Review of: "Necessity Was the Mother of Human Cultural Invention"

Alexander Shkurko

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The article is devoted to the problem of human evolution and human uniqueness. This is a Big Question, and there is a problem with Big Questions in contemporary science. On one hand, they are at the core of our worldviews and what makes sense of science after all. Scientists have to pose such questions and try to answer them, at least for themselves – and the article looks like such an attempt. But on the other hand, paradoxically, the organization of contemporary science makes it almost impossible to publish an article that directly addresses such Big Questions. Taking into account that various aspects of the problem of human evolution and uniqueness have been studied for centuries, across dozens of scientific disciplines and research fields, any general answer to the general question will face objective challenges of proving to be scientifically rigorous, convincing, and novel. This is not simply that such an attempt (including the present article) misses some evidence, particular theoretical model, or argument. It is a more general problem of how to deal with the whole amount of relevant findings, theories, and discussions in a wide range of sciences, from genetics to cultural studies, from databases in neurosciences accumulating evidence on brain-to-behavior connections to historical databases (e.g., Seshat) on the history of cultural evolution. I think this is the core difficulty of your study.

Now a few more specific comments, inevitably fragmentary and biased by my interests and expertise. I will focus on only three key issues: structure, conceptualization, and theory.

1. The organization of the article seems problematic. The introductory section doesn't provide the necessary contextual information for the study and doesn't clearly explain its goal (what does it mean – 'to consider the hypothesis'?), includes some arbitrary passages and ideas (e.g., on 'inevitable' tensions between instinctual and learned behavior), and abruptly switches to a section with some 'examples' – which are, after all, not evidence supporting your claim. There is no clear logic in the organization of the argument. The conventional logic would look like this: Set the problem – Define key terms – Review previous theories and findings and explain why they are bad – Provide your solution and try to convince the reader by referring to theoretical arguments and evidence, pointing special attention to alternative explanations and counterarguments. Why not organize the text in this way?

Together with the lack of elaboration in key aspects of the article, such as conceptualization and proposing a theoretical model, there are many unnecessary fragments and descriptions. For example, what is the value of providing 'a history of pornography' for the argument?

2. The key concepts are not well defined and require elaboration. Starting from 'instincts', 'suppression', or 'behavior' to 'culture' or 'decision'. This is not a formal issue, it is really not clear what they are and what they are not in your theoretical

account. All the key terms you use may have different meanings and operational definitions, important for the problem.

Particularly, there are many questions regarding the basic distinctions between instinctual and learned behavior. To begin with, what is the rationale for distinguishing these two types of behavior? What is the difference between reaction and behavior? If tropism is instinctual behavior, then humans must also have 'residual' behavior of this type – but is it the case? Are such types of ‘instinctual’ behavior as child-rearing and mother-to-child attachment of the same nature as tropism in protozoa – as can be concluded from your definition? Are there really good reasons to even them? If instincts are driven by genetically specified circuits (p. 2), cannot we say the same about ‘learned’ behavior – as they also require genetically determined hardware, e.g., responsible for memory? If ‘learned’ behavior is about trial and error, then how about behavior in novel situations, which is the source of the accumulated learning experience? Or behavior based on rational decision-making and forecasting outcomes?

The current use of the terms is very confusing and ambiguous. Genes don’t guide behavior directly (they just can’t), and any behavior requires some *cognitive* processes related to the perception of the environment and the coordination of body responses. Even the simplest forms of human behavior, including what can be classified as 'instinctual', require some previous learning, at least to coordinate motor reactions for walking or smiling or whatever else. As a social scientist studying how social structures and cultures are related to biological aspects of human evolution, I can say there are many research lines in this area, and they generally don't operate with the 'instincts' concept. I cannot even remember when I last saw it in publications as a key concept. When the problem is to compare automatic and more controlled forms of behavior, the most common framework now is the dual process (or dual systems) approach, which you don't mention at all. Probably, it would be useful for your analysis to familiarize yourself with the theories and evidence within this framework as they show the complexity of interactions between what you'd call instinctual and learned behavior (and beyond them).

3. The key theoretical claim is that humans switch to cultural evolution and become a uniquely intellectual species due to the suppression of instincts. Setting aside that the general idea is rather trivial, and the fact that the nature and mechanisms of this 'suppression' are not explained, let me point to what seems to be a logical gap in your general argument. If I correctly understand, you argue that cultural evolution (whatever that means) and uniquely human abilities emerge as a result of ‘suppressing’ instinctual behavioral patterns (again, whatever that means). Assuming there is indeed a specific evolutionary mechanism for this, how can it give rise to new and more complex types of behavior?

if you claim that this suppression of instinctual behavior (isn’t it cognitive control?) is itself an evolutionary outcome (as you point out on p.10), you have to explain, first of all, its selection mechanisms– a problem which seems to be ignored in the text. What are the selection forces leading to the emergence of this suppression mechanism? Second, you have to explain how can it result in the emergence of new, complex forms of behaviors. If 'instinctual' behavior is suppressed, it doesn't automatically lead to new complex behavior. If you simply lose your schema for action, you have nothing in return. There is just emptiness and an inability to act. Suppressing the instinctual mechanism is not enough. On the contrary, suppressing instinctual behavior is possible and evolutionary promising when you already have an alternative way to organize behavior and perform tasks (e.g. based on generalizations and reasoning, predicting environmental changes, or

acquiring knowledge from co-species). Thus, suppressing instincts hardly can be the sole explanation for human uniqueness and evolution.

Further, if you claim that the suppression of instincts is the basis of human uniqueness and cultural evolution, you have to explain how and why it is more important than other features, which are often proposed to be crucial for the emergence of culture and complex social organizations: general intelligence and abstract reasoning, language and symbolic processing, or, particularly, social intelligence and human 'ultra-sociality' (see M. Tomasello)? You have to explain why they are less significant or subordinate to the ‘suppression’ mechanism. Besides, if learning is common in animals – what is so special about this mechanism in humans?

There are many other comments, that could be formulated regarding particular claims within the text, but I think these more general notes may help in clarifying and elaborating your argument.