

David Wengrow's brilliant *Origins of Monsters* is a rare example of an archaeological study that addresses an important "middle-level" causal question (in this case, Why the proliferation of chimerical images in the Bronze Age?) from the standpoint of a scientifically sophisticated model of cultural evolution. The transmission of a specific iconography is of course a *locus classicus* in both history of art and archaeology, but it has been generally addressed in purely formal terms, without much consideration of the cognitive processes required to process and recreate visual information, with brilliant exceptions. So Wengrow takes over where distinguished predecessors like Aby Warburg left off, with of course the benefit of a much more precise psychology.

Before discussing Wengrow's rich material and fascinating discussion, it may be of help to do some conceptual cleaningup. In particular, some confusion about the underlying assumptions of evolutionary models, and specifically of an epidemiological framework, may result either from Wengrow's own formulations, or more likely from the way we discuss his hypotheses in the course of these exchanges.

For example, Wengrow at various places mentions the "limits" of epidemiological approaches. He also suggests that change or variation are not expected in such models. But it would be a misunderstanding to consider that evolutionary psychology can only explain cultural universals. This fits with a common understanding of 'genes' providing immutable features of organisms and 'environments' their variation. But that is of course misleading (Sperber, 2005). Indeed, some of the best examples of evolutionary models explain how evolved systems are designed to modulate responses as a function of external information. For instance, some young women mature and reproduce early, in their teens, while others delay reproduction. One of the main factors involved is the presence of fathers in their households during early childhood, which triggers an unconscious estimate of the extent of paternal investment in their social environment (Ellis et al., 2003; Ellis, Figueredo, Brumbach, & Schlomer, 2009). In other words, the evolved reproductive system is designed to motivate different behaviors, contingent on specific environmental cues. Or, people in the same town adjust their level of cooperation and trustworthiness, depending on a largely unconscious perception of uncertainty in their environment (Nettle, 2010; Nettle, Colléony, & Cockerill, 2011). So a single life-history strategy process, as a result of natural selection, results in either a 'fast and furious' or a prudent and moderate approach to life's choices (Sheskin, Chevallier, Lambert, & Baumard, 2014). There are many more examples. In fact, a central lesson of evolutionary biology is that most instincts are conditional, not of the "do x if y" form, but rather "do x if y, given conditions c1, c2, ... cn".

Related to this is the fact that neither an epidemiology of culture, nor the broader evolutionary psychology framework it is a part of, can make use of such a vacuous distinction as 'nature' vs. 'nurture'. (Wengrow's use of these terms, page 82, is the only blemish on a magnificent book). The terms are simply meaningless. If young girls in a poor social class react to their jailed father's absence with earlier menarche and earlier interest in sex, is this 'nature' or 'nurture'? The terms have no place in a causal explanation of human behavior.

Enough jeremiads and quibbles. The central question of the book, and the hypotheses presented by Wengrow, are of much greater interest.

So, why this proliferation of composites? As Wengrow points out, the question is more complex than this terse verbal formulation may suggest. The first specific question is, Why this (roughly accurate) cultural transmission of visual representations constructed on the same principle, of combining parts of distinct animals in a single body? This Wengrow addresses in terms of intuitive biology, of the expectations we spontaneously develop as regards invariances in living species. Because of the intuitive connection between species identification and apparent Bauplan, composites constitute a salient violation of our domain-specific expectations for animals, which makes them more attention-

grabbing than standard representations.

Wengrow's explanation shows how a cognitive evolutionary framework, not only answers old questions (e.g., Why combine parts of several animals?), but also highlights features that in other frameworks, as in the classical study of iconography, are not explained because they are simply not considered. In this case, why do people use accurate representations of each body part that is used in a chimera? Also, why are these fantastical creations 'anatomically correct'? That is, when adding fins to a lion's body, why do the creators of chimeras place them in the 'right' place on the back? In the standard description of chimeras as fantastical, we could predict imaginary body parts as well as real ones, and inappropriate positioning of real ones. The odder, the better. By contrast, the cognitive interpretation suggests that the effect of incongruous, counter-intuitive chimeric combinations is stronger if all parts can be quickly identified and associated with their species of origin, as Wengrow points out.

This, by the way, is an example of what epidemiologists would call a cultural attractor, a combination of representations whose probability of occurrence at a generation g increases if either that particular combination, or other specific ones, are frequent at $g-1$ (Claidière, Scott-Phillips, & Sperber, 2014; Sperber & Hirschfeld, 2004). To simplify, the implicit notion that the lion's fin must be in the middle of its back, would be reinforced by 'incorrect' exemplars that place it on the lion's paws. This kind of hypothesis can be tested, either by studying the actual occurrences, if one is lucky enough to have such a corpus, or by experimenting with cultural transmission in the lab.

David Wengrow also addresses the question, Why this proliferation of composites there and then rather than before or elsewhere? but tells us, rather depressingly, that cultural epidemiology has "no way of explaining why these images become stable and widespread only with the onset of urban life and state formation" (page 88). I found the statement baffling, as the various hypotheses Wengrow puts forward in the following pages strike me as perfectly fine epidemiological conjectures. (Unless of course one assumes that epidemiology and more generally evolutionary psychology are only about cultural universals... but see above).

So, for instance, Wengrow points out that there may be a causal connection in the coincidence between the appearance of composites and the spread of mechanical reproduction (page 82). If I follow his reasoning, the link may be that the onset of urban life and the development of intensive trade between distinct polities resulted in cosmopolitan exoticizing, so to speak, of which Wengrow describes three distinct modes, transformative (exotic goods upset traditional conventions), integrative (different conventions are blended in an international style) and protective (imagery is construed as a barrier to foreign conventions), respectively (pp. 91ff).

My main request to David Wengrow would be to clarify the differences between these modes, to speculate on what specific psychological motivations and processes underpin each of them, and explain to what extent they are mutually exclusive. This is important, as these distinctions about models of transmission constitute the rudiments of a genuinely epidemiological model of this extraordinary cultural development. Obviously, the constraints of taphonomy mean that specific answers are bound to remain speculative. However, such speculation, if made psychologically precise, could be supported or challenged by relevant evidence from other cultural trends or from laboratory experiments. For instance, under what conditions would a 'protective' mode, where imagery is used as a threat against foreign ways and people, favor the creation of fantastic composites rather than simply terrifying images?

It is of course unfair to ask an author to provide a second book that would answer all the questions raised by the one being discussed. But that is what happens when you engage in great scholarship. Anthropologists and other scientists should be grateful to Wengrow for such a precious contribution

to the epidemiology of culture.

Bibliography

- Claidière, N., Scott-Phillips, T. C., & Sperber, D. (2014). How Darwinian is cultural evolution? *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 369(1642). doi: 10.1098/rstb.2013.0368
- Ellis, B. J., Bates, J. E., Dodge, K. A., Fergusson, D. M., Horwood, L. J., Pettit, G. S., & Woodward, L. (2003). Does father absence place daughters at special risk for early sexual activity and teenage pregnancy? *Child Development*, 74(3), 801-821.
- Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature*, 20(2), 204-268. doi: 10.1007/s12110-009-9063-7
- Nettle, D. (2010). Dying young and living fast: Variation in life history across English neighborhoods. *Behavioral Ecology*, 21(2), 387-395.
- Nettle, D., Colléony, A., & Cockerill, M. (2011). Variation in cooperative behaviour within a single city. *PLoS One*, 6(10).
- Sheskin, M., Chevallier, C., Lambert, S., & Baumard, N. (2014). Life-history theory explains childhood moral development. *Trends in Cognitive Sciences*, 18(12), 613-615. doi: <http://dx.doi.org/10.1016/j.tics.2014.08.004>
- Sperber, D. (2005). Modularity and relevance: How can a massively modular mind be flexible and context-sensitive? In S. L. Peter Carruthers (Ed.), *The Innate Mind: Structure and Content*.
- Sperber, D., & Hirschfeld, L. A. (2004). The cognitive foundations of cultural stability and diversity. *Trends in Cognitive Sciences*, 8(1), 40-46.