

On the Relationship Between Environmental and Morphological Complexity in Evolved Robots

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Abstract

The principles of embodied cognition dictate that intelligent behavior must arise out of the coupled dynamics of an agent's brain, body, and environment. While the relationship between controllers and morphologies (brains and bodies) has been investigated, little is known about the interplay between morphological complexity and the complexity of a given task environment. It is hypothesized that the morphological complexity of a robot should increase commensurately with the complexity of its task environment. In the current work this hypothesis is tested by evolving robot morphologies in a simple environment and in more complex environments. More complex robots tend to evolve in the more complex environments lending support to this hypothesis. This suggests that gradually increasing the complexity of task environments may provide a principled approach to evolving more complex robots.