

F. Rivals:

In the introduction, in the list of problems you could also consider the issues related to the experience of the zooarchaeologist. For example for young researchers, the way the data are recorded may drift significantly from the beginning to the end of their PhD. That could be included in point 1 or 2.

I agree, that is another nice example. I edited the following sentence in point 2:

*The operational meaning behind certain variable states can also change or "drift" over time, which can happen when analyses are long or spread across multiple sessions, as is often the case for PhD students in training or for treating materials from ongoing excavations (e.g. unintentional shift in definition of taphonomic variable states such as "small spots" and "large spots" for manganese deposits, as analysts work on different collections with different degrees of preservation over multiple years).*

In the discussion, it would be interesting to add a short paragraph on future perspectives for TIPZOO. Maybe it would be interesting to integrate data for specific analyses on the bones, such as stable isotopes, tooth microwear, cementum analysis, geometric morphometrics among others, to have all these data linked in the same database. Just a suggestion.

I edited the following paragraph in the Discussion :

*New features will also be integrated, such as a better graphical interface for recording use-wear classes, additional reference datasets in TIPZOO-R and TIPZOO-QGIS (currently datasets are focused quite heavily on reindeer), modules that would allow the integration of inter-linked data sets (i.e. other data obtained on faunal remains such as stable isotopes, tooth microwear, cementum analysis, morphometrics, etc.), and help in the spatial analysis with QGIS (e.g. automated creation of cross-section plots, mapping of density patterns, processing of refit data, etc.).*

Th. Argant:

Titre : le point d'interrogation final suggère qu'il y a un doute sur l'intérêt de l'outil ! Ce n'est pas très vendeur et je comprend mal l'incertitude. S'il ne s'agit que de questionner la fiabilité (reliable) des analyses alors il faudrait tourner la phrase autrement ou insérer « ... » avant « and more reliable? » pour l'isoler.

Proposition alternative : «... An attempt to acquire data and to analyse them easier, faster, and more reliable ».

This has been quite a debate with myself in my head... I propose this title: *TIPZOO: a Touchscreen Interface for Palaeolithic Zooarchaeology. Towards making data entry and analysis easier, faster, and more reliable*

La critique qu'on pourrait dès lors faire à l'interface présentée est de conserver encore un certains nombres d'abréviations parfois absconses (juste deux exemples : « Pfus » pour Prox fused ; CEL pour Cervus elaphus. Il semble pourtant y avoir la place pour écrire les noms en entiers ou au moins le genre et l'initiale de l'espèce dans le second cas). Mais cela est plus une critique de l'ergonomie du projet plutôt que de l'article, j'en conviens.

That is very true. I'll try to remove as much abbreviations as possible in the next version of TIPZOO-FMP.

La partie discussion pourrait davantage être développée en précisant notamment depuis quand l'outil existe, quelles ont été les différentes étapes de son développement et les difficultés rencontrées, afin de servir pour l'avenir. Quelques données chiffrées auraient été les bienvenues sur le nombre de sites déjà enregistrés avec cet outil et éventuellement quelques publications dans lesquelles les résultats acquis auraient bénéficié de son apport. Quelques idées sur le temps gagné concrètement ? Autant d'éléments qui permettraient de renforcer l'image de l'outil.

TIPZOO was developed over several years, but without keeping track of the exact time spend developing the tool... No publication has yet used data entered in TIPZOO in its actual form. I started to compare "processing times" for a collection with or without TIPZOO, but such studies are extremely long, and I don't have any good quantitative info to share at the moment: I added a simple statement in the discussion saying *"In our experience, data entry and analysis are considerably faster with TIPZOO (even more so for the latter), but no quantitative estimation of time saved is yet available."* In short, to answer the reviewer, I'll be happy to provide this quantitative data, but I don't have it yet! I added the number of sites on which it is now used ( $n = 6$ ) and precised in the text the fact that *TIPZOO was developed over several years.*

Dans la fig. 1, l'outil TIPZOO-QGis, il manque le R à Project !

Thank you, it's corrected!

D. Vettese:

Introduction

1-> Some of the coding system presented by the author are complex. Moreover, the coding system in zooarchaeology can differ according to the language, change according to the researchers or research progress. Maybe, it could be useful to detail why selected these coding systems and not a less complex one.

I edited the last part of the following paragraph to make it more clear, but this paper isn't, in my opinion, appropriate to go into further details:

*For example, the cut mark coding system developed by Soulier and Costamagno (ibid.) involves more than 400 codes, and the NDE landmark system proposed by Morin et al. (ibid.) relies on more than 100 variables. The simple memorization and/or training required to efficiently employ one of these systems is already difficult, with the difficulty obviously being amplified by the use of several systems, and this necessarily renders data entry and analysis in simple spreadsheet programs quite arduous. This is in part ultimately why these useful coding systems are still not commonly used by zooarchaeologists, despite their obvious and inherent qualities **for reconstructing past butchering practices and skeletal-part representation.***

2 -> I would like to precise that software like excel, for example, allow having data validation to control data recording.

This is true, but it is quite complex to implement in Excel... and thus many do not use it. This is why I wrote: *Even if theoretically possible, the implementation of scripts that verify the validity of entered data in a spreadsheet is rare (e.g. if a variable should have been recorded but was not, if a combination of two variable values is theoretically impossible, or if a duplicate value was entered in the fragment ID number).*

Tipzoo general overview

It is a good presentation of the interlink between the software solutions proposed and well-illustrated, maybe it could be useful to specify the data transfer format between them.

Such technical details are provided in the manual.

Tipzoo key features

The different arguments listed explain clearly the features, which simplify the data recording. 3 -> Regarding the objective scale chose to record taphonomic surface modification, it could be interesting to specify in this paper the scale used, i.e. the expansion of the alteration on the bone remain surface (1/3, 2/3...).

This is specified for each variable in the online manual: *Bone surface modification variables and their possible states were therefore redefined and are described in detail in the manual in order to make individual observations as objective as possible.*

Such technicalities are in my opinion better presented in the manual rather than in the main text of the article (it would add 26 pages of variable descriptions in the article...).

7 -> I suggest grouping this paragraph with paragraph 9: Touchscreen recording of skeletal landmarks, because, in my opinion, they present a similar idea.

I disagree, as point 7 highlights the touchscreen capability in general, and point 9 the implementation of the Morin et al. landmarking system.

8 -> I am wondering if it will be possible to link the location of cutmarks with Q-GIS software?

That would be theoretically possible (at first I wanted to implement it directly), but for now I haven't found a good system to make it work seamlessly... maybe in the future!

12 -> I understand the importance of highlight the real-time verification, but I suggest grouping this point with -> 6: Dynamic display.

Well, these are two very different things so I prefer to keep them separate...

In the last part regarding the analysis features: 1 -> Regarding R environment, it could be useful to specify that it is possible to use it without Filemaker, based only on spreadsheet software. The R codes could simplify also the analyses and could be the first approach to use the software solutions presented in this paper. That is even more, because Filemaker is not

free software, and it is possible from previous database record on spreadsheet software that zooarchaeologists could standardize the analyses.

Yes, that is very true. I added the following sentence: *TIPZOO-R scripts can also be used without relying on TIPZOO-FMP for data entry, for example with a spreadsheet software, but only if the formatting rules of TIPZOO-FMP are followed (as described in the manual).*

I noticed in the R-table French version, provided with Tipzoo-R, numerous errors, probably due to the French accent from Filemaker to spreadsheet software.

That is probably due to R settings on the user side, and it is very difficult to control for it. I would suggest trying to switch to UTF-8. French accents are always very annoying for that...

Maybe, in the discussion, it could be interesting to specify the strength of the R environment by comparison with the package zooRch (Otárola-Castillo et al. 2016).

Well, there are many packages built in R, but none were designed to process TIPZOO-FMP data output... which is normal!

2 -> The Q-GIS exploitation could be extended to spatial analyses and maybe regarding the anthropic or carnivore mark distributions (e.g.: Parkinson et al. 2014, 2015; Stavrova et al. 2019)? I am wondering if in an application in the future, the refits data could be analysed with R for calculating easily the distance and with Q-GIS to contextual integration of the refit with spatial analyses (faunal assemblages and all archaeological remains). Because the author specify the unique ID-refit attribution, but it seems for now unused.

That is typically what I would love to directly integrate in TIPZOO-QGIS, but haven't had the time to properly debug and implement. I better explained it in the discussion: *New features will also be integrated, such as a better graphical interface for recording use-wear classes, additional reference datasets in TIPZOO-R and TIPZOO-QGIS (currently datasets are focused quite heavily on reindeer), modules that would allow the integration of inter-linked data sets (i.e. other data obtained on faunal remains such as stable isotopes, tooth microwear, cementum analysis, morphometrics, etc.), and help in the spatial analysis with QGIS (e.g. automated creation of cross-section plots, mapping of density patterns, processing of refit data, etc.).*

Discussion I would appreciate having more discussion about the choice of the criteria and publication chosen for the software solutions. Moreover, I appreciate to have a presentation of the additional criterion will be selected. Maybe, a discussion more detailed about the other tries to systematize the data record and analyses and their failure to highlight the strength and benefit of the solution proposed. I suggest adding the number of users and their experience in the zooarchaeological field (beginner or expert) to highlight the advantages of software solutions developed. This discussion is central in this article because it could be easy, to sum up, the manuscript at a software solutions presentation as advertising and could lose its impact.

I respectfully disagree with the reviewer, and I'll try to answer to the best that I can to their remarks: my goal with this article and with TIPZOO is not to place myself as a "judge" of

what methodology should or should not be used, which criteria should or should not be recorded. It is an extremely complex discussion, and you often find yourself walking on a fine line when you're dealing with data standardisation... It is with purpose that I mentioned previous attempts at standardizing data entry without criticizing them, as I do not wish to demonstrate that TIPZOO is "better". It is simply another way of handling data entry and analysis that I propose. I hope some will find it "better" and well-suited to their needs, but I am also sure it won't be adequate for others... and that's fine! I don't think we have to demonstrate that our research methodology/datasets/projects/software are always the "best".

In sum, this manuscript and the software solutions are a welcome contribution to the constant effort to standardize the record and analyse of zooarchaeological data. I guess the software solutions proposed will be used and allow to compare better dataset between Palaeolithic sites.

Thank you.