Evolution of Sex-Ratio-Equilibrium

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Sex-ratio (Female:Male)

* Why is it 1:1 in most organisms?
* "the whole problem is so intricate that it is safer to leave its solution for the future" (Darwin ,1871)

17,388

* Fisher's First Principle (Fisher, 1930)
* Extraordinary sex-ratios (Hamilton, 1967)

2828

Multi-agent model of Population Dynamics

* Can Fisher's First Principle be illustrated with simple rules of agent behavior?
    * Two breeds - males and females

Males

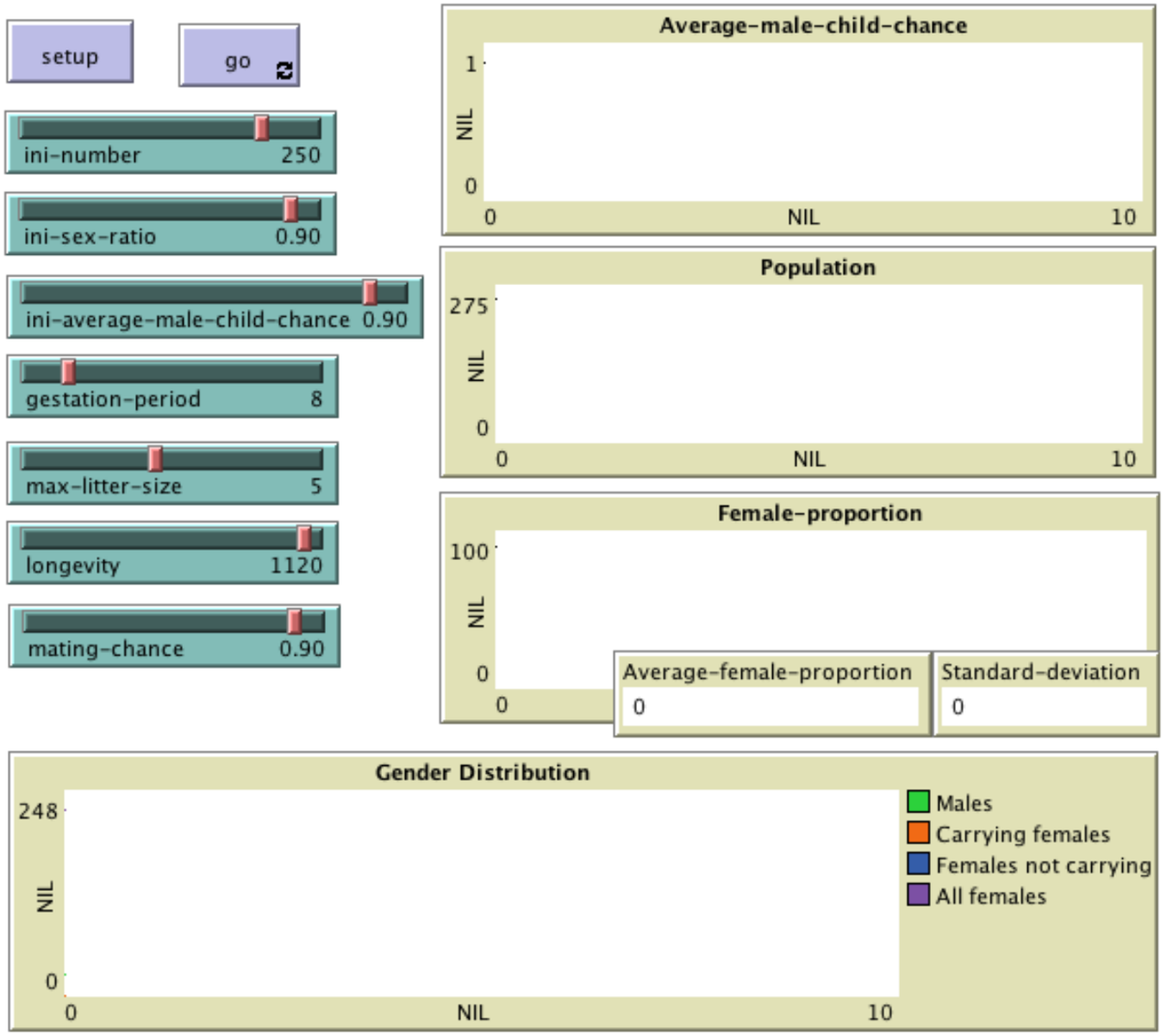
- Age and die
- Move
- Search for a partner
- Mate

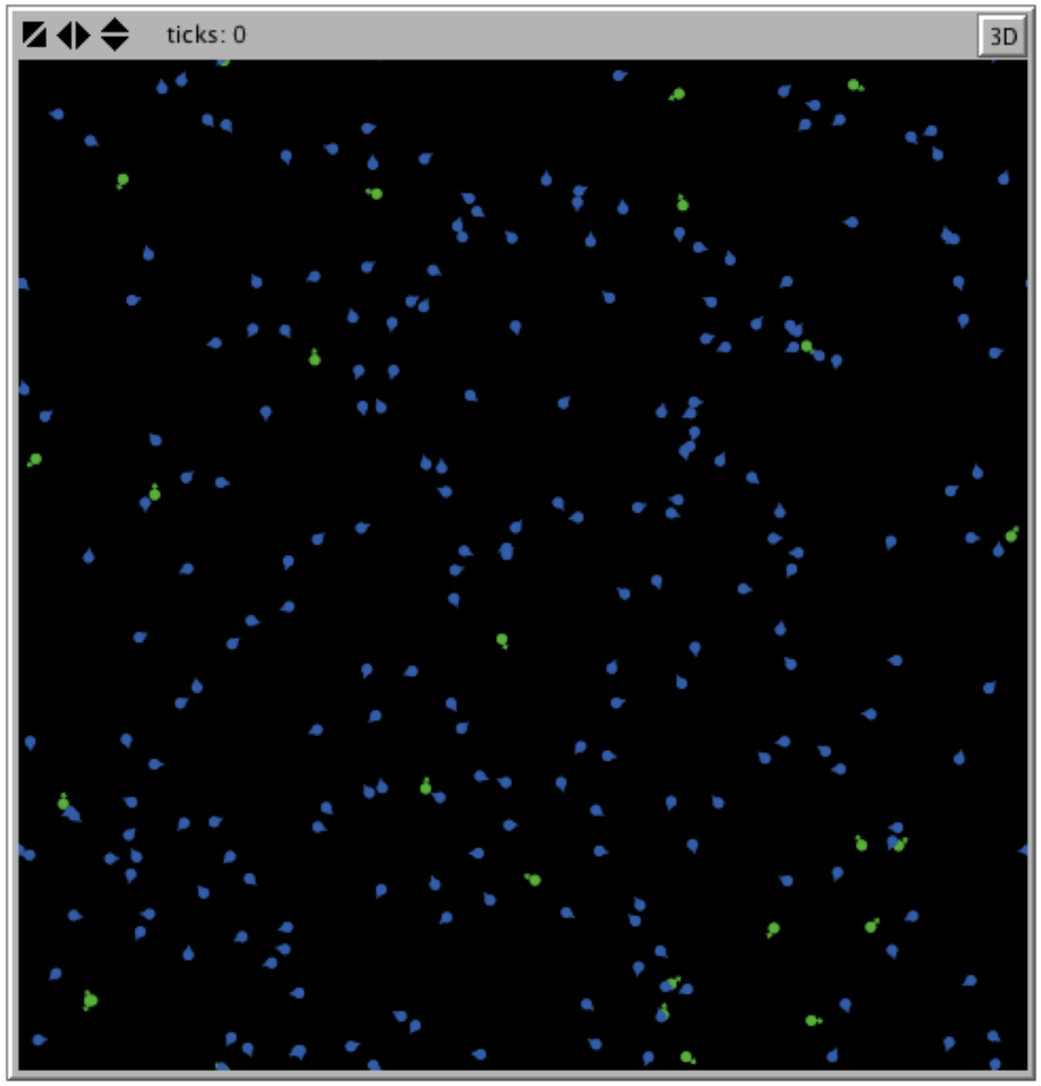
Females

- Age and die
- Move
- Mate
- Carry a child
- Give birth after gestation

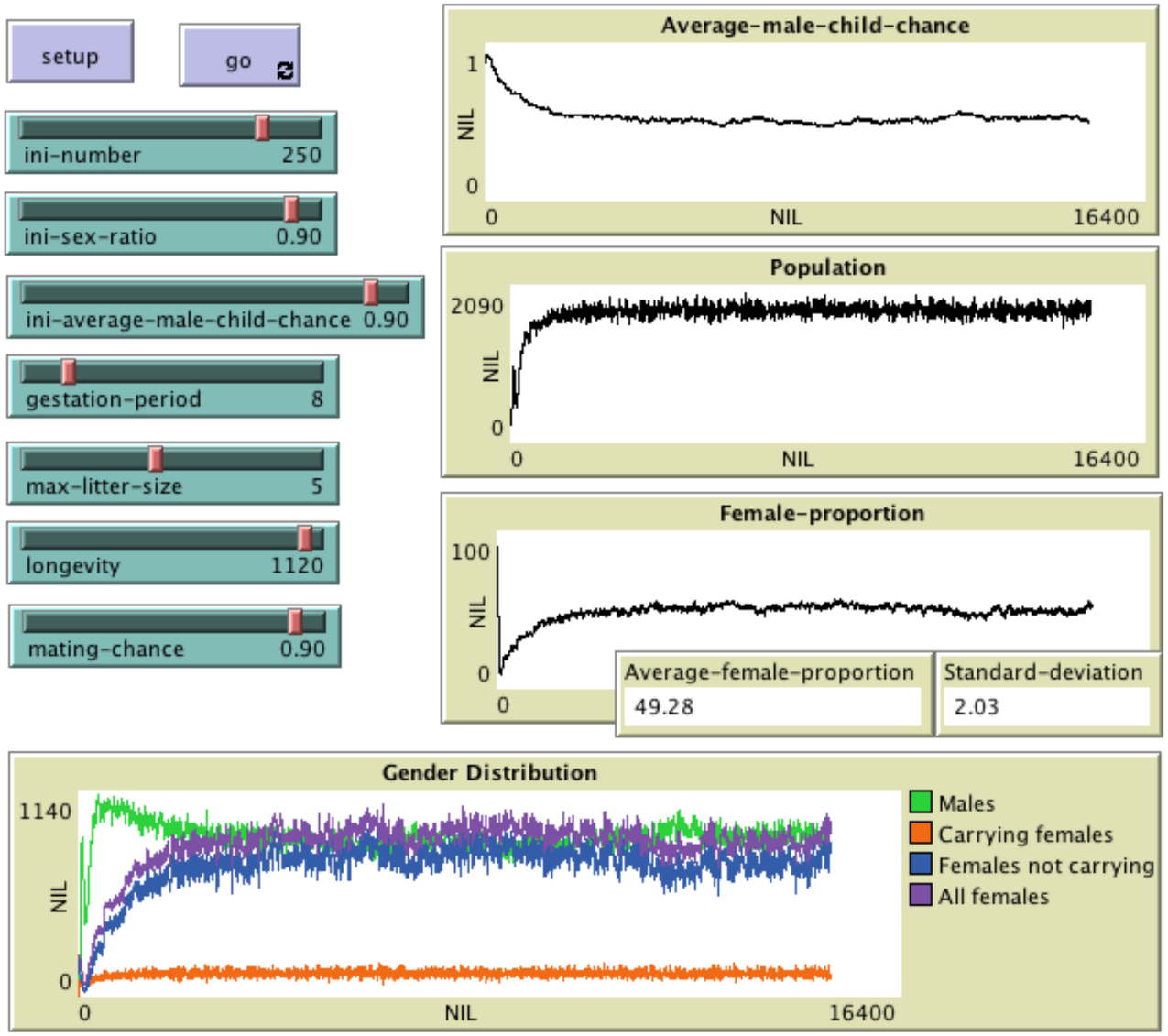
* Autosomal Inheritance of the mechanism (Fisher's Assumption): Equal contribution

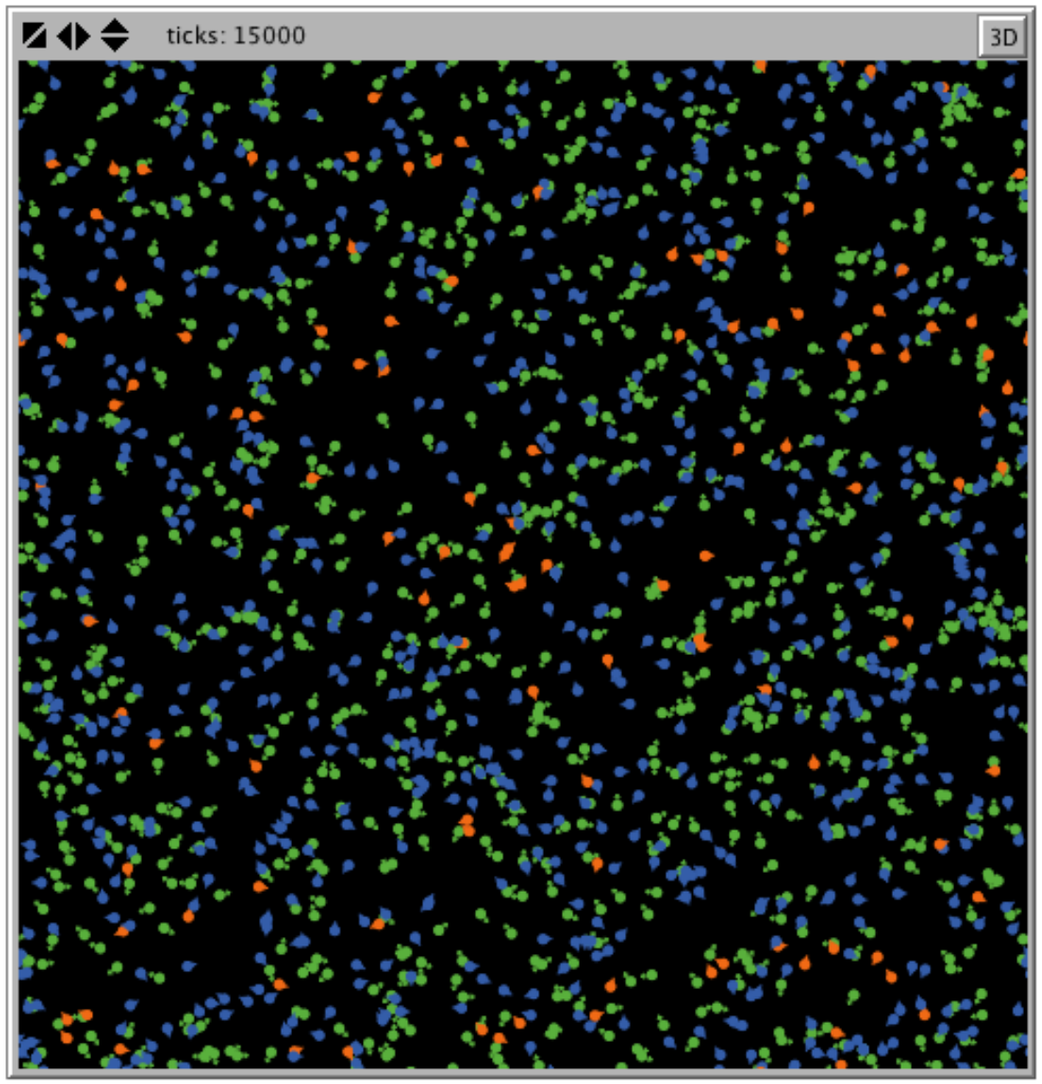
Sex-Ratio Equilibrium Model



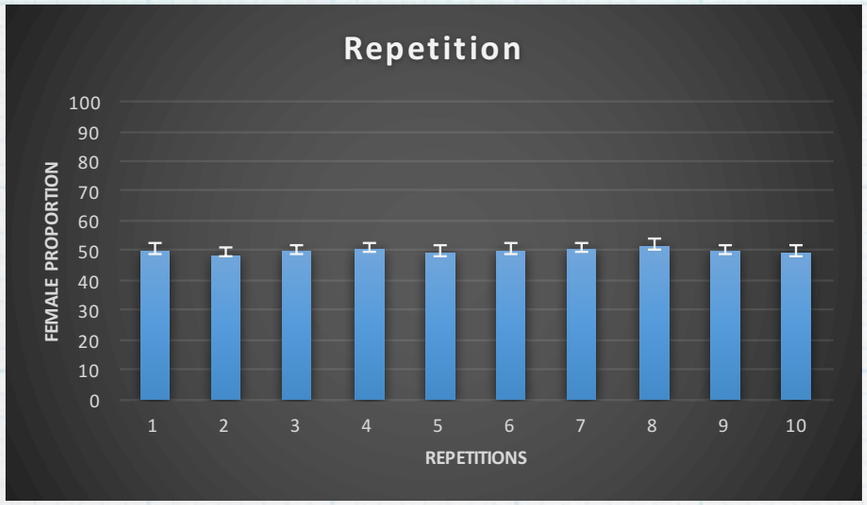


Model Behavior

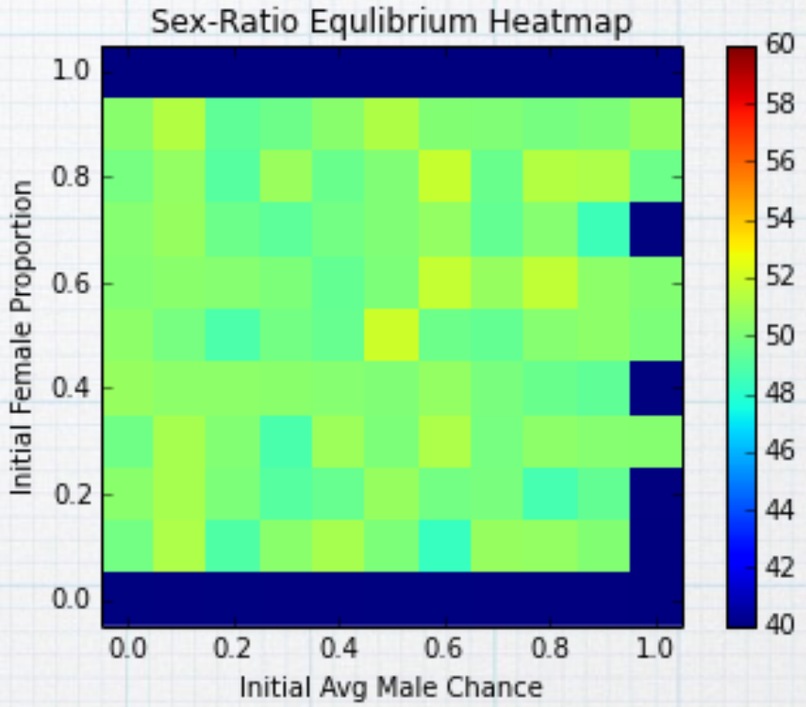




Model Validation

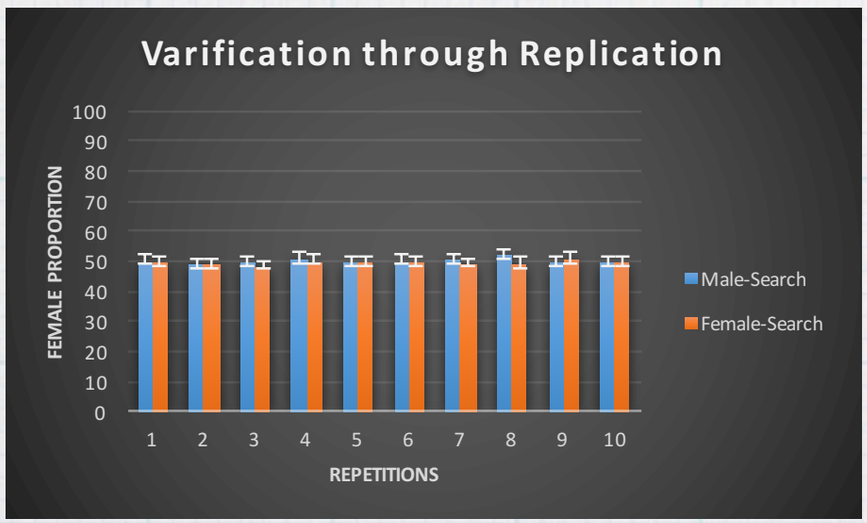


Multiple runs



Sensitivity Analysis

121 runs, 22 hours
on BehaviorSpace!



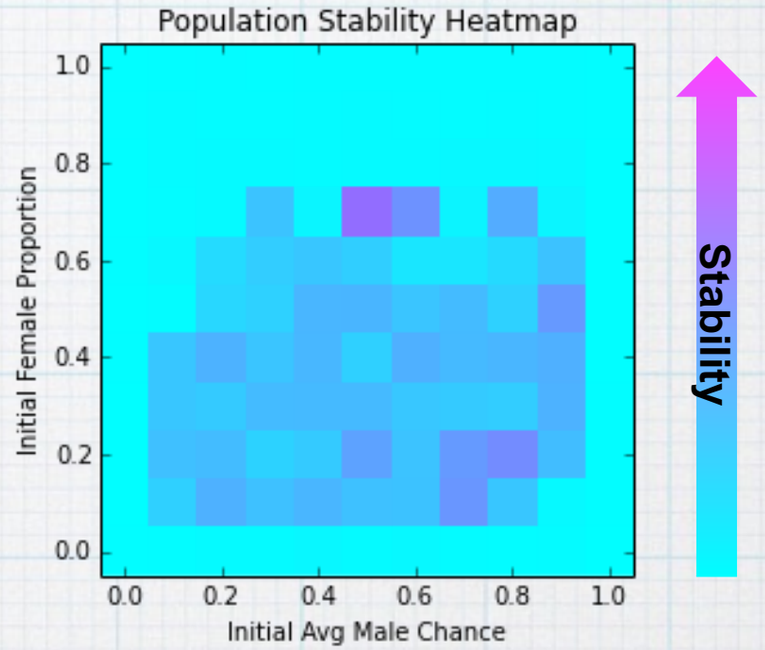
Different coding strategy

Three Extensions

* Extension 1 : extraordinary sex-ratios (Hamilton, 1967)

* Extension 2: disentangling sex-determination and sex-linked inheritance

* Extension 3: sex-role reversal (Liker et al., Nature, 2013)



sex-role reversal