

Approaching Evolvability

Nayely Velez-Cruz and Manfred Laubichler

August 4, 2016

Abstract

Evolvability is broadly defined as the capacity to evolve. While there have been numerous attempts to reduce the ambiguity inherent in this definition, these attempts are constrained to the context of the biological subdisciplines in which they were developed. This project aims to develop a potential conceptual and mathematical framework for a theory of evolvability that makes the conceptual clarifications necessary for understanding this term without restricting its scope. In this talk, I summarize our work in taking initial steps towards this objective by presenting a review of the various interpretations of the capacity to evolve. First, I discuss how these interpretations were constructed and why a consensus has not yet been reached as to which types of refinements are needed for an understanding of evolvability. Next, I discuss how we may make such conceptual refinements by emphasizing the roles of development, co-evolution and niche construction in determining a systems evolutionary potentiality. Finally, I introduce wavelet analysis as a potential mathematical and computational modeling technique for representing a refined conceptualization of evolvability.

¹I would also like to extend my gratitude to Eric Libby for his mentorship in the first half of this program.