Comment on "Apprenticeship in early Neolithic societies: The transmission of technological knowledge at the flint mine of Casa Montero (Madrid, Spain), c, 5300-5200 cal BC.

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As we understand it, the crux of Castañeda's argument relies on using published ethnographic and experimental results of knapping skill variation and learning to develop a list of criteria, associated with both the selection of raw material blanks and the reduction of cores. These criteria are applied in a top down approach to the study of flint cores from Casa Montero allowing their categorisation into one of three skill levels, expert, advanced apprenticeships and novice. Based on these categories, Castañeda describes a dynamic picture of communal gathering at a raw material source, where novice adolescents and expert adult knappers are engaged in extensive social teaching of blade production.

We will comment on three aspects of this study 1) the methodology, 2) to what extent the data presented supports the interpretations and 3) issues surrounding possible future applications of similar studies to elucidate the presence of children in the early archaeological record.

In respect to the methodology, this study benefits from discussing the process of blank selection in a primary raw material source. Tying core blank selection into the level of expertise of the knapper is an interesting aspect of this study, as it moves beyond the focus on core reduction often seen in knapping skill studies (Stout, 2002; Knight, 2017) and places the acquisition of technical skill within a wider understanding of the technology. Conversely, by focusing solely on a single technological category –the cores–, we worry that Castañeda may be inadvertently tying one hand behind her back. A consideration of the full artefact assemblage –including all waste material and detached products which preserve evidence of knapping mistake rectification, alongside a detailed description of refit sequences–, may achieve a finer grained understanding of individual skill. The application of refit analyses has the added advantage of being able to trace the actions of an individual knapper throughout the core reduction process (e.g., Delagnes and Roche, 2005). This, it has been suggested, is vital in understanding differing knapping skill levels (Finlay, 1997). Castañeda goes to the point of noting that apprentice knappers can reuse expertly discarded lithic material. However interesting this observation might be, we are uncertain that this interpretation can be firmly sustained without a full technological analysis of the assemblage. Therefore, while it is clear that the lithic reading approach

employed in the study of the cores has provided an adequate overarching understanding of the technological characteristics associated with the differing skill levels, we also believe that this analysis would benefit from a more detailed quantification of technological attributes associated with varying skill levels. This would allow the application of comparative statistical analyses, which would inevitably strengthen the conclusions.

In regard to the interpretation of the results, we find invoking the presence of child activity in such definitive terms as "*verification of apprenticeship activities at Casa Montero demonstrates the presence of a younger segment of the population*", too daring. One must be mindful, that although lithic analysis often allows fine resolution reconstruction of an individual's knapping ability (Pelegrin, 1990; Roux et al., 1995; Sternke et al., 2009), especially when including detailed refit analyses (Fischer, 1990; Pigeot, 1990; Karlin et al, 1993; Schlanger, 1996; Delagnes and Roche, 2005), there are limits to the reconstructive accuracy. Identifying children in the archaeological record based purely on differentiation of knapping skill levels may be seen as overstepping what can be inferred by the lithic data alone. Novice knappers do not necessarily equate to children (Finlay, 1997). Having said this, however, one of the aspects of this study which we find interesting is indeed its focus on trying to identify children in the archaeological record through lithic analysis, and for this, it should be commended.

As researchers interested in early technologies, the prospect of identifying apprenticeship in the archaeological record is enticing to us. To date, discussions on knapping skill within the Oldowan and Acheulean seem to assume a priori that all lithic material during these time periods were produced by adults. However, as has been discussed elsewhere (Shea, 2006) and argued for in this study, children were probably a contributing factor to the development of archaeological lithic assemblages. The question that must be addressed, therefore, is how can we identify these agents? The early Palaeolithic record is often derived, time- averaged and highly fragmented in nature. In addition, although Castañeda argues convincingly that raw material quarries are an ideal location to identify novice knappers due to the abundance of raw material, the fact is that such quarries are largely unknown in the early Palaeolithic, and very few are subjected to excavation. By combining lithic analysis with experimental results of variable knapping skills, ethnographic observations of novice, apprentices and expert knappers, and pedagogical learning models to infer the presence of lower skilled individuals, and by placing this interpretation into a wider social context of prehistoric societies, this study demonstrates the potential for similar multi-faceted approaches to identifying the archaeological signature of apprenticeship.

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