

Phrase Evolution

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Purpose

“Phrase Evolution” is an educational software designed to simulate a basic illustration of evolutionary search based on random typing on a typewriter, which was provided by Richard Dawkins in *The Blind Watchmaker* (Dawkins, 1996).

Overview

The interface is adorned by the portraits of Darwin and Shakespeare. The presence of the former should be self-explanatory. The presence of the latter refers to the narrative of Dawkins where a phrase from Hamlet was used. This phrase is the default phrase also here.

The user is presented with an interface that permits:

- Input (or change of a default) sequence of upper-case characters.
- Changing the population size used.
- Changing the mutation rate per character.
- Running the evolutionary simulation.

When the simulation is run, a random initial candidate phrase is made, which is the starting point from which we will evolve. A population of the size indicated by the uppermost slider is then filled with variants of this starting point, using the mutation rate indicated by the lowermost slider.

In the simple case we illustrate here, we know an optimal state that we seek to reach. As pointed out by Dawkins, this is tantamount to *teleology* – i.e. the erroneous assumption that an outcome of evolution has been a target in the process of natural selection leading there. However, in this simple illustration we may think of this target as representing a fixed environment.

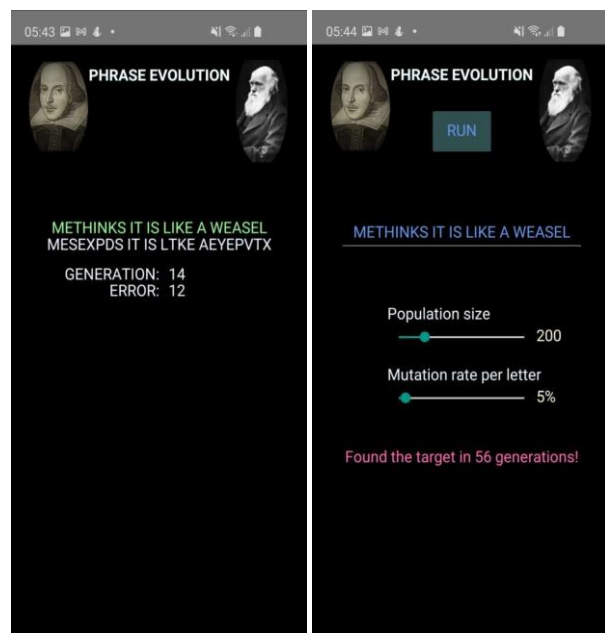
The candidates in the population are compared to the target phrase, computing a distance measure. The candidate that minimizes this distance is then selected as the parent of the entire next generation, following the scheme above.

This procedure is repeated, every time displaying the currently best phrase on the screen, along with generation number and distance measure, until the distance is zero. That is, until the phrase is found.

When the phrase is found, a final summary screen is shown and the user may alter parameters for a new run, as described above.

Reference

Dawkins, R. (1996). *The Blind Watchmaker*. W. W. Norton and Company, Inc.



Screen during (left) and after (right) a run.