaxe assemblages...). It includes and groups de facto various elements by default and it does not allow us to better perceive and understand the lithic technology. And it is exactly what happens in the next sentence of your definition: « The opportunistic débitage include an infinite range of variants ». This tentative of definition tends to group an infinite range of variants as you said, and it is hard then to prove, as you mentioned, that the whole « infinite range of variants [...] comes from the same common operative (mental?) scheme ». Using such a definition you just create a new (or continue to use, depending in your point of view) a simple dichotomy between prepared core technologies and non-prepared core technologies. The question is to know if you think it is relevant and useful for the lithic specialist community to introduce in a new term for non-prepared/weekly predetermined débitage. I think not but you are free to propose another point of view in your paper.*

*Third, I am also embarrassed by the choice of the term « opportunism » because the given definition (« a behaviour in which someone adapts his actions to each context in order to gain from them the most advantage ») can be applied to all known débitage methods, including predetermined methods including Levallois.*

*Finally, if you want to maintain your proposal of « opportunistic débitage », please consider our remarks inserting a deeper explained definition, try to define your concept by the positive and not by the negative. Add also references about such question of prepared vs non-prepared core technologies in relevant British literature for example.*

In recent years those who criticized so much the typological approach are transforming stone technology into a closed, dogmatic typology that no longer seeks to reconstruct a process but aims at its description. A description based on dogmas that, as in the old days, forget the variability of production and the fact that many factors can never be reconstructed. The variability of a production (sometimes random, we must not forget) must no longer be traced back to categorical definitions, moreover often new expressions of concepts already extensively treated. The observations made seem to go in this direction and to be the result of a too categorical school.

The definition "for negative" according to us, on the contrary, allows to consider the variability. Many examples of reduction sequences (cf. discoid) had been defined in a "positive" way and through a relatively closed series of characteristics which were then re-evaluated over time to arrive at a more general inclusion in a centripetal débitage (among others, Peresani eds., 2003).

The importance of defining this débitage is linked to the fact that it is necessary to reflect on the fact that in many articles the débitage not attributable to a defined method (discoid, Levallois, etc.) is completely forgotten. There are not a few cases in which the flakes are

included in a general category of "preparation/mise en forme" regardless of whether they actually belong to this stage of the reduction sequence.

Recognizing the existence of a débitage that allow ourselves to define it as "opportunist" (in the positive sense of the term) is an important step to achieve an interpretation of a behaviour and not a simple categorization of gestures. Furthermore, the definition of the term "opportunism" is quoted, translated, and adapted, both from the English and Italian dictionary and it was added to confirm the positive sense of the term.

Finally, the term opportunist cannot be applied in the same way to all methods of débitage because then there would be no "mise en forme" phase for many methods.

*A column with the total of lithic pieces contained in each SU could be added to show the part of the assemblage selected for the study. Other columns with the detail of the technological categories of pieces had to be added to better know the composition of the studied assemblages and their representativity (core, flake...).*

The table 1 has been implemented in the text with the SU identified in each site and with the cores and flakes studied in this work.

*OK. But you could go further and insert more relevant elements to better know the composition of the studied assemblages and their representativity (core, flake...) in the table 1. For example, first, delivering the number of pieces for each level of Cà Belvedere di Montepoggiolo, as you did for Riparo Tagliante and second, adding two columns with the total number of cores and flakes for each level (studied as you already mentioned + and non-studied). With the current table, the percentage of studied pieces appear low or very low regarding the whole assemblages (31 % for Pirro Nord = good representativity; 6 % for Cà Belvedere = low representativity; 3% for Ciota Ciara cave = low representativity; 0,3 % for Riparo Tagliante = very low representativity). If you insert the number of existed cores and flakes, the reader will be able to better estimate the representativeness of the studied pieces. Currently, the table 1 gives the impression of a low representativity of your sampling. So, I hope that the detailed numbers of cores and flakes will deliver a better ratio (studied cores vs non-studied cores, studied flakes vs non-studied flakes). Finally, you could also insert the details for the other categories, to give a broader view of the composition of the assemblages.*

Thank you for this suggestion. We understand the low representativity of our sample, however, as aforementioned, we selected four contexts that have already been studied and published. In their whole extension regarding the lithic assemblages. The aim of this work is not a validation of the technical behaviours applied in each site (which have already been discussed and verified in several papers: Peretto et al., 1998; Arzarello, 2003; Arzarello et al., 2015; 2016; Arnaud et al., 2016; Arzarello and Peretto, 2017; Daffara, 2017; Daffara et al., 2018; Cheheb et al., 2019) but rather a methodological re-evaluation and chronological contextualization of the opportunistic débitage which has been already identified in all the selected contexts.

*I invite you to give us in "Material and methods" section a definition on these scheme or/with references. Please precise if for you bipolar corresponds to bipolar-on-anvil (as some scholars use it) or not.*

By bipolar it is intended the bipolar-on-anvil technique. Regarding the definition of the core's exploitation/scheme, the following sentence in "Material and methods" has been added:

"Overall, the technical behaviours identified through the analysis of cores were divided into (I) unifacial and (II) multifacial, depending on the number of knapping surfaces exploited, (III) cores on flake and (IV) split fractures cores. The terms unipolar, centripetal, orthogonal, and bipolar, applied to cores' descriptions, indicate how one, or more, knapping surfaces were knapped."

*OK. But you must precise what you mean for « unipolar, centripetal, orthogonal, and bipolar », define it or insert a reference for each definition. Unipolar =, centripetal =, orthogonal =, bipolar =. The use and the definition of these words are not commonly shared, so, you have to define it. And the example of « bipolar » show us that you have to define it properly or give us a reference.*

Ok thank you for this suggestion. We understand that the definition of bipolar as given in the previous response could be misleading. For this reason, the proper references have been added within the text also concerning the meaning of unipolar, centripetal etc. and the following sentence has been rephrased this way:

"Overall, the technical behaviours identified through the analysis of cores were divided into (I) unifacial and (II) multifacial, depending on the number of knapping surfaces exploited, (III) cores on flake and (IV) split fractures cores. The terms unipolar, centripetal, orthogonal, and bipolar, applied to cores' descriptions, indicate how each knapping surface was knapped according to scar removals' direction (Inizan et al., 1995)".

*The following sentence has been rephrased.*

As a matter of fact, the ratio between unipolar removals and orthogonal + bipolar removals is closer when only centripetal reduction sequences are selected.

*OK. But it remains for me a little bit unclear.*

We would like to say that when the centripetal reduction sequences are addressed the unipolar removals are not so predominant if compared to the orthogonal and bipolar ones.

*You could explain here more precisely what you mean considering "morphological flaking-predisposition".*

The following sentence has been added in the text:

"With this term we want to indicate the presence of natural suitable angle and convexities as the guiding line not only for the blocks' selection but also during the knapping activity as well."

*Ok. This is part of the definition of what E. Boëda calls « affordance » if you want to cite it as reference.*

Thank you for this suggestion. We believe that this concept has been largely addressed by several works, even before the creation of the concept of "affordance" by E. Boëda. The

morphological subordination to natural convexities all along the knapping activity is a feature which has been recognized as common in many archaeological sites especially when “secondary” raw materials were exploited.

*Why do you use the singular? You show and demonstrate that you have different methods. You can group them in a “family”/a group of methods if you want but you cannot say different methods = a single method. I think you have to rephrase to deliver a more complete explanation.*

Thank you for the suggestion. The following sentence has been added in the text:

“On the other side, it underlines how the opportunistic debitage persists during middle Palaeolithic resulting in being as much as an efficient and independent method (if compared to Levallois and Discoid) replicated through several technical behaviours (i.e., unipolar, orthogonal, centripetal, bipolar) for the manufacturing of functional products.”

*Ok. I think you have to be more precise in the use of your terminology « unipolar, orthogonal, centripetal, bipolar » are not « several technical behaviours », they are schemes, operative knapping schemes. If you have any doubt in lithic technology terminology, it would be good to come back to a reference book like « Technology and terminology of knapped stones » (Inizan, Reduron-Ballinger, Roche, Tixier, 1999), easily and freely findable online (<https://www.researchgate.net/publication/241685228> Technology and Terminology of Knapped Stone).*

Thank you for this suggestion. The term “technical behaviours” has been replaced with “operative schemes” all along the text to avoid any misinterpretation of this terms. Moreover, an appropriate reference has been added within the section “Material and method”.

*The following sentence has been rephrased in this way:*

As stressed above, this strategy resulted, eventually, in semi-tournant behaviours involving, initially, natural edges then by progressively exploiting ones created during the production, recalling the laminar conception.

*Ok. But you could precise which « laminar conception » you are referred to (Aurignacian, Gravettian, etc.), and insert reference.*

Since in this sentence we are referring to the Mousterian levels of Riparo Tagliente (where the Levallois, Discoid and Laminar methods have been attested), the “laminar conception” term is referred to volume’s conception and exploitation which is proper of the laminar method. To avoid any misunderstanding the reference of the work concerning the technological analysis of Riparo Tagliente’s lithic assemblage has been implemented within the text.

*The following sentence has been rephrased in this way:*

The production focused on parallel removals which gradually involved the entire surface allowing a better control over the flakes' morpho-technical criteria, granted by an easier management of the convexities, and guiding arrises.

*OK. But it remains for me a little bit unclear.*

We are saying that a unipolar exploitation of a single surface with parallel removals will, most likely, involve the entire knapping surface (in its whole width) allowing to obtain a more convex extraction's surface and, at the same time, to better manage such convexity.