

Presentation at the workshop „Epigenetic Landscapes and Social Configurations“, Interacting Minds Center, Aarhus, Denmark, 9.1. 2014

Cultural evolution and the propagation of the most flexible

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Abstract

As it is more and more recognized that human evolution is based on multiple evolutionary principles that go beyond explanations by standard evolutionary theory, the major subject of contemporary anthropology becomes to expose the various factors and mechanisms of this development. One such approach of unifying different types of selective forces, feedback loops and outcomes is presented in the integral model of “cultural capacities”. It enables to derive types of cultural behaviour and formalize stages of cultural capacities from archaeological findings by taking into account the interdependencies of instrumental behaviour, technological artefacts, cognitive properties, social dependencies and biological features. The model shows that the “take-off” of human cultural evolution lies in the flexibility of bodily operations and cooperative actions based on the transmission of semantic information. As survival becomes increasingly dependent on the organisation of cooperative and social actions, sociality itself becomes a second nature with special selective forces that are put forth by certain adaptive demands. The new evolutionary role of sociality is evident in the genetic incorporation of adaptive modules that are related to the social environment, as for example in joint intention in early childhood, ontogenetic development or emotional communication by universal facial expressions. It can be shown that human cultural evolution is not based on the selection of the fittest phenotype in reference to natural forces, but on the propagation of organisms that are the most flexible regarding the capability of learning and performing new bodily operations. Within this model of human evolution sociality establishes a second causal arrow of selection that poses “a problem and a prism” for the paradigm of epigenetics. While social learning and newly arising problems in niche construction are linked to epigenetic mechanisms in neurons, which therefore play an important role in cultural evolution, the frame-problem and the slowness of human evolution forbid a strong epigenetic argument. On the other hand it can be argued that important DNA changes during human evolution are not to be located on the level of expressions of the outside form of the phenotype, but on the level of epigenetic mechanisms. For example encephalization might be understood as an effect of a fastened epigenetic interplay between neural stimulation and the fixation of new connections, making not the emerging specialized brain areas, but the underlying connecting and imprinting mechanisms a materialization of a cognitive module. At the same time epigenetic mechanisms can be conceived as the contact surface of a top-down-influence: if survival is dependent on cultural cooperation, semantically mediated stressors can theoretically have an impact on gene expression and transmission of properties, thus exemplifying an interdependency of the dimensions of sociality, biology and individuality.