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### Influence of natural selection on the evolution of epistasis and evolvability

#### *Abstract:*

The main effect of natural selection is to influence the mean of phenotypic characters in populations. However, in realistic genetic architectures, gene effects depend on the genetic background due to numerous epistatic interactions. The evolution of epistasis remains poorly understood, in spite of major empirical and theoretical interest: changes in genetic interactions may influence the effect of new mutations, and thus condition long-term evolution of species. In order to understand better the evolution of complex genetic architectures, we developed a model in which epistatic interactions are directional and multiplicative (the multilinear model, Hansen and Wagner 2001). We ran individual-based simulations in which populations were submitted to various selection pressures, including directional, stabilizing, and fluctuating. Our results confirm that adaptive evolution of genetic architectures is possible: for instance, stabilizing selection promotes genotypes that minimize the average effect of new mutations, i.e. canalization. On the opposite, a deterministic evolution towards decanalized genotypes seems unlikely. These considerations hinder an adaptationist interpretation of the differences in evolvability among populations and species.