Abstract

Interaction of genes and culture is crucial for human evolution. Human ethnic groups and subcultures frequently function as discrete units, and people clearly distinguish between in-group and out-group individuals on a cultural basis. This thesis aims to model the formation of distinct cultural clusters, cultural equivalents of distinct species.

Historical development of theories of blending inheritance led to the formation of biometric parallels to Mendelism. Galton-Pearson model of nonparticulate inheritance with constant offspring variance, the most influential model of continuous inheritance ever formulated, was based on measurements of genetically transmitted traits. Ronald Fisher later demonstrated, that this type of inheritance directly stems from polygenic traits with additive genetic variance. Dan Sperber's metaphor of culture space allows integrating any continuous models of position inheritance into computer simulations of the evolution of culture. Most studies today, however, employ particulate models of cultural inheritance. The exceptional works of Cavalli-Sforza and Feldman pioneer the continuous models of cultural inheritance applying Galton-Pearson model to culture. Galton-Pearson inheritance is, unfortunately, not a very good model of cultural transmission. Parental Variability-Dependent inheritance (PVDI), where offspring variance is proportional to parental variance, approximates the heuristic social learning better. Computer simulations of adaptation in unidimensional culture space demonstrate that PVDI leads to punctuated evolution even without complex spatiotemporal dynamics of various subpopulations.

In multidimensional culture space with PVDI, where natural selection is replaced by relative preferences between agents governed by homophily i.e. preference for interaction with self-similar individuals, clusters with small within-group and large between-group variance form naturally. Multidimensional generalization of Galton-Pearson inheritance does not lead to the formation of distinct clusters. If cultural transmission resembles PVDI, cultural divergence can effectively work as a factor allowing for subsequent sympatric speciation for example in hominins, songbirds, and cetaceans. Sympatric speciation might, however, happen more often than usually thought, because assortative mating in all animals is frequent and the gene flow between subpopulations with substantially overlapping ranges can be limited by disruptive and/or sexual selection.