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# Comparison of Evolving Against Peers and Fixed Opponents Using Corewars

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## Abstract

Two methods of evolving Corewars programs are compared, one against a fixed set of opponents, another against the other programs in the generation. The fixed opponent system improves faster initially but is limited overall. The second is slower to evolve but achieves a better final result.

## EVOLVING COREWARS WARRIORS

Corewars[1] is a game where two programs written in a language called redcode, try to destroy each other. The programs fight against each other in a simulator. A program wins when all of its opponent's processes have terminated with invalid instructions.

A group of warriors evolved against fixed opponents (Group F) was compared with a similar group evolving against their peers (Group P). An unseen control set of 10 fixed opponents (Group C), was used as a benchmark to compare the other two groups giving a common fitness indicator for both sets. The warriors in the control group had competed in previous international Corewars tournaments in 1989 and 1990.

The values shown on the graph in Figure 1 are the average fitness level of Group P and Group F, over 300 generations, when tested against Group C. The initial performance of Group F can be explained by the more stable environment they are in. Later on though, Group F reach a stage where they are getting reasonable results most of the time against their fixed opponents. Individuals in Group P do not stay ahead of one another for long as the best strategies propagate through the rest of the population over the next few generations and so any successful individual must find a better strategy to enable them to win. The strategies evolved by both groups are transferable as neither group has any knowledge of the control group.

Figure 1: Fitness levels of Group P and Group F

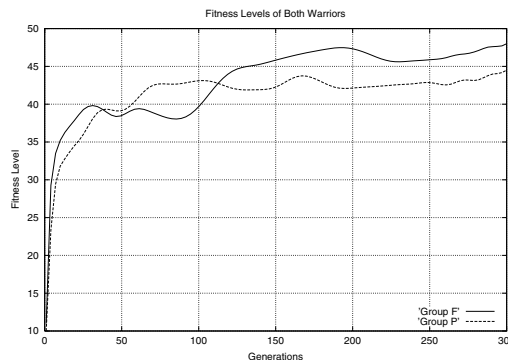


Table 1: League table of Group C and the best individual in Group P and Group F at generation 350

Position	Warrior	Fitness
1..4	Control Opponent 6,4,9,8	91 .. 122
5	<b>Best Individual of Group P after 350 Generations</b>	71
6	Control Opponent 10	62
7	<b>Best Individual of Group F after 350 Generations</b>	61
8..12	Control Opponent 3,5,2,1,7	41 .. 57

## Acknowledgements

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## References

- [1] Dewdney A.K., 1990, The Magic Machine: A handbook of Computer Sorcery. ISBN 0-7167-2125-2.