INFLUENCE OF THE CULTURAL LEVEL IN THE EXTINCTION OF HOMO NEANDERTHALENSIS IN ITS COMPETITION WITH HOMO SAPIENS: ANALYSIS THROUGH THE GAME OF CONTESTS

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ABSTRACT

We develop a model based on one of the possible causes of the extinction of Homo neanderthalenis: the arrival of Homo sapiens to Europe and their competition. The cultural level of the species is introduced in the contest determining the efficiency of the effort. The population dynamics chosen is the replicator equation. It is now coupled with the temporal evolution of their cultural level. The results show that, the extinction of one of the species is inevitable. The model also predicts the existence of a threshold in the initial concentration, which the Sapiens had to overcome to extinguish Neanderthals. When the contest has a cost, the ability to learn of Sapiens species and its relationship with the optimization of the effort could be decisive in the reduction of the threshold.

Figure 1. *Numerical establishment threshold for* $c_{sapiens}(t=0) = c_{neandertal}(t=0) = 0{,}1$, $w = 0.02$, $X(t=0) = variable$, $\gamma_{sapiens} = \gamma_{neandertal} = 0.5$, $\delta_{sapiens} = 1$, $\delta_{neandertal} = 0.3$

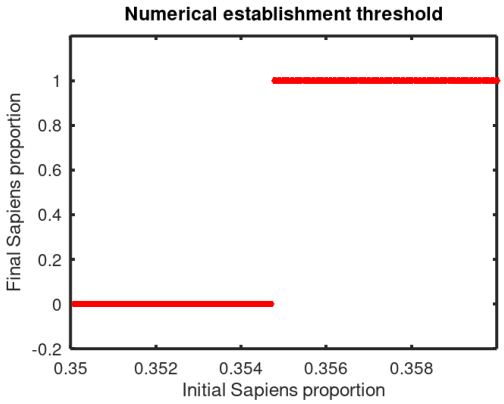
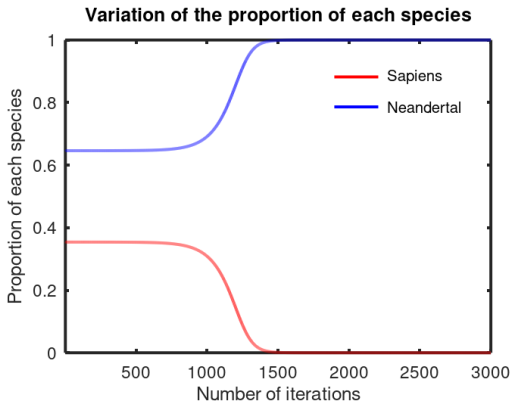


Figure 2. *Simulation of dynamics with the sapiens-neanderthal model for initial value a):* $c_{sapiens}(t=0) = c_{neandertal}(t=0) = 0{,}1$, $w = 0.02$, $X(t=0) = (0{,}3547, 0{,}6453)$, $\gamma_{sapiens} = \gamma_{neandertal} = 0.5$, $\delta_{sapiens} = 1$ $\delta_{neandertal} = 0.3$ *(b): same values as in (a) but with initial proportions above the threshold:* $X(t=0) = (0{,}3548, 0{,}6452)$

a)



b)