Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Predicting genetic interactions between beneficial mutations from Fisher's geometric model SUNGMIN HWANG, University of Cologne, Cologne, Germany, SIJMEN SCHOUSTRA, Laboratory of Genetics, Wageningen University, Wageningen, The Netherlands, JOACHIM KRUG, University of Cologne, Cologne, Germany, ARJAN DE VISSER, Laboratory of Genetics, Wageningen University, Wageningen, The Netherlands — Biological evolution is modeled as a hill-climbing process fueled by genetic mutations in the fitness landscape. The complexity of this process is highly dependent on genetic interactions among different loci by shaping various valleys and peaks in the fitness landscape. The topology of fitness landscapes formed by genetic interaction is generally complicated as there can be a large number of different phenotypic traits of an organism that contribute to its fitness. *Fisher's geometric model* (FGM) is a simple mathematical model that provides a geometric interpretation of the interplay between genotypic and phenotypic layers, on top of which the fitness landscape is constructed. In the framework of FGM, we discuss the statistical properties of the fitness effects when multiple mutations are combined. Experimental data for the filamentous fungus *Aspergillus nidulans* are analyzed with these results to extract the biological information such as the complexities and well-adaptiveness of the organism. Finally, we discuss the geometrical interpretation of the diminishing returns pattern observed in the data in the language of FGM.
Reference: Proceedings of the Royal Society B 283:20161376 (2016)

Sungmin Hwang
University of Cologne, Cologne, Germany

Date submitted: 11 Nov 2016 Electronic form version 1.4