



Comment

Language and innovation
Comment on “Replication and emergence in cultural transmission”
by Monica Tamariz

Daniel Dor

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Tamariz [8] makes an important suggestion about the nature of human cultural transmission. In her model, the part of culture that consists of observable behaviors is inherited with high fidelity, or *replicated*: “behavioral patterns are copied, largely independently of their normal, effective or conventional function, by naïve learners”. The part of culture that is mental (beliefs, values and attitudes) *emerges* in the minds of individuals as they “learn the associations between actions and their contexts and outcomes”. The replication of observable behaviors is what ensures the cumulative stability of human culture. The emergent nature of mental culture allows for much more variability between the cultural worldviews of different individuals. At the center of the model, lies the suggestion that the replication of observable behaviors and the emergence of mental contents are inherently ordered: naïve learners copy behaviors before they begin to learn their associations: the associations emerge as individuals gain experience at the behavioral level.

I think this is an important insight. It grounds itself in the one thing that seems to lie beyond controversy: observable behavior (communicative or otherwise) is indeed foundational. Without it, there is nothing to be transmitted, regardless of the level of fidelity. I also appreciate the way the model rationalizes the relationships between the various theories of cultural transmission and inheritance that it builds on. I would, however, like to highlight two issues that seem to challenge the model from two different directions.

(1) The suggestion that mental culture emerges in the minds of individuals based on their experiences with behavioral culture implies that our ideas, values and attitudes are eventually private and variable. As Richerson and Boyd [7] put it, “If we could look inside people’s heads, we might find out that different individuals have different mental representations of a bowline, even when they tie it exactly the same way” (2005: 63–64). On the one hand, I believe this is just right. As I show in Dor [2], for example, native speakers may use the same lexical items in a very similar way, based on the assumption that they also understand their meanings in the same way – and yet represent the meanings very differently. This is one major reason why we often find linguistic communication such a frustrating business.

But on the other hand, what makes language so special is exactly the fact that it allows for the public communication, through what I call *the instruction of imagination*, of unobservable mental representations – ideas and values, judgements and attitudes, stories from the past and plans for the future, visions of gods and fairies and much more. We talk about our mental representations, mutually-identify them, argue about what they mean. And while we still

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E-mail address: danieldd@tauex.tau.ac.il.

represent our mental cultures somewhat differently inside our heads, many of their components actually replicate in the public domain just like behavioral patterns. Just like them, they meet Tamariz' criteria for replication: longevity, fecundity, similarity, causation and information transfer.

In this sense, I think that Tamariz' model captures something very deep about human cultural evolution *before* language appeared. In all certainty, the first stage of our evolution, from about 2 million years ago until about 400 thousand years ago, was mediated by mimetic communication [1,9]. Mimesis is an extremely efficient tool for the communication of observable behavioral culture (both in terms of the demonstration of complex behavioral patterns and in terms of the construction of collective identity in ritual, music and dance). But mimesis is also severely limited in its ability to communicate unobservable meanings. In mimetic culture, then, behavioral patterns could already be efficiently replicated. Mental culture, on the other hand, could only emerge inside individuals' heads, and it could only emerge there on the basis of what was replicated on the behavioral level.

When language entered the picture, however, all this changed. Thanks to language, mental culture gradually acquired autonomy from behavioral culture [3]. It became cumulative on its own, and it came to be entangled in a co-evolutionary spiral with behavioral culture. Today, when we teach naïve learners how to do something with their hands, we use language from the very beginning to express unobservable meanings that help them acquire their behavioral skills: we say things about the function of what they are learning to do; we teach them its significance and value; and much more. Tamariz does mention the fact that language “plays a unique catalyzing role in the emergence of mental traits”, and she acknowledges that her model doesn't yet “explain in detail language-mediated transmission”. I believe that such detailed explanation will also entail some changes in the model itself.

(2) Most of the literature on cultural evolution concentrates more on the fact that it is conservatively cumulative than on the fact that its entire dynamic is driven by innovation. But the story of cultural evolution is not just that we manage, at every given moment, to preserve what we already have (and improve on it). The story is also (and I would say mainly) that we continuously move forward from one game-changing innovation to the next. Tamariz acknowledges this in saying that innovation “is also an essential ingredient of a full explanation of cultural evolution”, but in line with much of the discourse, she concentrates on the type of innovation that may be characterized as a “cultural mutation”, a result of low-fidelity copying: all those instances where we improve on what we learn. From my perspective, however, the major story lies somewhere else, in the series of revolutionary innovations – from the control of fire, the manufacture of stone tool and mimetic communication, through language, art and writing to the cellular phone and the Internet – all of which are obviously causally related to their precursors, but none of which can be characterized (let alone explained) as a mere improvement on something that was already there.

Such revolutionary innovations emerge and stabilize in complex processes of collective *exploration* (very often made imperative by new problems), in which groups of individuals go beyond everything they have already accumulated (because it cannot deal with the new problems) and search the space of possible behaviors, ideas and values for solutions that are as new as the problems [6,4]. They are based on individual cognitive plasticity, but much more than that, on *collective plasticity*. Then, when the solutions are found, they require an entire range of major re-configurations in everything around them: from society and its structures, through behavioral and mental culture, through individual behaviors and capacities, beliefs and values, and sometimes all the way – through genetic accommodation – to their genes.

The fact that human culture allows for such collective explorations, and adjusts so flexibly to new solutions, implies that conservative accumulation is just one side of the coin of human culture: on the other side of coin, human culture is extremely plastic, imaginative and creative [5]. Without this side of the coin, there would be nothing to transmit on the other side. So, there seem to be two general explanatory venues one might take. According to the first, each side of the coin is governed by a different evolutionary logic. Something very special happens when game-changing innovations emerge. Then, when they stabilize and create a new cultural lineage, they are conserved and further developed according to the logic of Tamariz' model. In this case, all is well. If, however, it turns out that the two sides of the coin are governed by the same logic, Tamariz' model may turn out to be too conservative: as it is at the moment, it doesn't seem to allow for those moments of revolutionary changes that produced the cultural lineages that we then had to preserve.

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