

# “Shakespeare Got it Wrong: Why Biology and Culture are More Intimate than We Thought”

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In this paper, I will want to argue that the widening causal window between genotype and phenotype allows us to contemplate a different pattern of interaction between culture and biology in man than has guided the thinking of previous generations. Neither the Newtonian-inspired nativism of the Enlightenment, nor the stratigraphic approach of classical anthropology were able to capture the intricate interplay between cultural and biological variables in the making of man, to a large degree because they both adopted the basic division between the innate and the learned, or, in Shakespeare’s borrowed term, ‘Nature and Nurture’. The false dichotomy continues to plague much of modern evolutionary psychology.

Nevertheless, it is becoming increasingly clear that this beaten horse can be safely laid to rest. To begin with, developments in evolutionary studies are teaching us that not all Darwinian adaptations are based on genetic variation, since other, no less important, inheritance systems besides the genetic one play meaningful roles in evolution. Secondly, developmental biology is re-educating us with respect to the interplay between genetic substrates and environmental cues – whether molecular, cellular, systemic, or out-of-the-body. What we are learning is that the impressive amounts of plasticity at all levels exhibited by organisms (from the molecular to the behavioral) may allow for processes in which phenotype actually precedes genotype, reversing our usual Neo-Darwinian perspective. This is not to say that good-old- fashioned genetic selection is not a major driving force in evolution, but rather that parallel mechanisms may broaden the scope and strengthen the power of evolution to bring about novelty over time.

Following a short presentation of the Enlightenment view of human nature and the one espoused by 19<sup>th</sup> and early 20<sup>th</sup> century classical anthropology, I will offer a definition of culture which facilitates the understanding of culture-biology interactions in man. Culture will be presented, following Geertz, as a set of control mechanisms – ‘programs’ – for governing behavior, rather than a complex of concrete behavior patterns. The re-formulation of culture in this way has the effect of training our focus not on universals of human behavior (and

hence, human nature), but rather on the mechanisms by which the breadth and non-determinativeness of man's capabilities are canalized to his actual achievements and actions. This line of thought will lead to the conclusion that Robinson Crusoe is but a fiction.

Next, I will turn to a deconstruction of the Nature/Nurture divide. Morphological examples from nature (Himalayan rabbits, Aguti mice, Linaria flowers), will be followed by classical examples from human experience (language acquisition, musical perception, phobias). A fleetingly brief consideration of the neural system, the immune system and of moral capabilities will be used to bring home the point that to ask today whether nature or nurture is determinative of a given trait is like asking: 'do drums or drummers produce percussion sounds?'

The interesting question remains: Which biological mechanisms can explain the phenomena mentioned above, and whether there is an evolutionary model than can incorporate them. Clearly, the shift from the neo-Darwinian focus on heredity to the current development-driven, and increasing focus on a theory of form in evolution (including evolvability, epigenetics, plasticity, self-organization) will be helpful in explaining the morphological and physiological examples (the differences between the Linaria and Aguti variants, for example, are due to epigenetic imprints, *not* to different DNA).

More specifically, however, and with reference to behavior, I will present the modern incarnation of the Baldwin Effect (1896), Waddington's 'genetic assimilation', as a good candidate for explaining much of what is interesting in the evolution of complex behavior and cognition in humans. Waddington's experiments on flies showed how Darwinian mechanisms can produce apparently Lamarckian evolution. When faced with an environmental challenge, induced developmental changes unmask already existing genetic variation, which can then be captured by natural selection. Today we know that short term evolution needn't depend on mutation, but can lean instead on epigenetic change. The interesting thing from the point of view of evolution is that some induced epigenetic states are inherited. Heritable epigenetic variants can do a 'holding job' until the genes catch up. So epigenetic inheritance augments the probability of genetic assimilation because it maintains a new developmental pathway until it can be established more permanently by genes.

But how does this relate to the evolution of mankind?

While every one agrees that the capacity to learn has evolved genetically, the mechanism of assimilation renders learning an *agent* of evolutionary change, rather than merely its product.

The point is that one cannot separate development and heredity (think, for example, of learning and transmitting a new song or word or idea or behavior (development and transmission go together): For this reason, one cannot separate development from evolution – Dawkins' division between 'Replicators' and 'Vehicles' breaks down. The changes induced during development, mainly through learning, play a big role in behavioral and cultural evolution.

This final consideration will lead to the notion that Culture is the bridge between man's intrinsic capacities and what he ultimately becomes. To become human means, above all else, to become an individual – and this we do by means of the cultures in which we live and develop. Man and Woman, then, should not and cannot be defined by their innate traits and abilities (Enlightenment, evolutionary psychology), nor simply by their behavior alone (Behaviorism and its current offshoots). Rather, the manner in which generic potentials are transformed into specific manifestations presents a much richer canvass for the study of humankind and its nature, while at the same time eschewing the unnecessarily simplistic, and patently wrong and harmful, traditions of biological determinism.