Response to Reviewer 2 Comments

Point 1: One of the great virtues of the text is that it deals with a current and classic topic, but does so from a primarily psychological and informational perspective. This is not a problem, but I think it would be of great importance to show the position from which one is going to speak. That is, in the article there is no reference to great authors (Habermas, Weber, Luhmann, among others) linked to sociology who have contributed much to the subject of this paper. I understand that this is due, as I said, to the author's perspective. Well, according that I think these premises should be made very clear. At present it is intuited, but it is not clear.

Response 1: We have substantially reworded the introduction and parts of the second section to position the scope of the problem more explicitly to be addressed and our approach to it. The decision to not involve the broader sociological context was an intentional choice to constrain the article's scope, but we also imagined that connections to that higher-order literature would be reasonably inferred by the reader. Our core assertions are that the normalization (in the statistical sense) of a local information environment is ultimately the generative process of the sociocultural environment, and that these complex social systems can emerge very naturally from more rudimentary and parsimonious processes.

This, we believe, reconciles well with sociological ideas about social *systems* in the sense of Parsons or Luhmann, while allowing for a dynamic interaction between individual agency and collective. Our motivation, as anthropological archaeologists, was to circumvent the more problematic theoretical aspects of constructs such as Bourdieu's "habitus" or Giddens' "structuration" or the causal primacy of power relations intrinsic to critical theorists of the Frankfurt tradition. We have long felt that these do not necessarily generalize overly well to past societies and began this work (in part) to find a different approach to the underlying assumptions of social formation processes.

It's always difficult to decide where to "cut" the scope of a synthesis article like this one, especially when there is so much background literature to cover across so many disciplines. We chose not to dive too far into the broader sociological literature to try and keep the scope somewhat more manageable in an already long and theory-heavy manuscript.

Point 2: On the other hand, in several places (for example on page 6 line 304, or on page 18 line 909) it seems that the term normal or normality is used and it seems that its meaning is colloquial. This should be avoided as it is confusing. The concepts of social norm and "the normal", in their colloquial use, are not comparable. Indeed, the social norm can be conceived as prior information of a macro nature, "the normal", in its colloquial use, is closer to individual and group conceptions (micro and meso). I think this idea is well reflected in this article on Goffman: https://doi.org/10.1111/0735-2751.00143. Therefore, I suggest the authors to eliminate the terms referring to colloquial use.

Response 2: The intent was to link the concept of a social norm to our lived, intuitive experience of normality but the point is well-taken on how that might read as confusing the issue. These passages have been re-worded to try and make that distinction, and the intended analogy, clearer. We were not previously familiar with Goffman or the related work but have incorporated those discussions of "normality" into our text – they fit very well with our premise that social norms (generally) function to minimize surprisal. Thank you for the suggestion.

Regarding the macro/meso/micro distinctions between normality and norm, we are in part arguing that such compartmentalization is an analytical artifact rather than a distinction between social/cognitive process or phenomena – i.e., we are explicitly referring to a set of recursive processes of reinforcement, in which collective properties emerge (in the sense of Bedau's "weak emergence") from the interaction of individuals. Some text has been added to that effect.

Point 3: Third and finally, on page 8, line 380, it is stated that sociality promotes norms. This is interesting, but I think it could only be adjusted to human societies. As the authors also refer to biological phenomena (page 9), I humbly believe that they could adjust this to indicate that sociality, in socially undeveloped organisms, promotes regularities and in socially more complex organisms it promotes norms. This is better explained in this text: https://doi.org/10.1016/j.biosystems.2021.104552

Response 3: The statement is partly rhetorical, but if we consider "norms" as referring to information captured by a collective or population (as opposed to a specific set of rules, strategies, and beliefs attached to a particular sociocultural cohort) then it may only be a distinction of complexity and scale. Social norms, as they are currently understood, are most definitely unique to human sociality.

Human capacity for abstraction and language certainly promotes far greater complexity and specificity of such information, and the *curation* of that information (i.e., institutionalization) may be dependent on that capacity as well. It is conceivable, though, that if norms really are seen to be the collectively validated information derived from the social interactions of individuals, then norms (in that broader sense) may *not* be a solely human social phenomenon.

The status of gene-culture evolution and the appropriateness of the concept of a "social niche" (as described in Coca et al 2021) are still not settled questions, though. Respectfully, we do not concur with Coca et al's assessment of the literature or share their view that the idea of a social niche is sufficient explanation. Both Gintis and Mesoudi have expressed some reservations (even relatively recently) regarding how current ideas on social norms fit in with the concepts, and the idea of cultural behavior primarily as an "extra-somatic" means of adaptation has been controversial since anthropologist Leslie White in the 1950s and later Dawkins "memetic" evolution in the 70s.