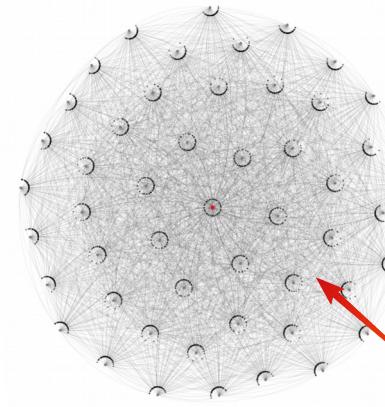


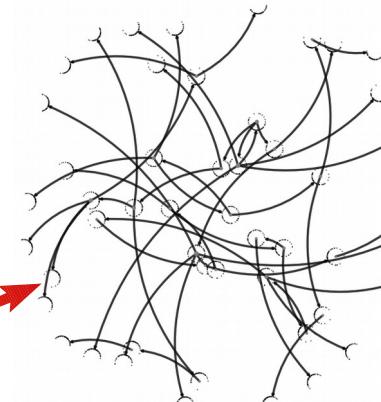
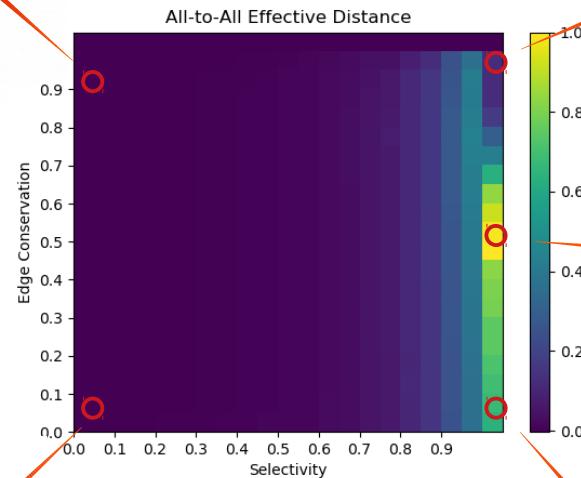
Network Evolution

For Random edge initialization, Constant Seeding, 50 Nodes, Source Reward = 2.6, $\delta = 1$



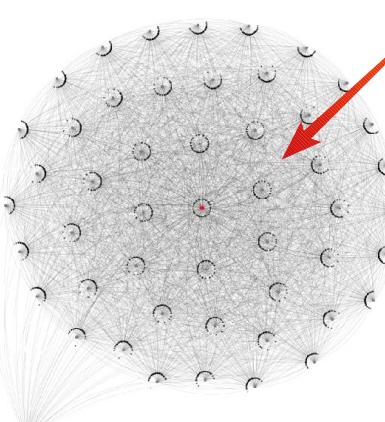
Edge Conservation: 0.9,
Selectivity: 0.05:

As nearly all edges are rewarded according to existent values, the system remains as it was, which by virtue of the high inter connectivity of uniform random edge initialization yields an effectively low global effective distance



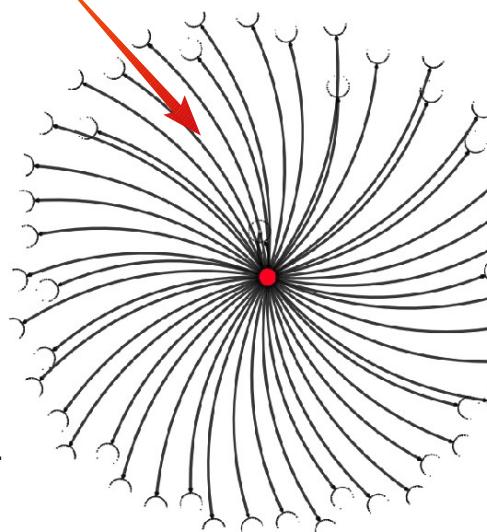
Edge Conservation: 0.95,
Selectivity: 1:

Only one edge per node is rewarded each round, leading to continued reinforcement of whatever the initial edge value was initially strongest, regardless of effective distance to source, due to high edge conservation value.



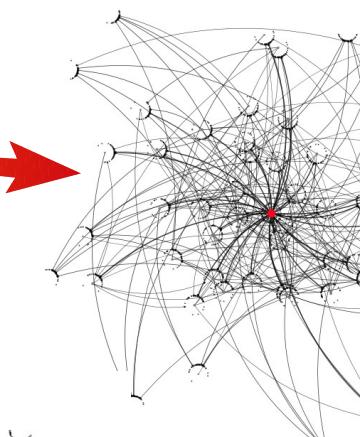
Edge Conservation: 0.05,
Selectivity: 0.05:

Despite all edges being rewarded according to the effective distance from source, the system remains as it was, because all edges are rewarded, and thus the nodes are insufficiently selective to promote a more centralized configuration about the source.



Edge Conservation: 0.05,
Selectivity: 1:

Only one edge per node is rewarded each round, however as edge conservation is low, the reward is based on effective distance to source, leading to all direct source connections being reinforced, and a resultantly inefficient configuration. (as all connections from the source are reinforced, but not intermediate connections or any to the source).

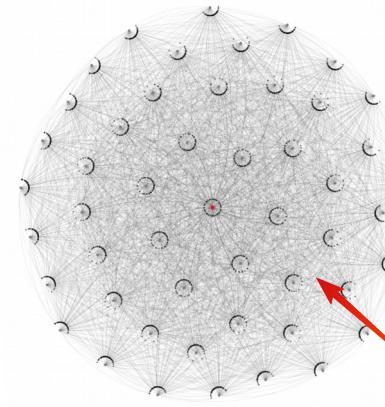


Edge Conservation: 0.5,
Selectivity: 0.9:

Resting between extremes above and below, the resultant configuration is maximally inefficient.

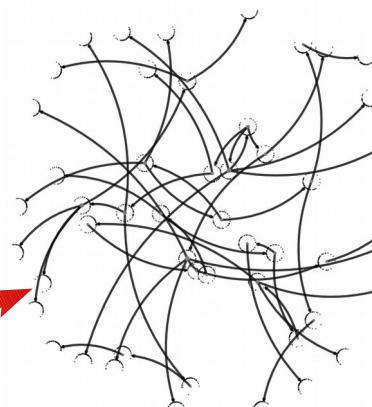
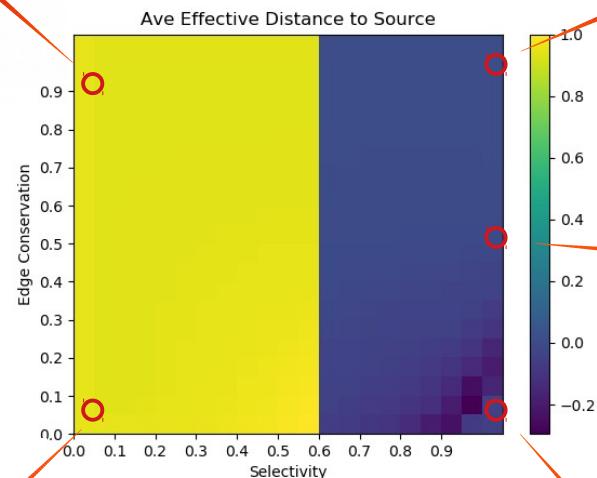
Network Evolution (Average Eff. Dist. From Source)

For Random edge initialization, Constant Seeding, 50 Nodes, Source Reward = 2.6, $\delta = 1$



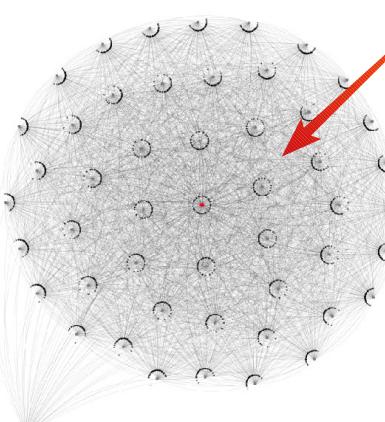
Edge Conservation: 0.9,
Selectivity: 0.05:

As nearly all edges are rewarded according to existent values, the system remains as it was, which by virtue of the high interconnectivity of uniform random edge initialization yields an effectively low global effective distance



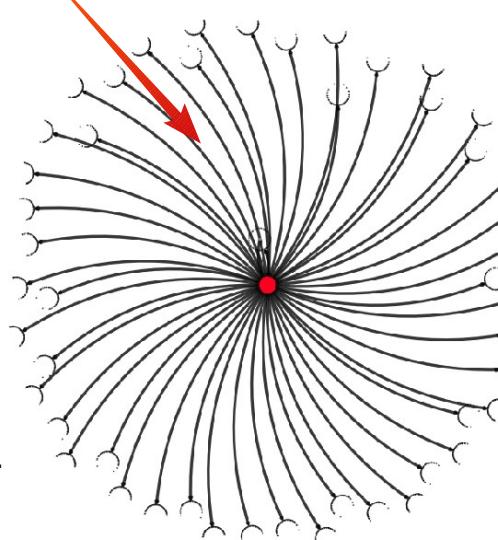
Edge Conservation: 0.95,
Selectivity: 1:

Only one edge per node is rewarded each round, leading to continued reinforcement of whatever the initial edge value was initially strongest, regardless of effective distance to source, due to high edge conservation value.



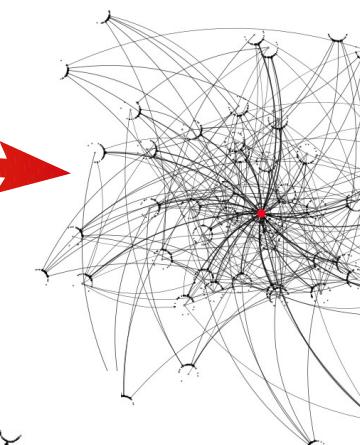
Edge Conservation: 0.05,
Selectivity: 0.05:

Despite all edges being rewarded according to the effective distance from source, the system remains as it was, because all edges are rewarded, and thus the nodes are insufficiently selective to promote a more centralized configuration about the source.



Edge Conservation: 0.05,
Selectivity: 1:

Only one edge per node is rewarded each round, however as edge conservation is low, the reward is based on effective distance to source, leading to all direct source connections being reinforced, and a resultantly inefficient configuration. (as all connections from the source are reinforced, but not intermediate connections or any to the source).



Edge Conservation: 0.5,
Selectivity: 0.9:

Resting between extremes above and below, the resultant configuration is maximally inefficient.

Comparison of Model Mechanics Directionality

All simulations performed with constant seeding, edge conservation and selectivity ranges from 0 to 1 in intervals of 0.05, $\delta = 1$, 50 nodes, 500 runs, equilibrium distance of 100, uniform random edge initialization.

Titles list mechanics whose behavior was reversed from the base:

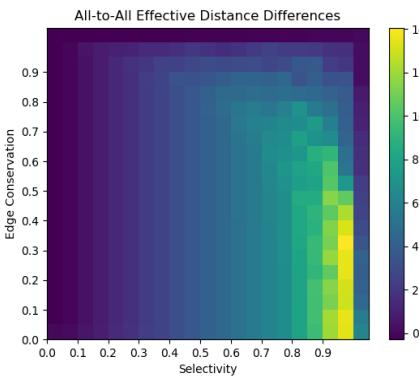
ED → Effective Distance is calculated *to the source* rather than *from it*

A → Nodes adapt *outgoing* edges (not incoming)

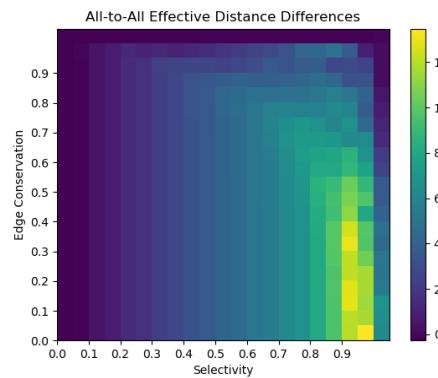
C → A node's sum total *outgoing* edges are conserved (=1)

All-to-All Effective Distance

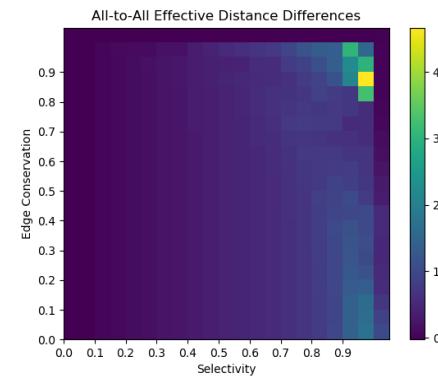
Base Case



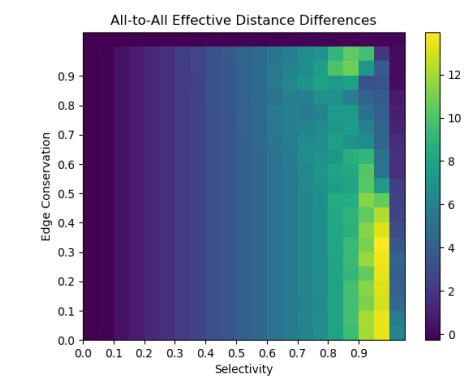
to source Eff. Dist.



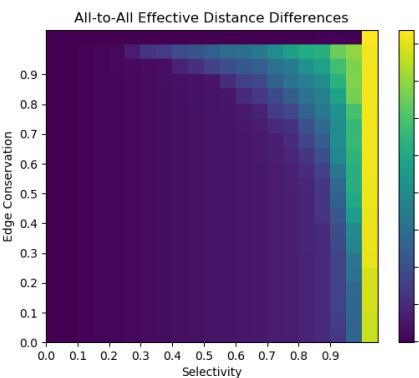
Outgoing edge adaptation



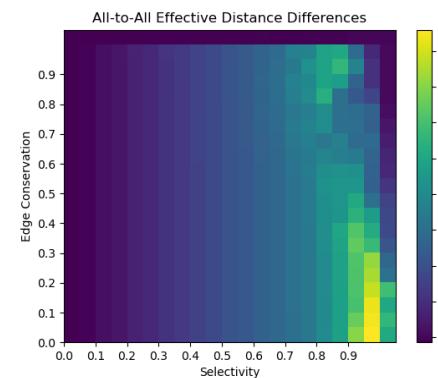
Outgoing edges conserved



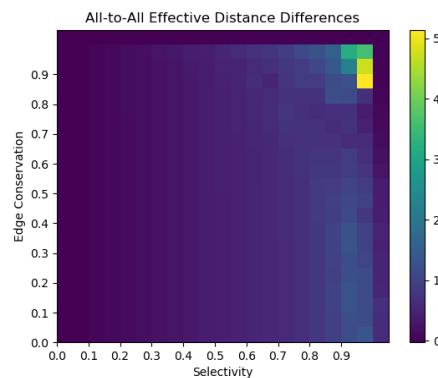
All reversed



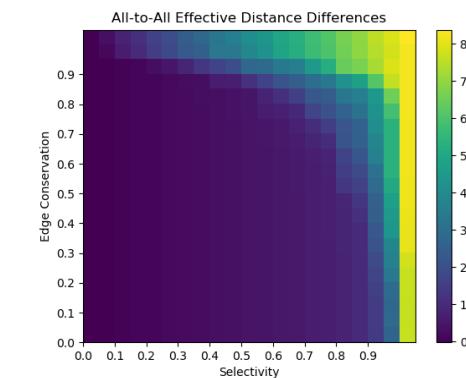
ED + A



ED + C



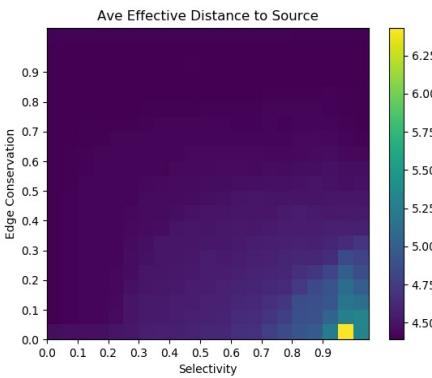
A + C



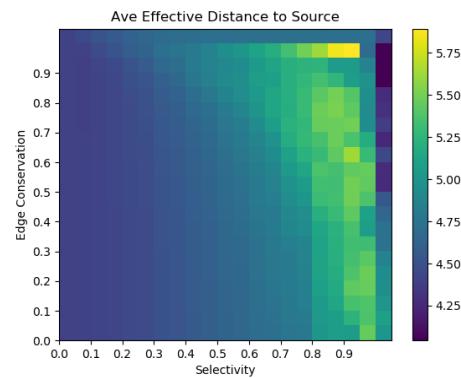
Mean Effective Distances

i.e. Mean Effective Distance over entire run time

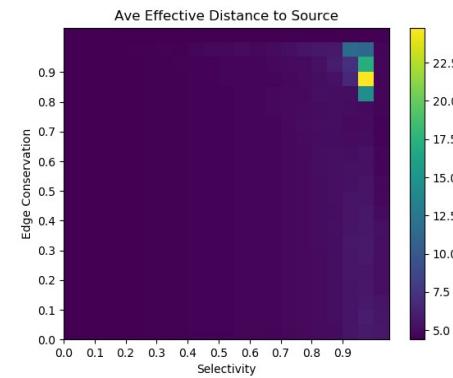
Base Case



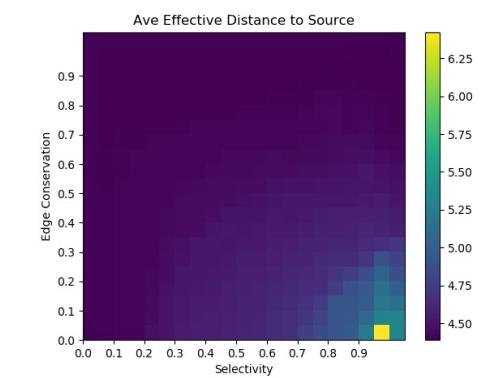
to source Eff. Dist.



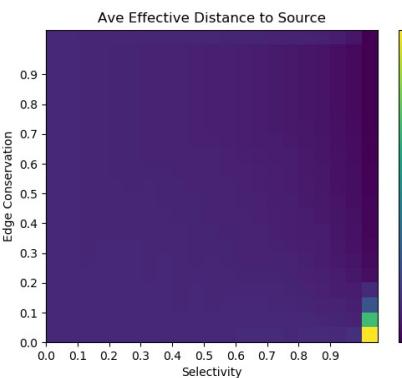
Outgoing edge adaptation



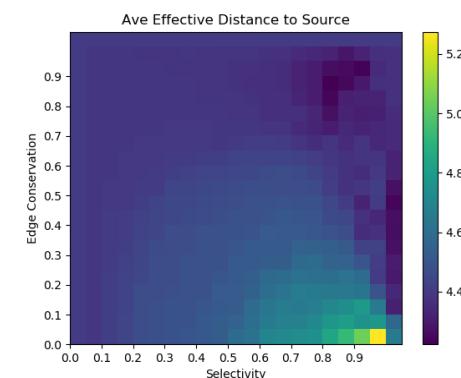
Outgoing edges conserved



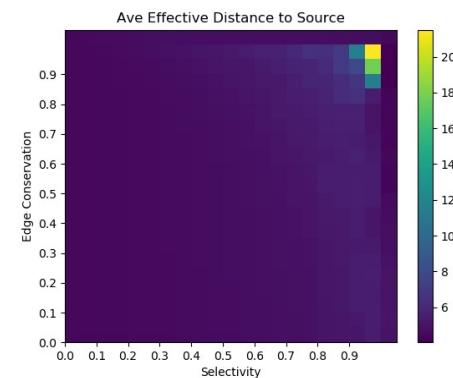
All reversed



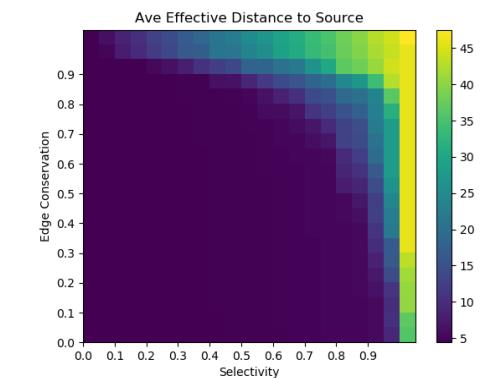
ED + A



ED + C



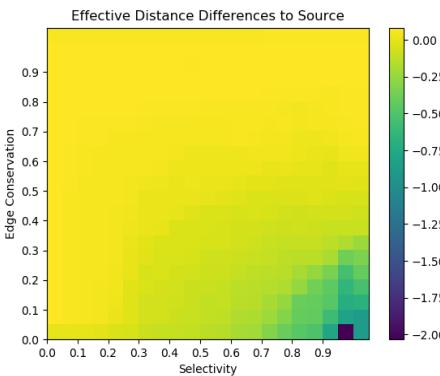
A + C



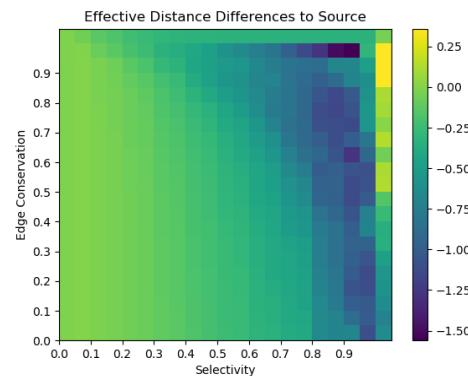
Effective Distance Differences

Effective Distance to source at end subtracted from at start

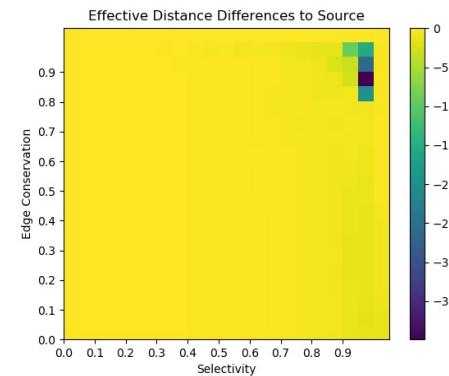
Base Case



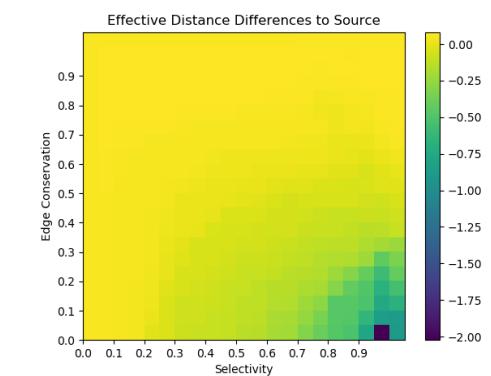
to source Eff. Dist.



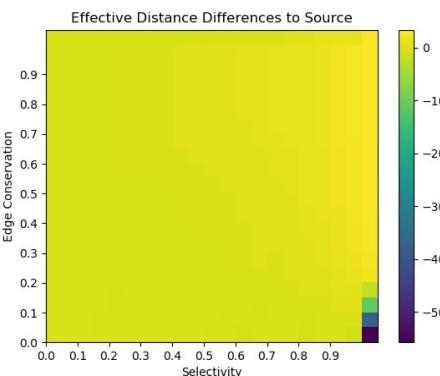
Outgoing edge adaptation



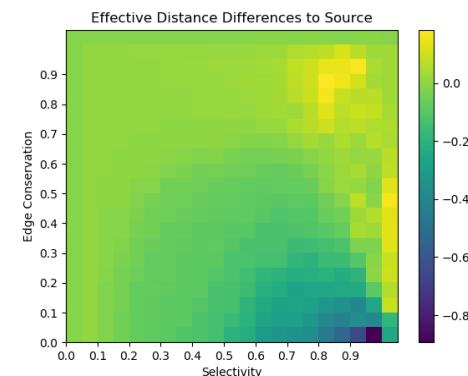
Outgoing edges conserved



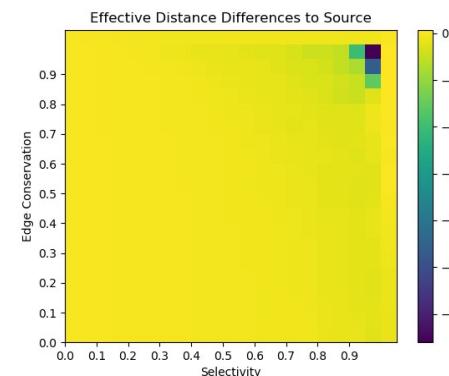
All reversed



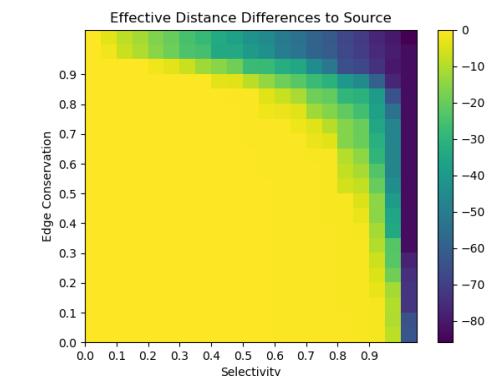
ED + A



ED + C



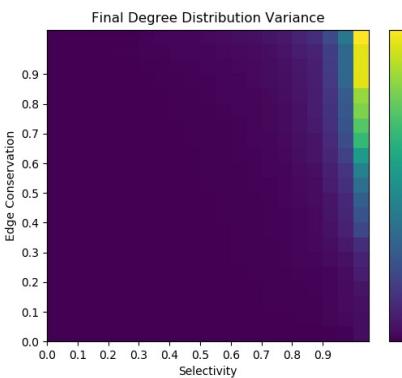
A + C



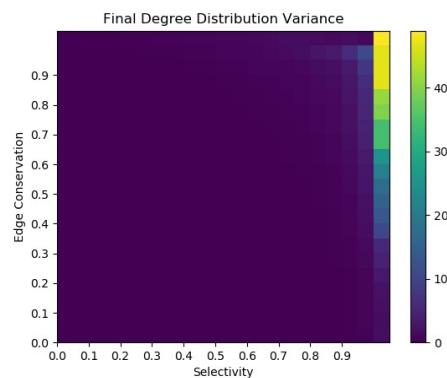
Degree Distribution Variance

Log variance of the *total edge values* distribution

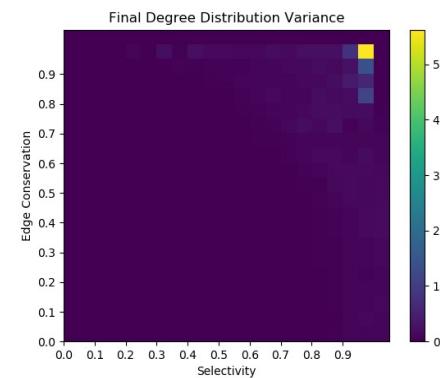
Base Case



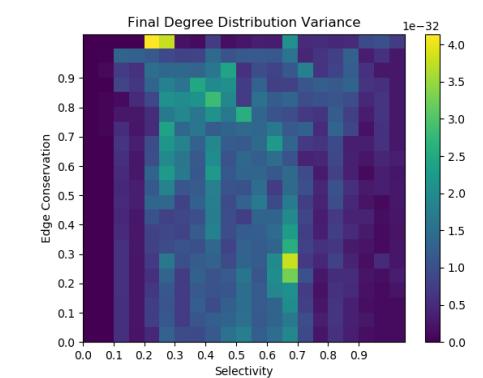
to source Eff. Dist.



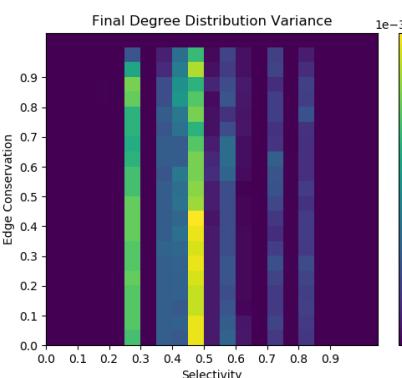
Outgoing edge adaptation



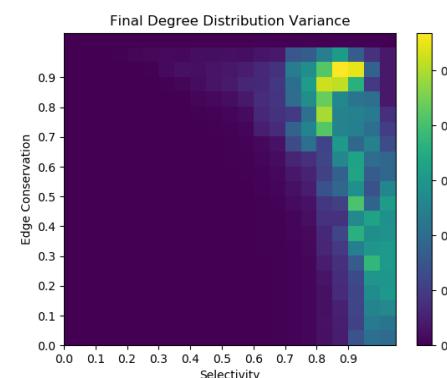
Outgoing edges conserved



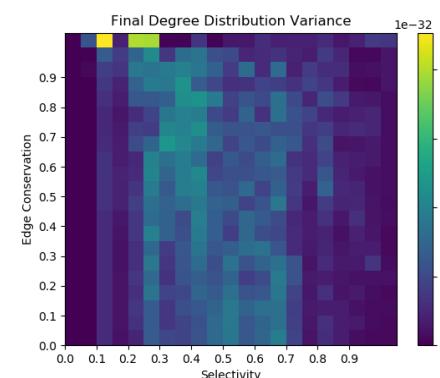
All reversed



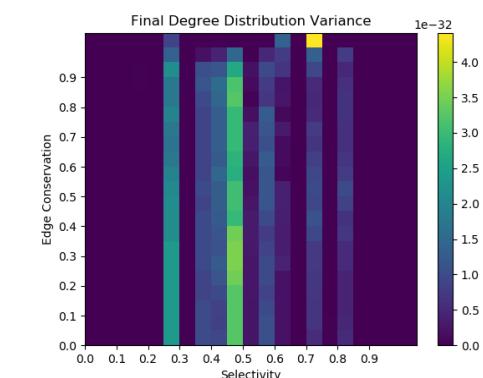
ED + A



ED + C



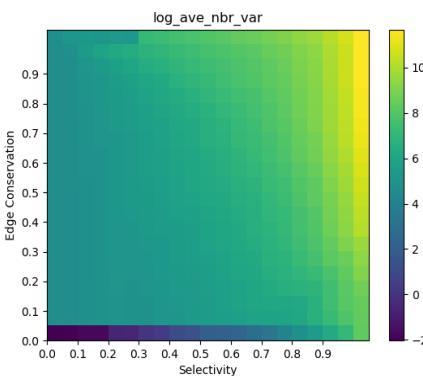
A + C



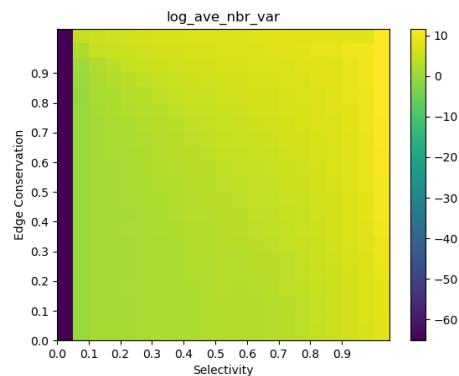
Average Neighbor Variance

Log average neighbor out degree (*at last time step*) variance

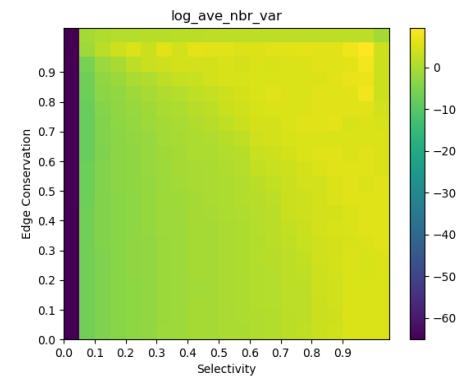
Base Case



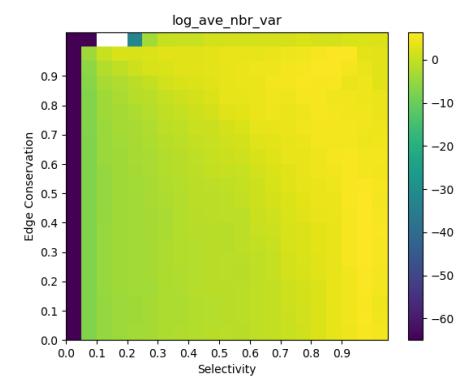
to source Eff. Dist.



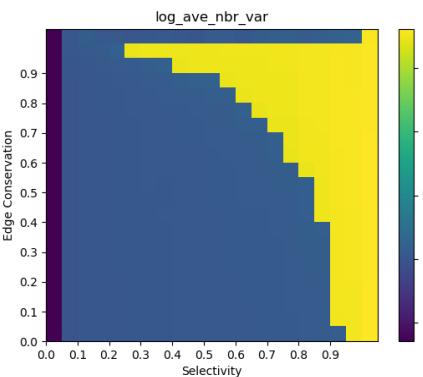
Outgoing edge adaptation



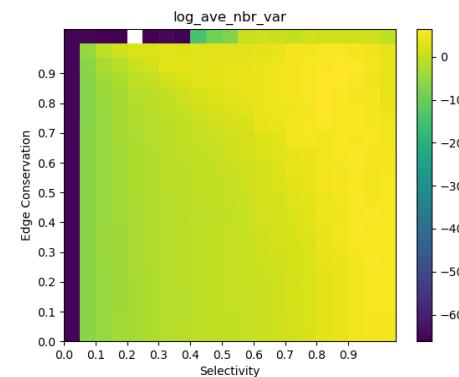
Outgoing edges conserved



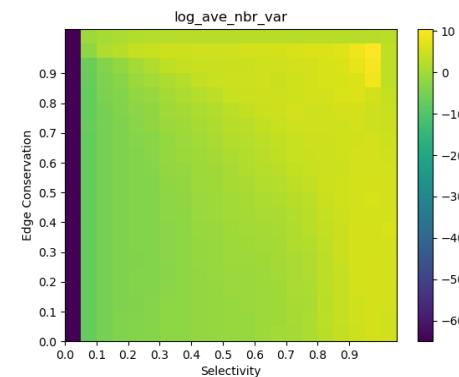
All reversed



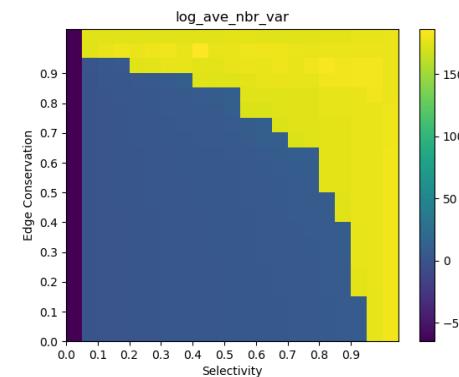
ED + A



ED + C



A + C



Comparison of Model Mechanics Directionality

All simulations performed with constant seeding, edge conservation and selectivity ranges from 0 to 1 in intervals of 0.05, $\delta = 1$, 50 nodes, 500 runs, equilibrium distance of 100, **sparse edge initialization** with degree exponent of 1.2.

These runs were not averaged over an ensemble

Titles list mechanics whose behavior was reversed from the base:

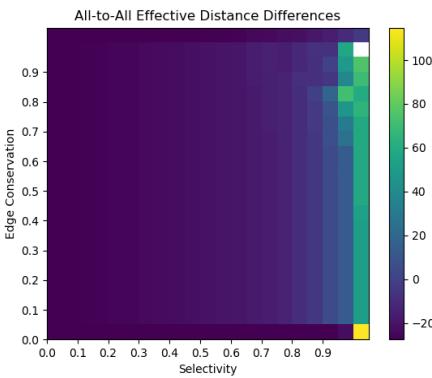
ED → Effective Distance is calculated *to the source* rather than *from it*

A → Nodes adapt *outgoing* edges (not incoming)

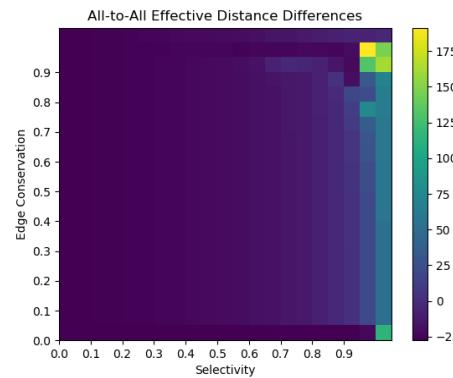
C → A node's sum total *outgoing* edges are conserved (=1)

All-to-All Effective Distance

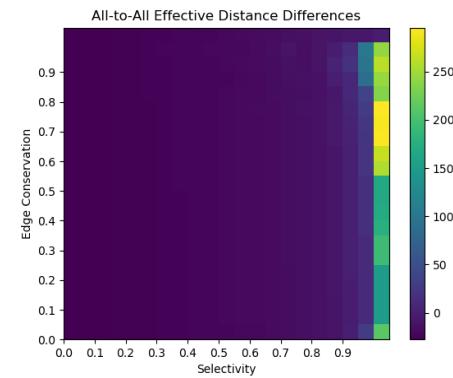
Base Case



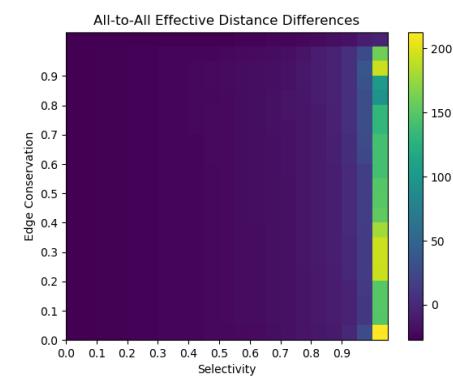
to source Eff. Dist.



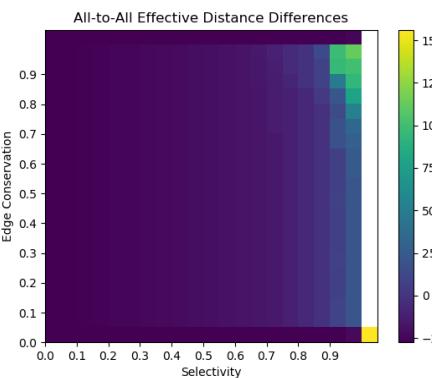
Outgoing edge adaptation



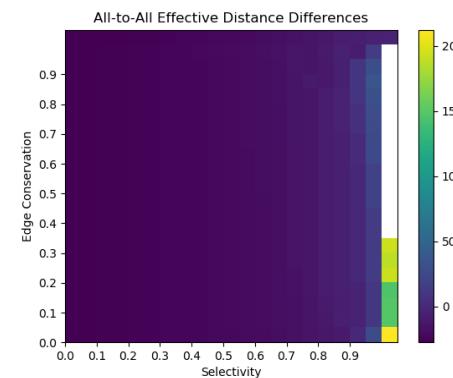
Outgoing edges conserved



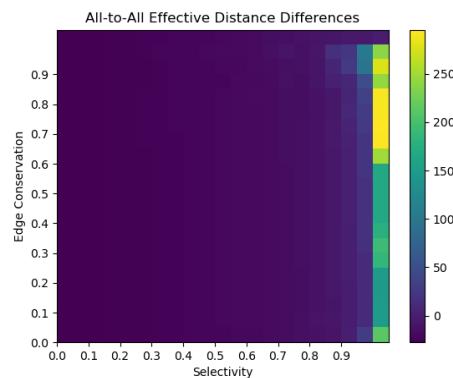
All reversed



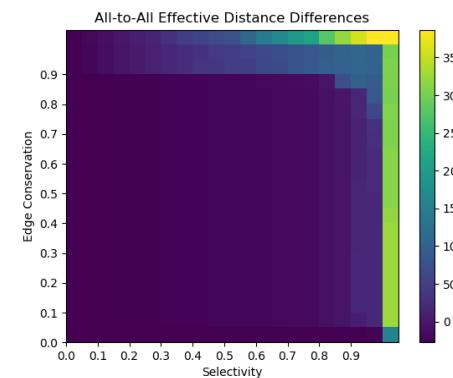
ED + A



ED + C



A + C

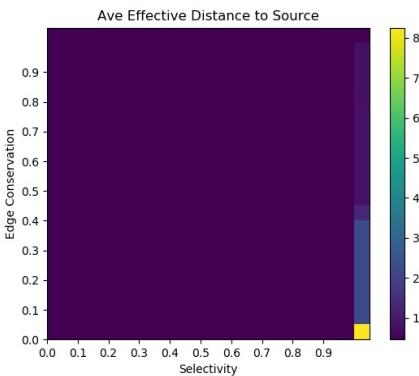


sparse edge initialization

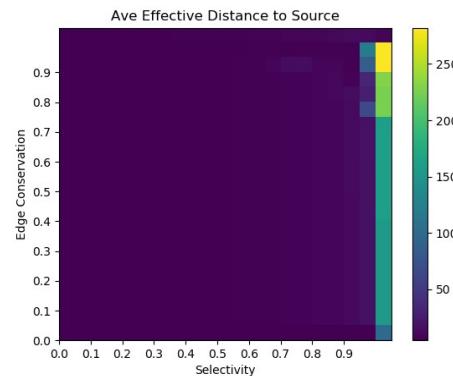
Mean Effective Distances

i.e. Mean Effective Distance over entire run time

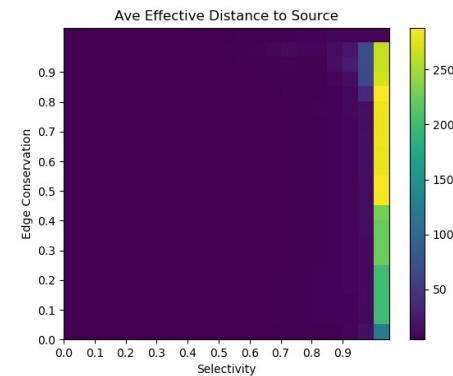
Base Case



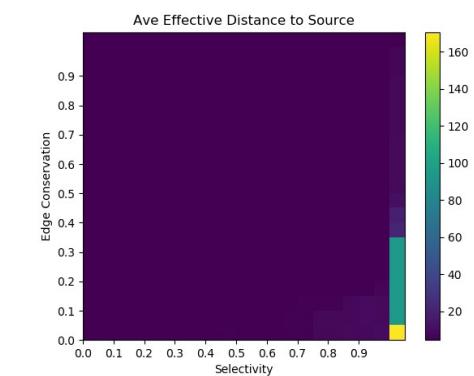
to source Eff. Dist.



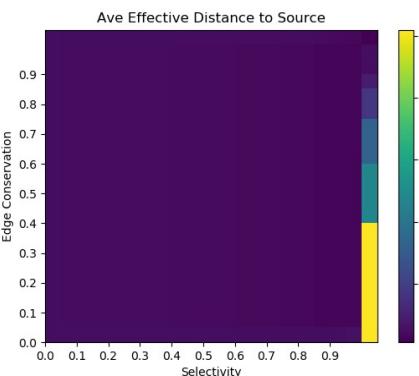
Outgoing edge adaptation



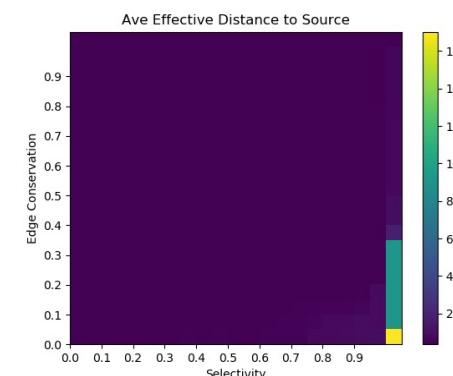
Outgoing edges conserved



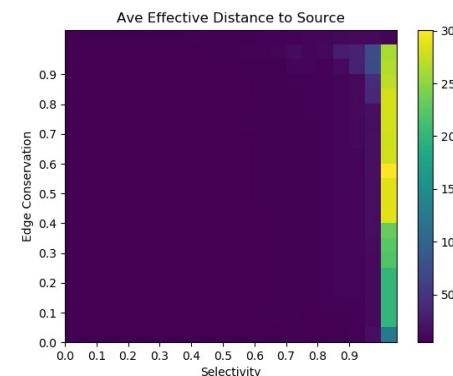
All reversed



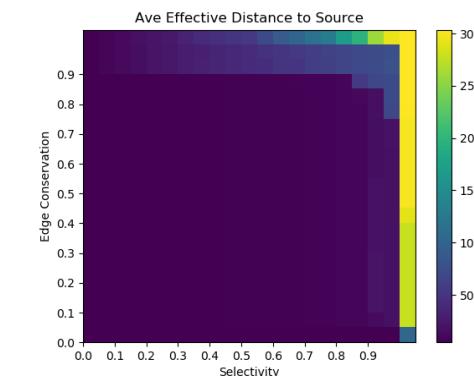
ED + A



ED + C



A + C

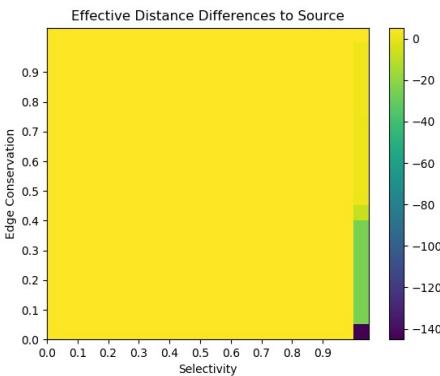


sparse edge initialization

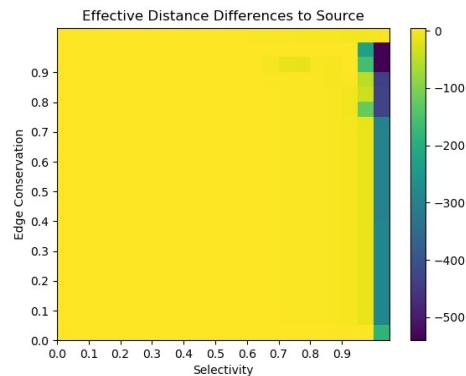
Effective Distance Differences

Effective Distance to source at end subtracted from at start

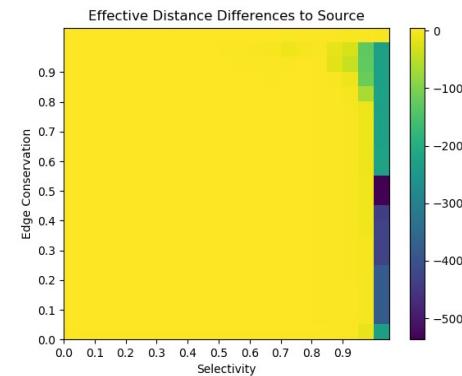
Base Case



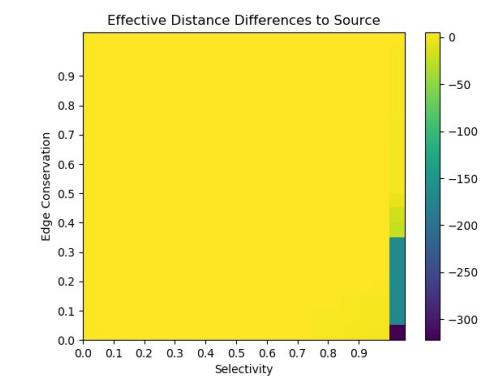
to source Eff. Dist.



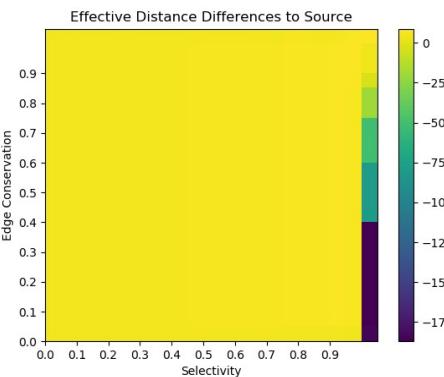
Outgoing edge adaptation



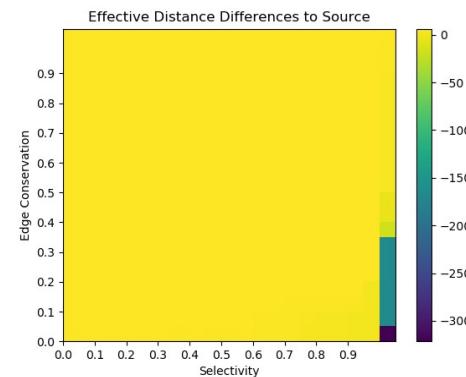
Outgoing edges conserved



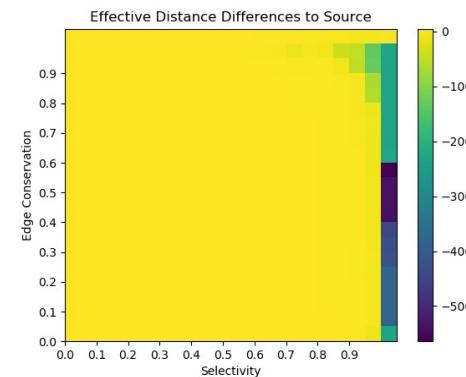
All reversed



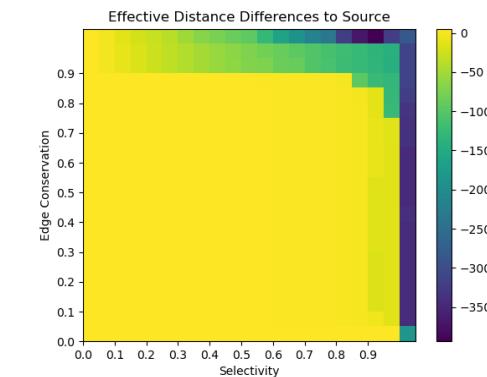
ED + A



ED + C



A + C

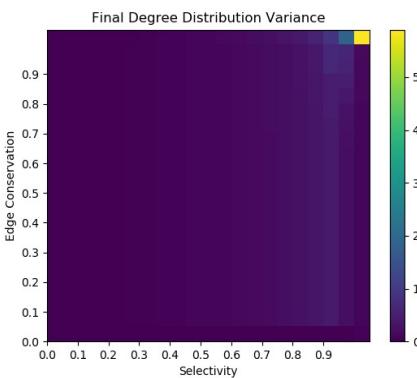


sparse edge initialization

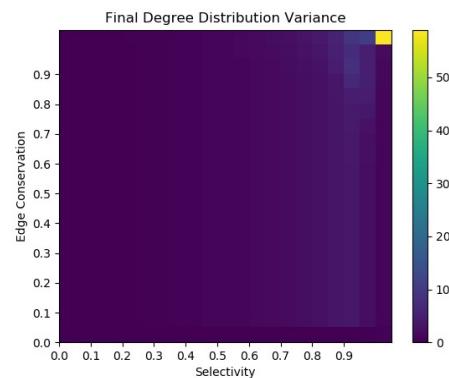
Degree Distribution Variance

Log variance of the *total edge values* distribution

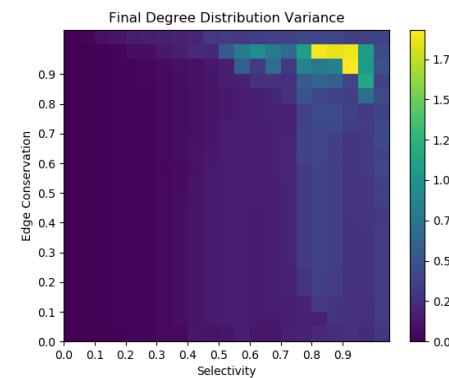
Base Case



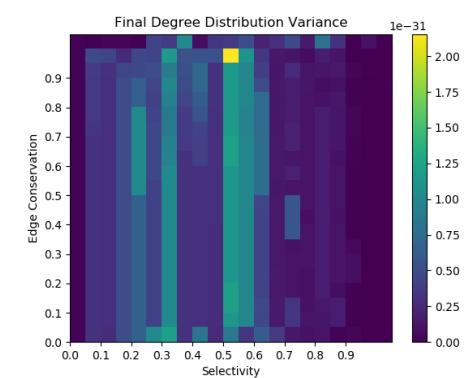
to source Eff. Dist.



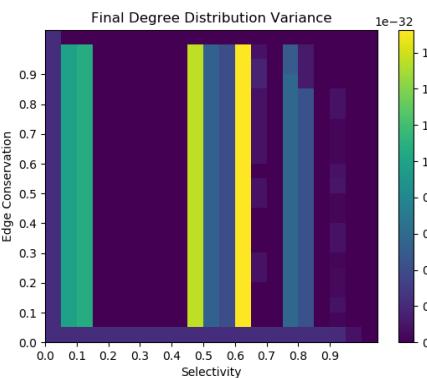
Outgoing edge adaptation



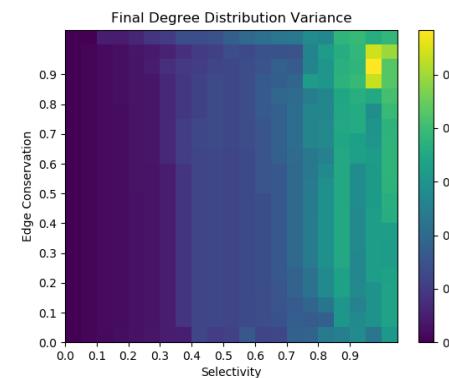
Outgoing edges conserved



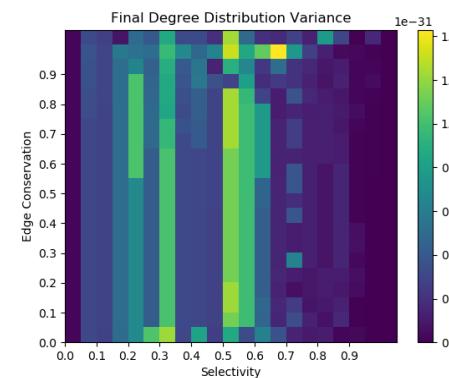
All reversed



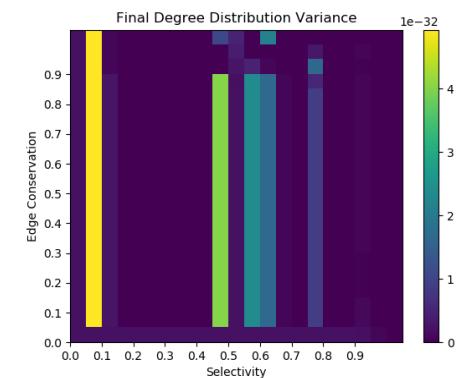
ED + A



ED + C



A + C

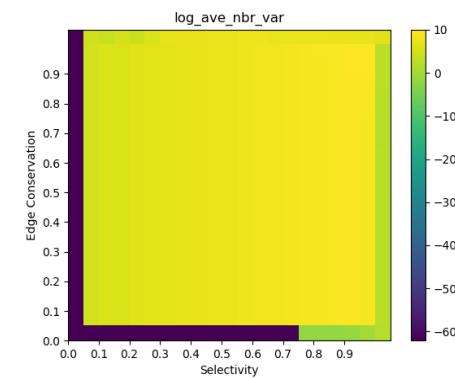


sparse edge initialization

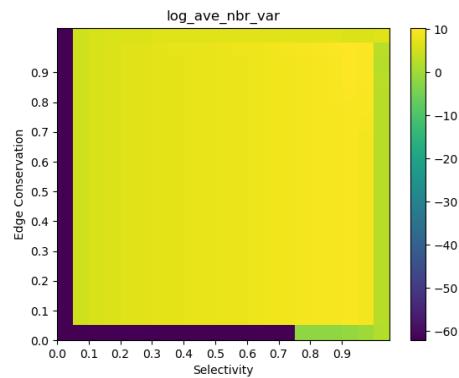
Average Neighbor Variance

Log average neighbor out degree (*at last time step*) variance

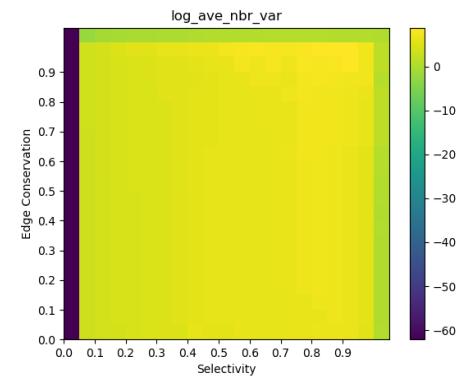
Base Case



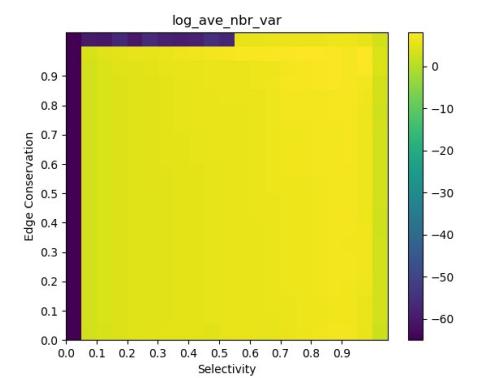
to source Eff. Dist.



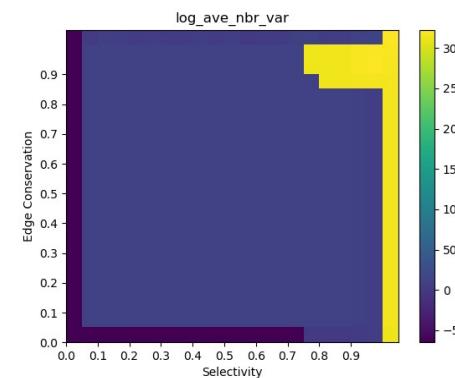
Outgoing edge adaptation



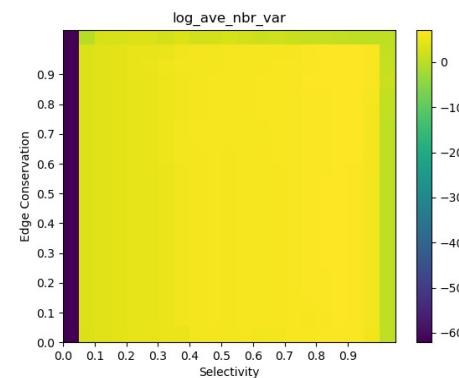
Outgoing edges conserved



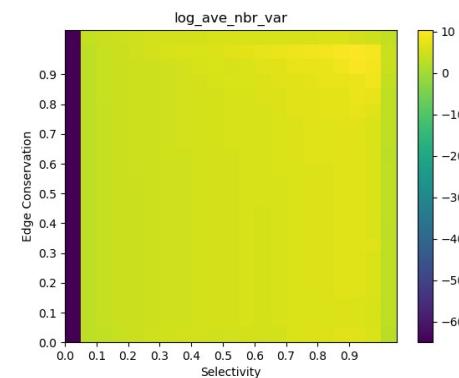
All reversed



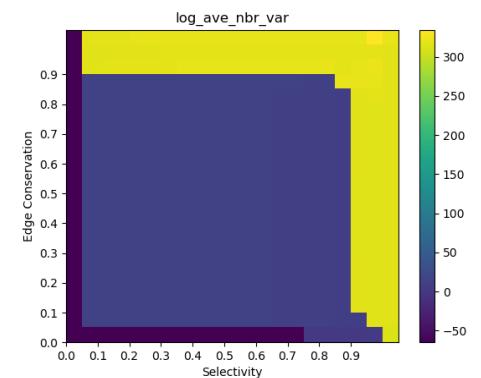
ED + A



ED + C



A + C



sparse edge initialization

Comparison of Model Mechanics Directionality

All simulations performed with **constant** seeding, edge conservation and selectivity ranges from 0 to 1 in intervals of 0.05, $\delta = 10$, 50 nodes, 500 runs, equilibrium distance of 100, **sparse scale free $\gamma = 1.2$** edge initialization.

Titles list mechanics whose behavior was reversed from the base:

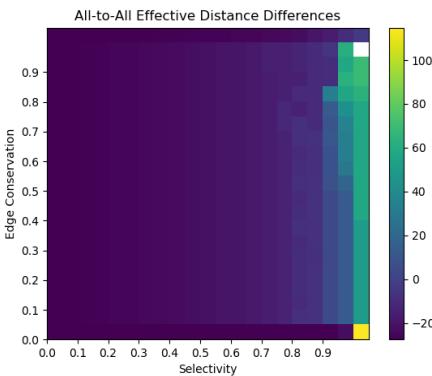
ED → Effective Distance is calculated *to the source* rather than *from it*

A → Nodes adapt *outgoing* edges (not incoming)

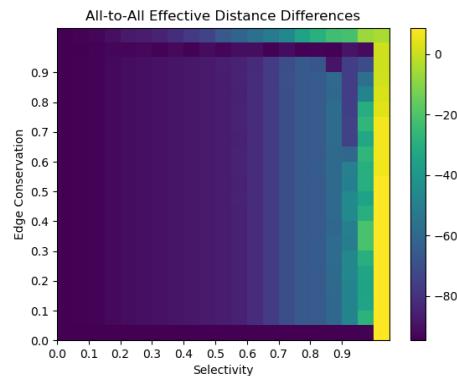
C → A node's sum total *outgoing* edges are conserved (=1)

All-to-All Effective Distance

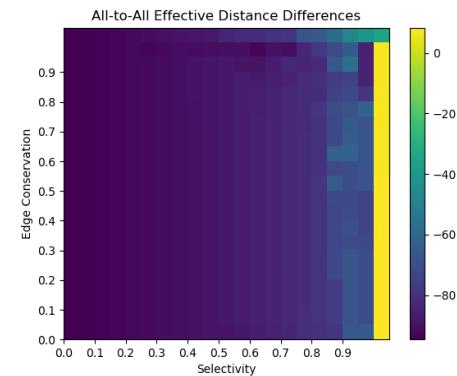
Base Case



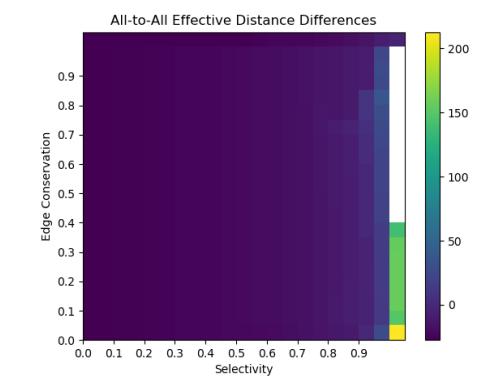
to source Eff. Dist.



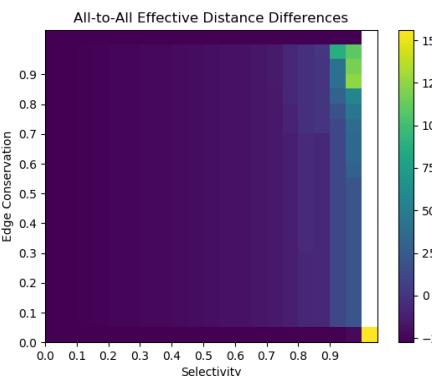
Outgoing edge adaptation



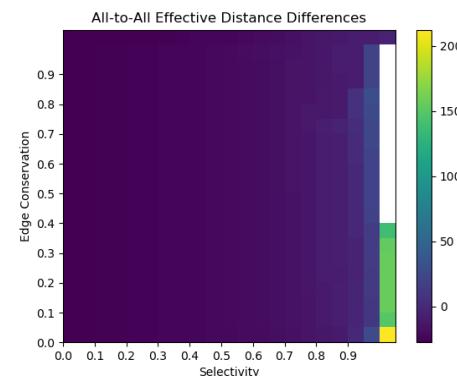
Outgoing edges conserved



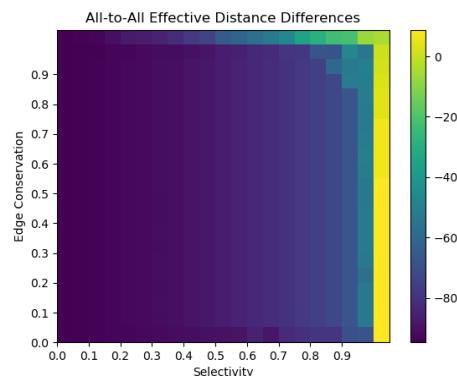
All reversed



ED + A



ED + C



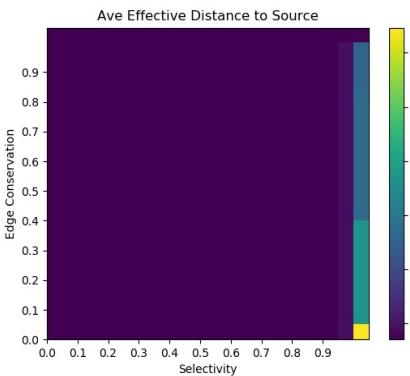
A + C

Sparse Edge Initialization $\gamma = 1.2$

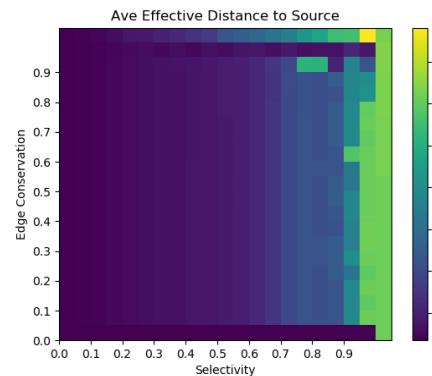
Mean Effective Distances

i.e. Mean Effective Distance over entire run time

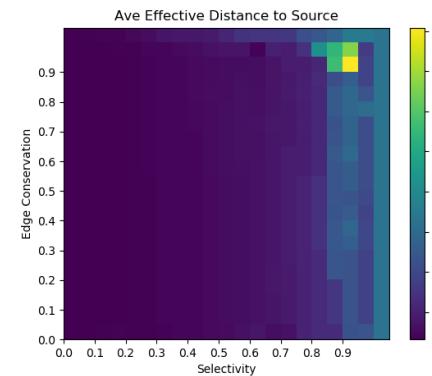
Base Case



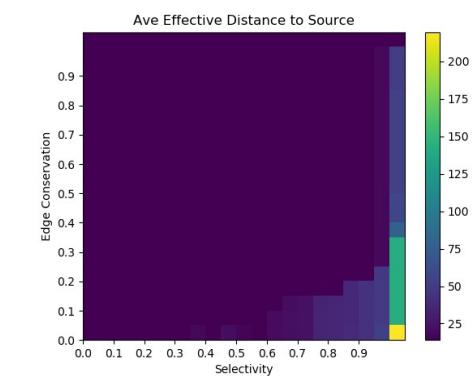
to source Eff. Dist.



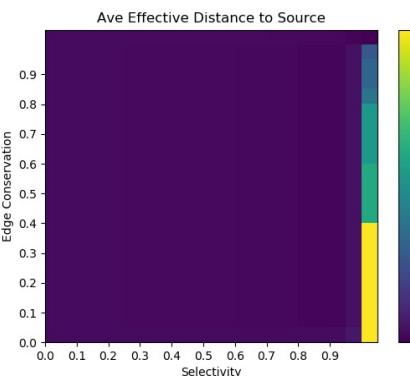
Outgoing edge adaptation



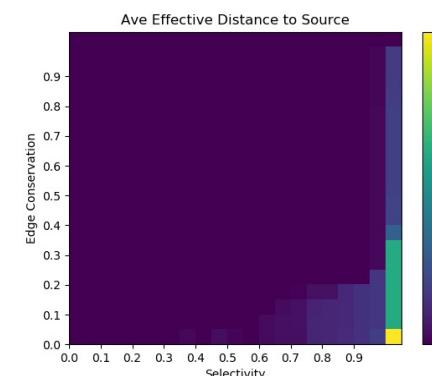
Outgoing edges conserved



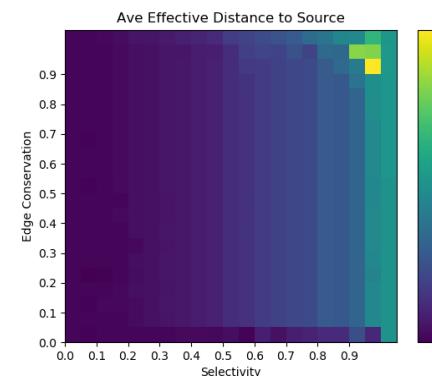
All reversed



ED + A



ED + C



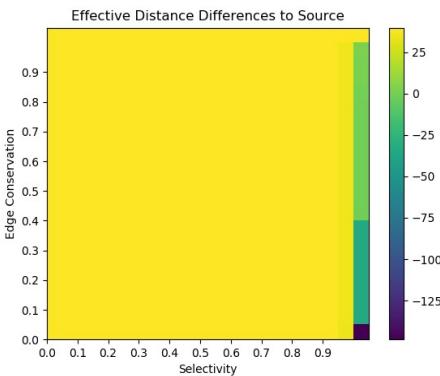
A + C

Sparse Edge Initialization $\gamma = 1.2$

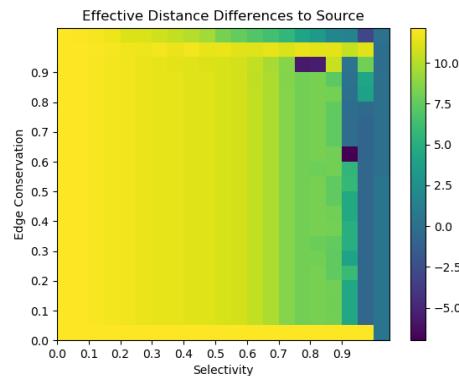
Effective Distance Differences

Effective Distance to source at end subtracted from at start

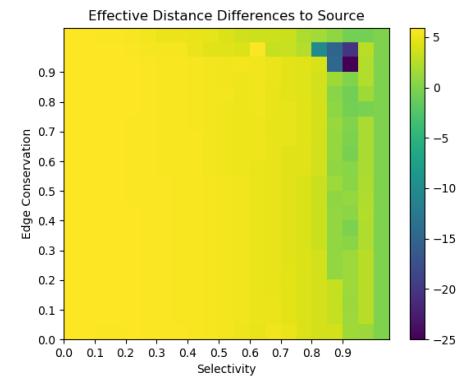
Base Case



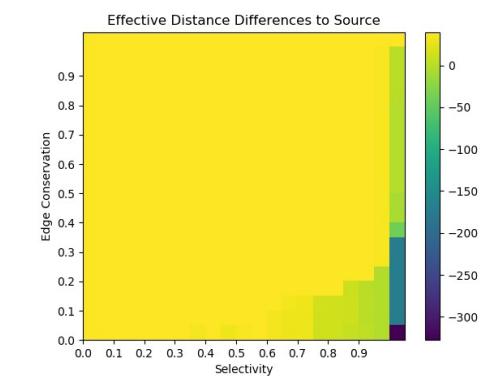
to source Eff. Dist.



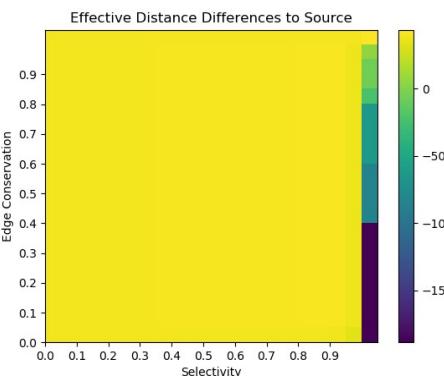
Outgoing edge adaptation



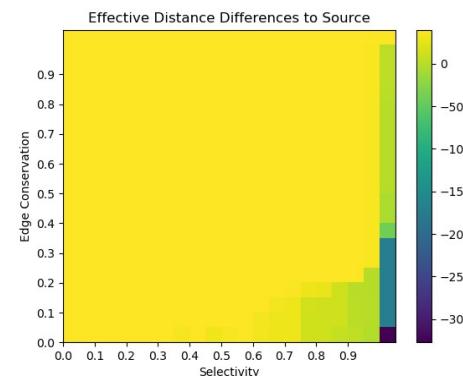
Outgoing edges conserved



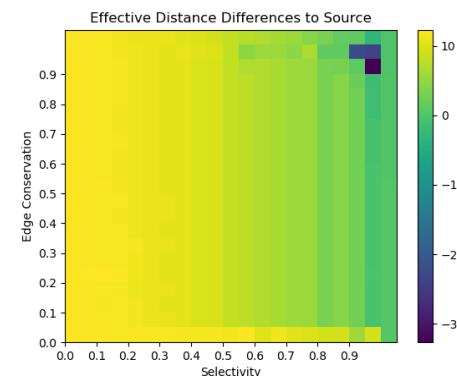
All reversed



ED + A



ED + C



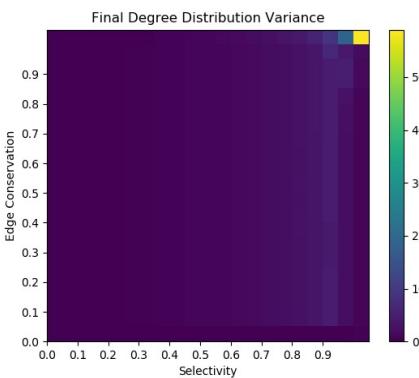
A + C

Sparse Edge Initialization $\gamma = 1.2$

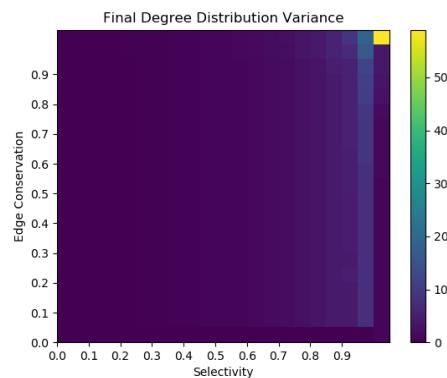
Degree Distribution Variance

Log variance of the *total edge values* distribution

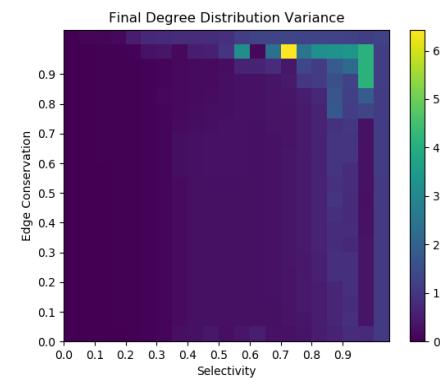
Base Case



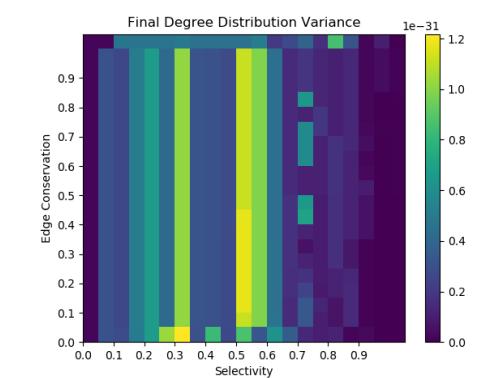
to source Eff. Dist.



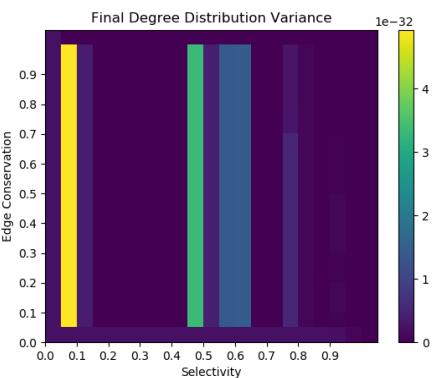
Outgoing edge adaptation



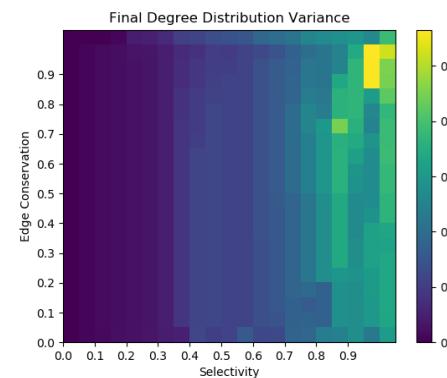
Outgoing edges conserved



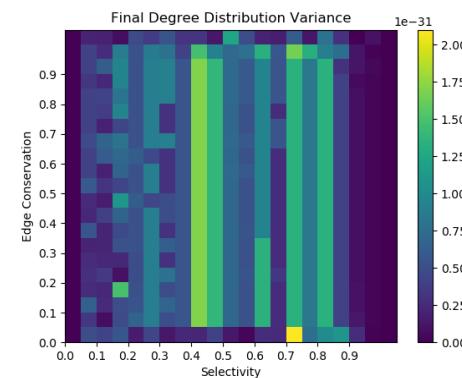
All reversed



ED + A



ED + C



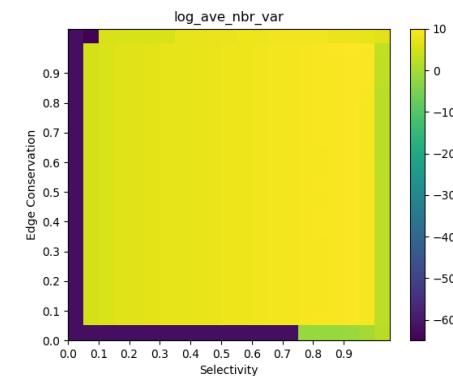
A + C

Sparse Edge Initialization $\gamma = 1.2$

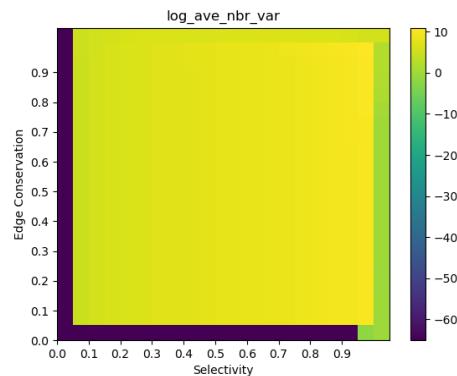
Average Neighbor Variance

Log average neighbor out degree (*at last time step*) variance

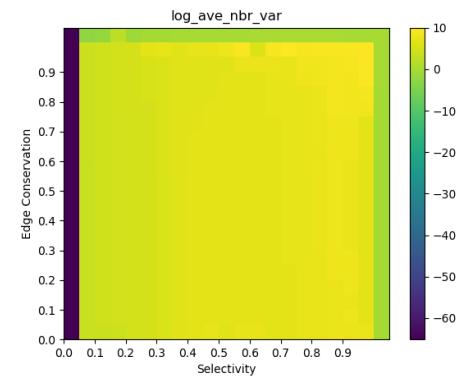
Base Case



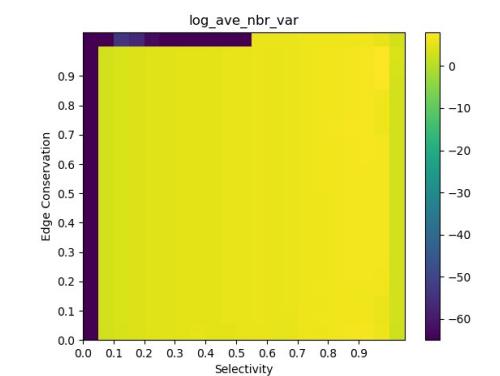
to source Eff. Dist.



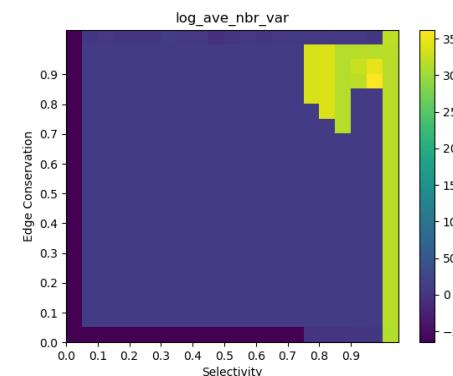
Outgoing edge adaptation



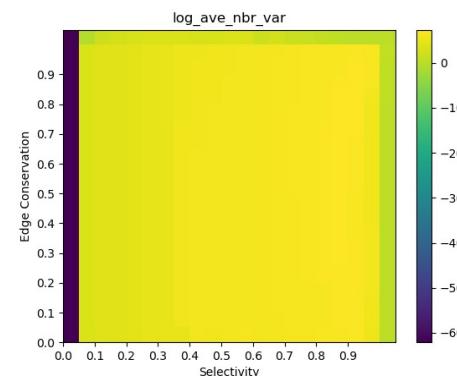
Outgoing edges conserved



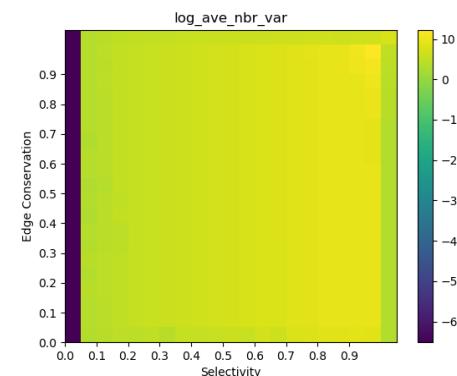
All reversed



ED + A



ED + C



A + C

Sparse Edge Initialization $\gamma = 1.2$

Comparison of Model Mechanics Directionality

All simulations performed with **power law** seeding with exponent 8, edge conservation and selectivity ranges from 0 to 1 in intervals of 0.05, $\delta = 1(0?)$, 50 nodes, 500 runs, equilibrium distance of 100, uniform random edge initialization.

Titles list mechanics whose behavior was reversed from the base:

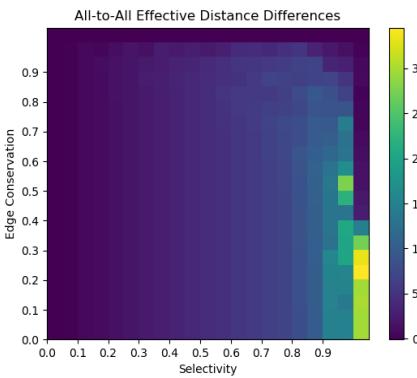
ED → Effective Distance is calculated *to the source* rather than *from it*

A → Nodes adapt *outgoing* edges (not incoming)

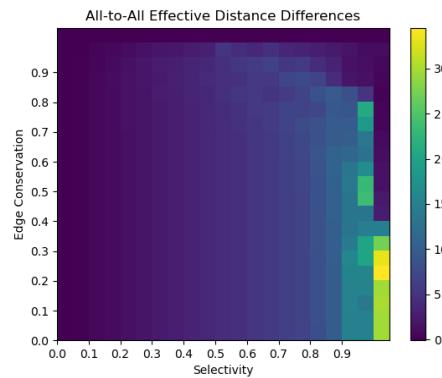
C → A node's sum total *outgoing* edges are conserved (=1)

All-to-All Effective Distance

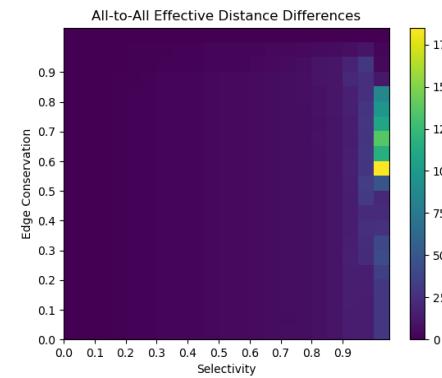
Base Case



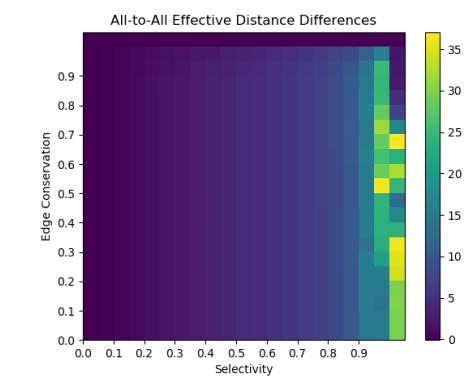
to source Eff. Dist.



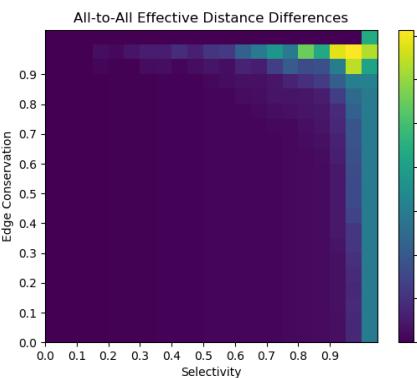
Outgoing edge adaptation



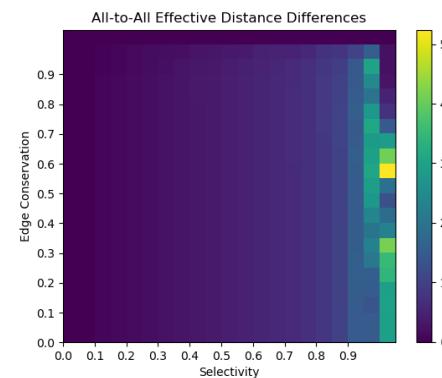
Outgoing edges conserved



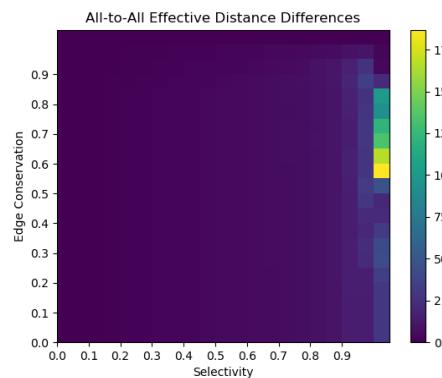
All reversed



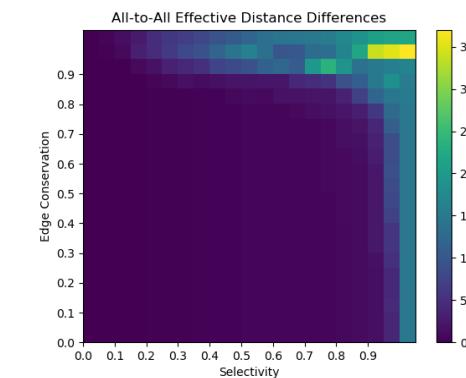
ED + A



ED + C



A + C

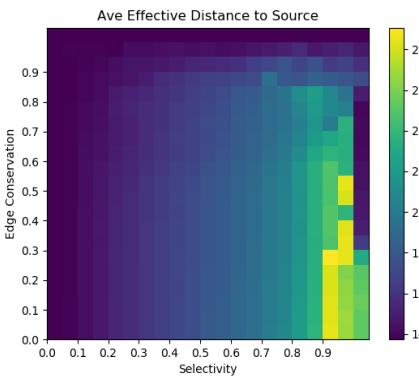


power law exponent 8

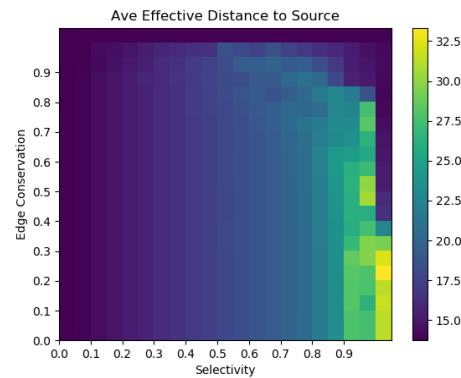
Mean Effective Distances

i.e. Mean Effective Distance over entire run time

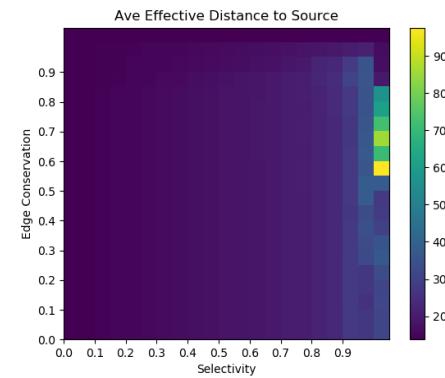
Base Case



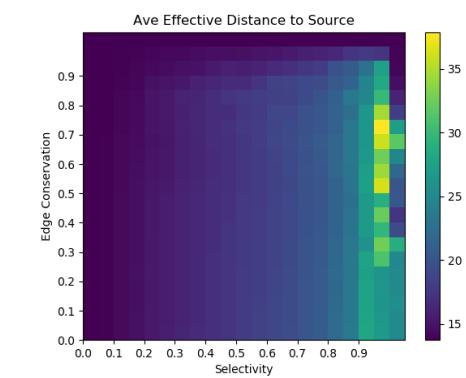
to source Eff. Dist.



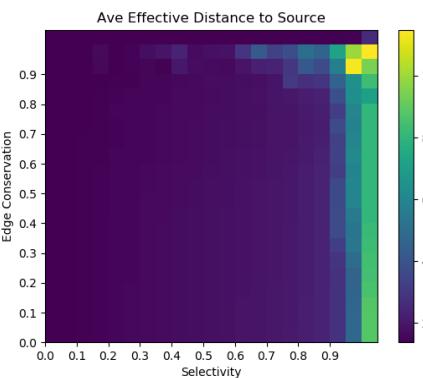
Outgoing edge adaptation



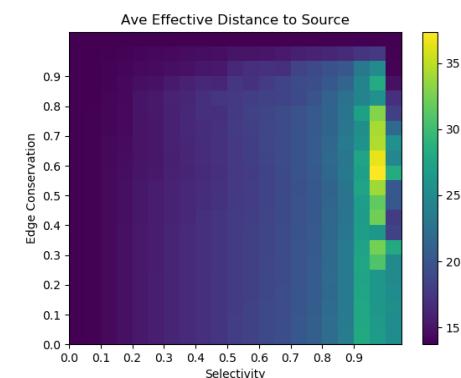
Outgoing edges conserved



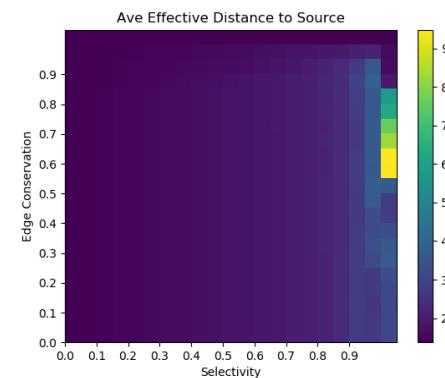
All reversed



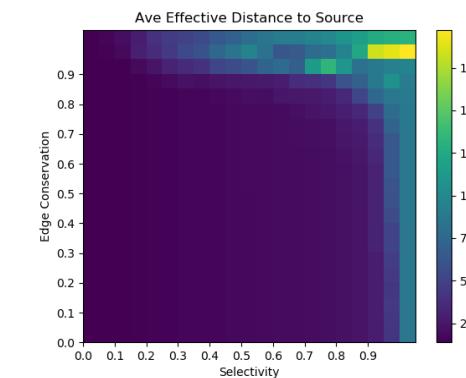
ED + A



ED + C



A + C

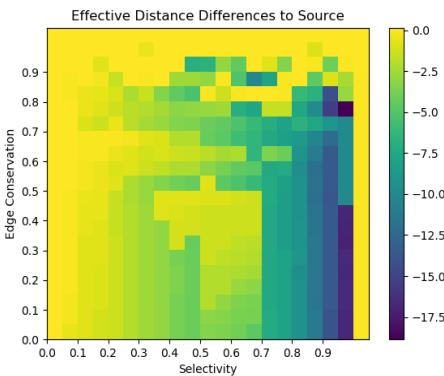


power law exponent 8

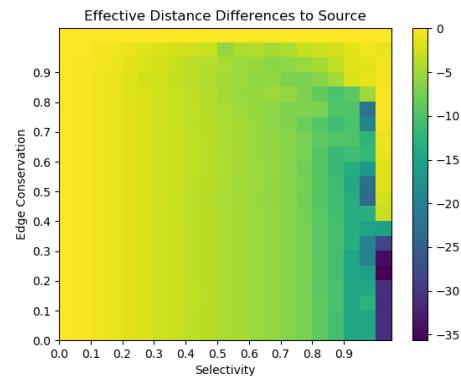
Effective Distance Differences

Effective Distance to source at end subtracted from at start

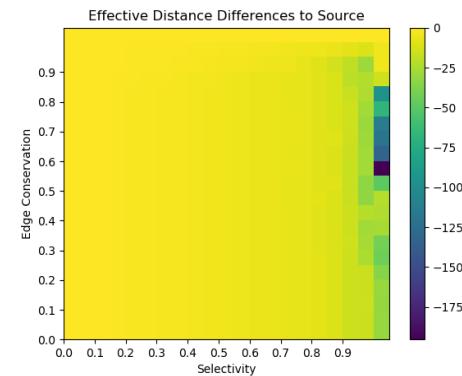
Base Case



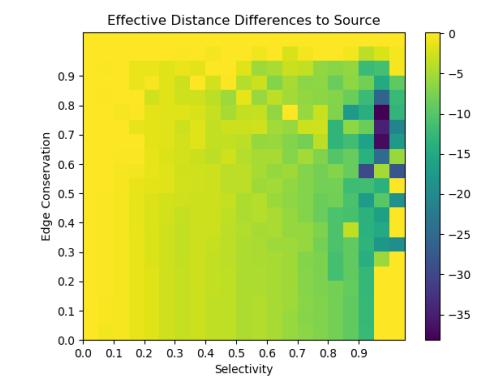
to source Eff. Dist.



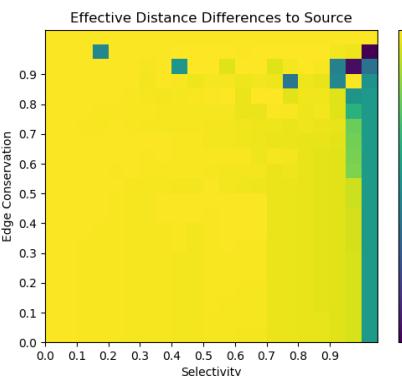
Outgoing edge adaptation



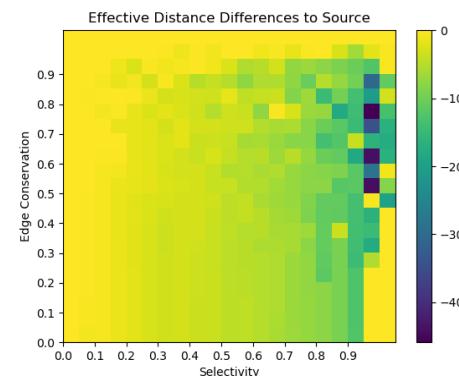
Outgoing edges conserved



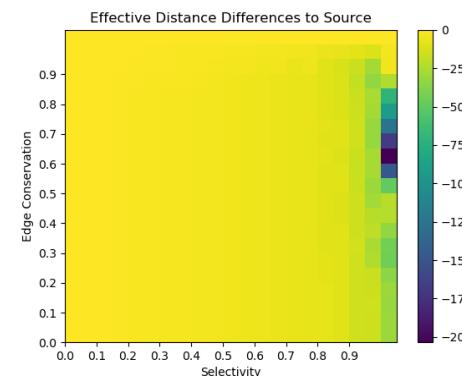
All reversed



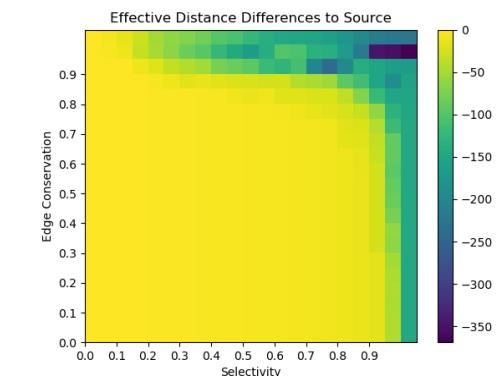
ED + A



ED + C



A + C

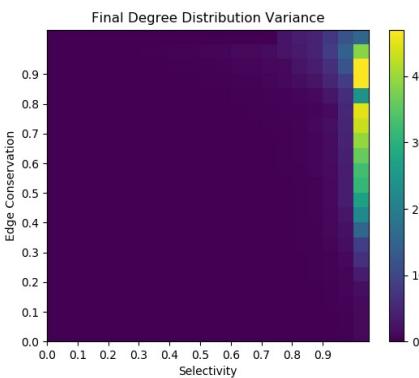


power law exponent 8

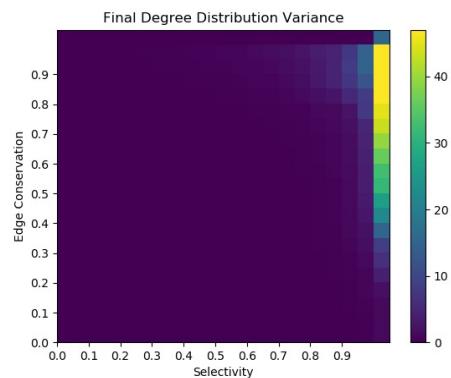
Degree Distribution Variance

Log variance of the *total edge values* distribution

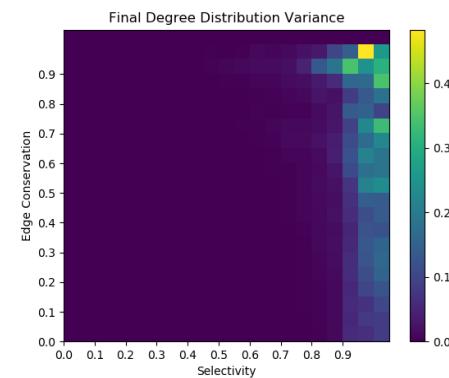
Base Case



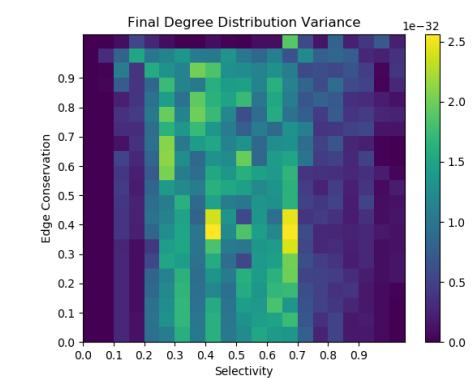
to source Eff. Dist.



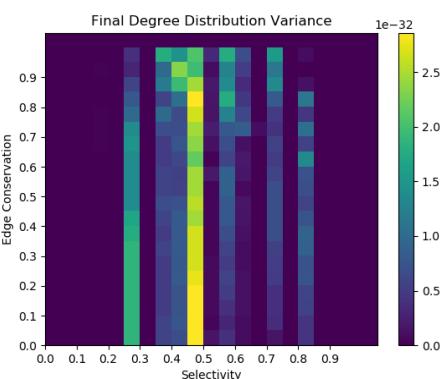
Outgoing edge adaptation



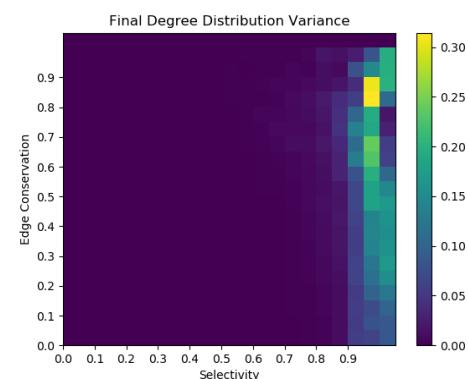
Outgoing edges conserved



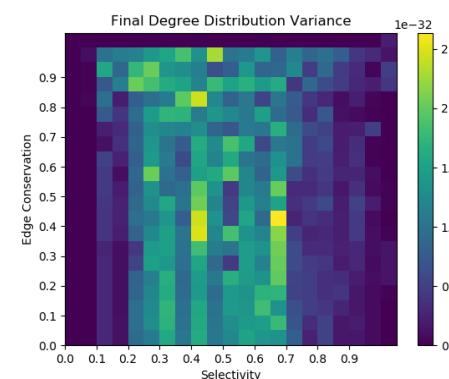
All reversed



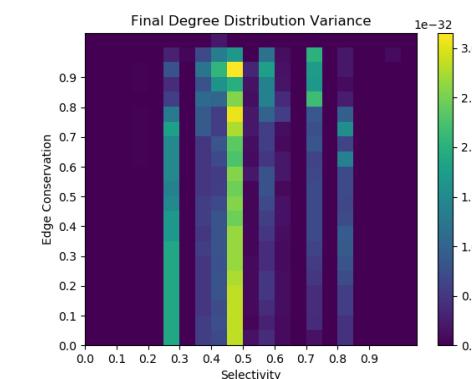
ED + A



ED + C



A + C

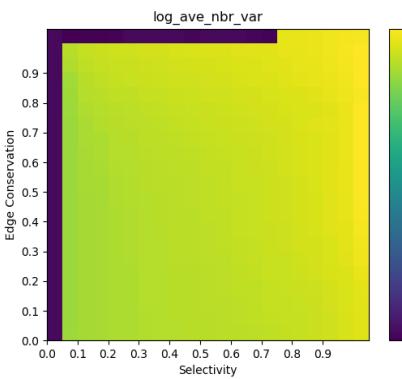


power law exponent 8

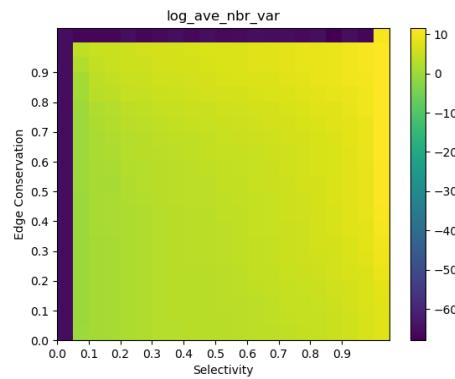
Average Neighbor Variance

Log average neighbor out degree (*at last time step*) variance

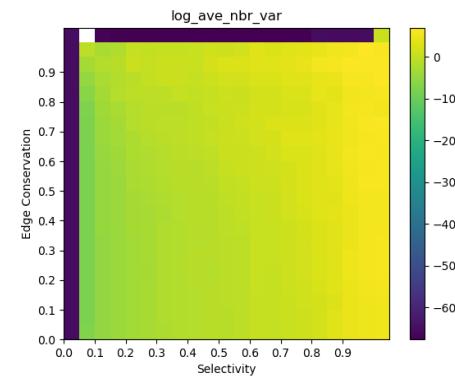
Base Case



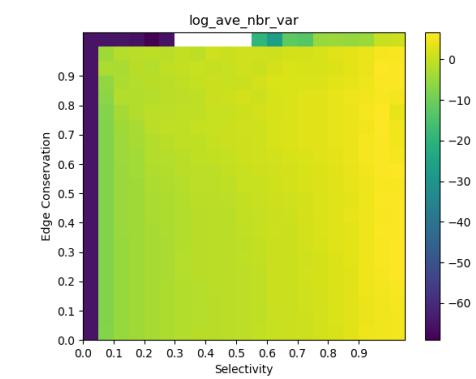
to source Eff. Dist.



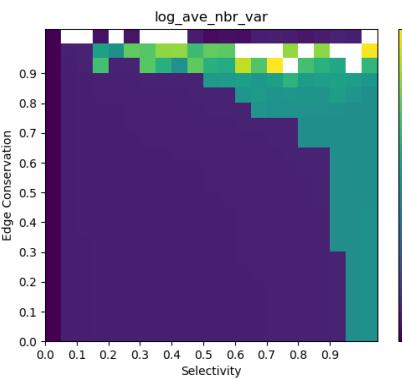
Outgoing edge adaptation



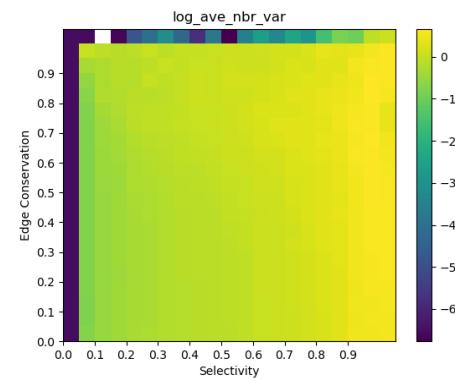
Outgoing edges conserved



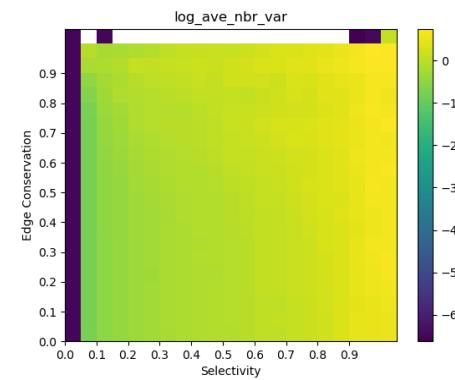
All reversed



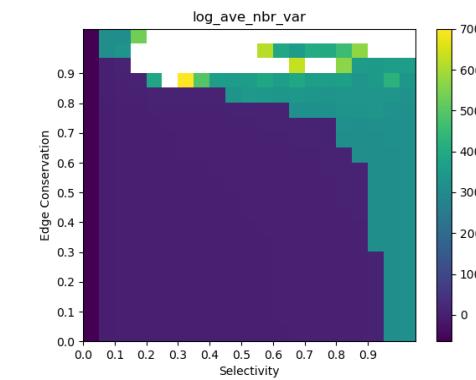
ED + A



ED + C



A + C



power law exponent 8

Comparison of Model Mechanics Directionality

All simulations performed with **power law with exp 8** seeding, edge conservation and selectivity ranges from 0 to 1 in intervals of 0.05, $\delta = 10$, 50 nodes, 500 runs, equilibrium distance of 100, **sparse scale free $\gamma = 1.2$** edge initialization.

Titles list mechanics whose behavior was reversed from the base:

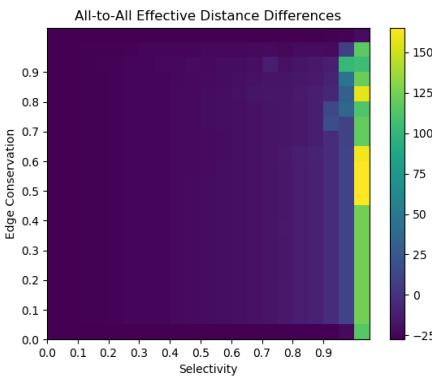
ED → Effective Distance is calculated *to the source* rather than *from it*

A → Nodes adapt *outgoing* edges (not incoming)

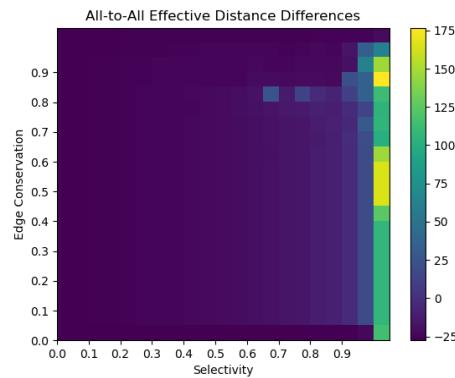
C → A node's sum total *outgoing* edges are conserved (=1)

All-to-All Effective Distance

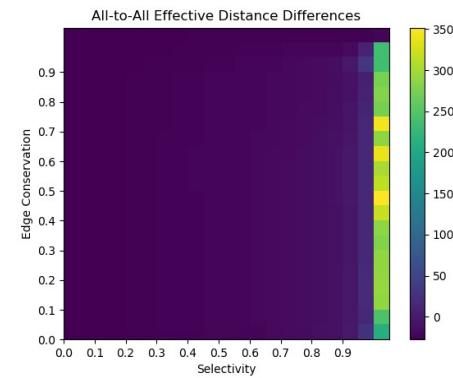
Base Case



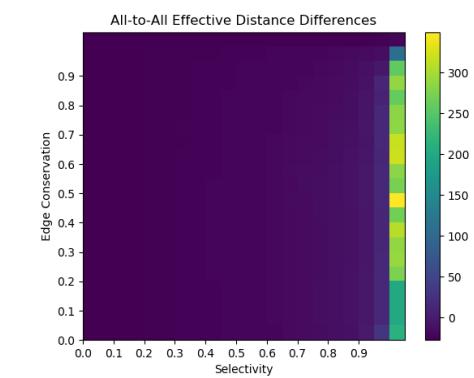
to source Eff. Dist.



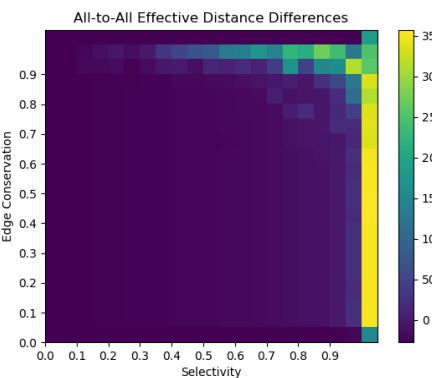
Outgoing edge adaptation



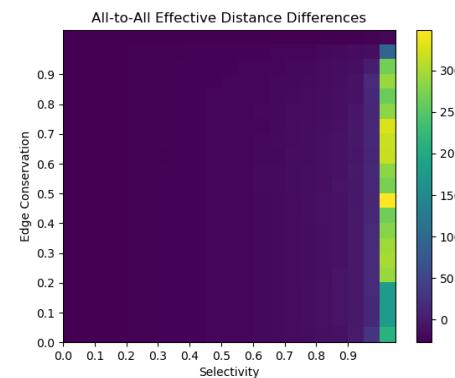
Outgoing edges conserved



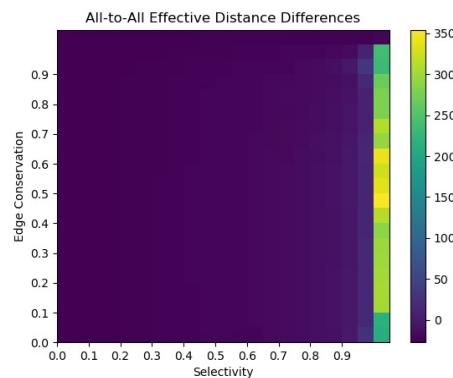
All reversed



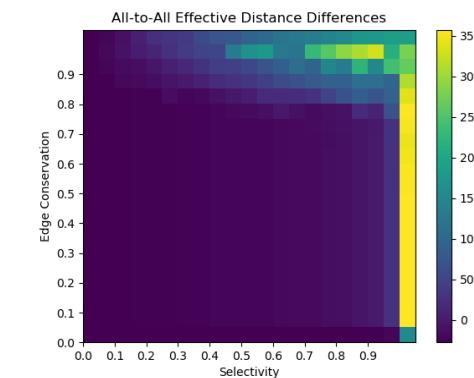
ED + A



ED + C



A + C

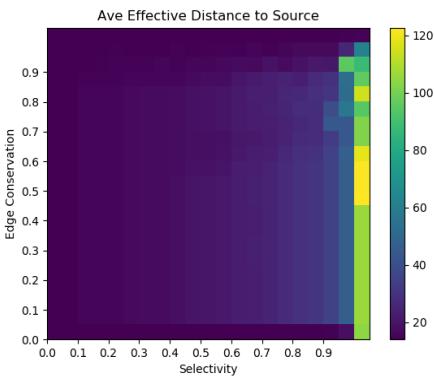


Power Law Seeding (exponent 8)
& Sparse Edge Initialization $\gamma = 1.2$

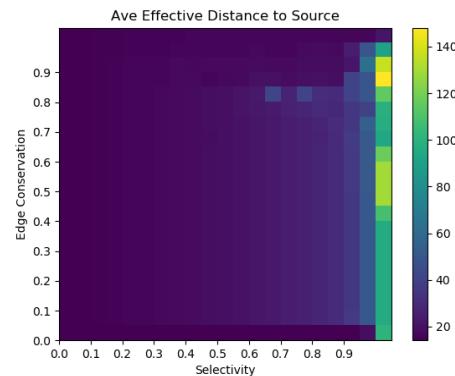
Mean Effective Distances

i.e. Mean Effective Distance over entire run time

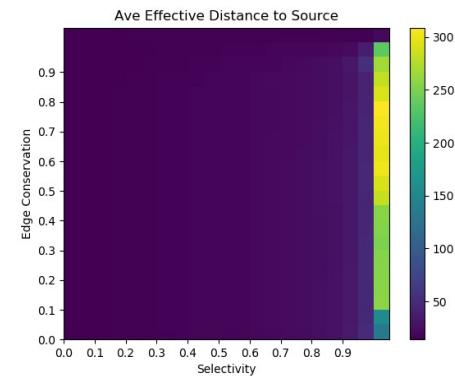
Base Case



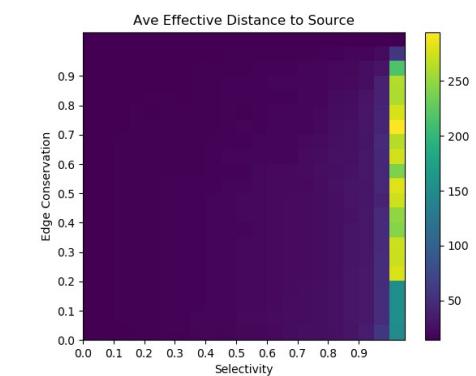
to source Eff. Dist.



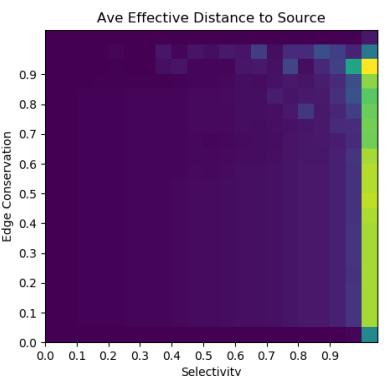
Outgoing edge adaptation



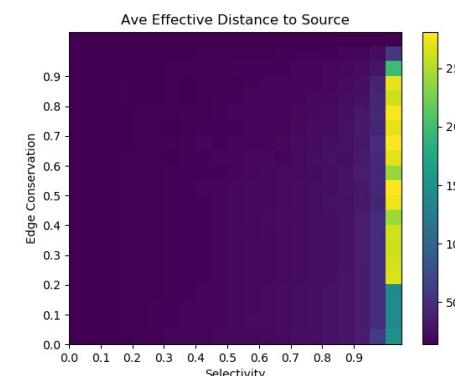
Outgoing edges conserved



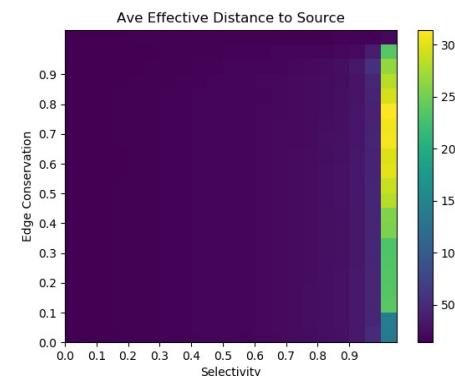
All reversed



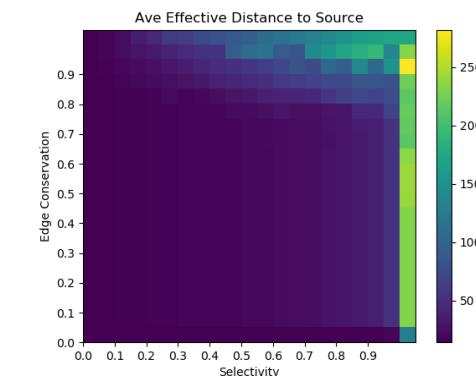
ED + A



ED + C



A + C

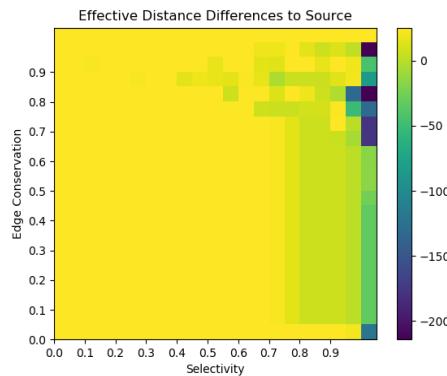


Power Law Seeding (exponent 8)
& Sparse Edge Initialization $\gamma = 1.2$

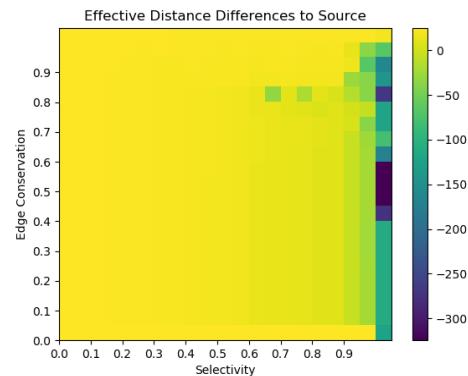
Effective Distance Differences

Effective Distance to source at end subtracted from at start

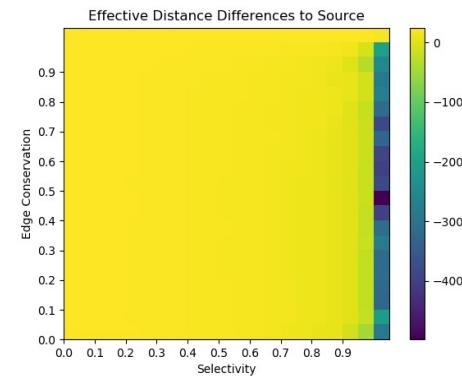
Base Case



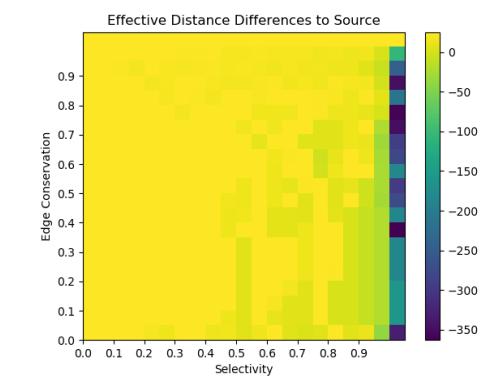
to source Eff. Dist.



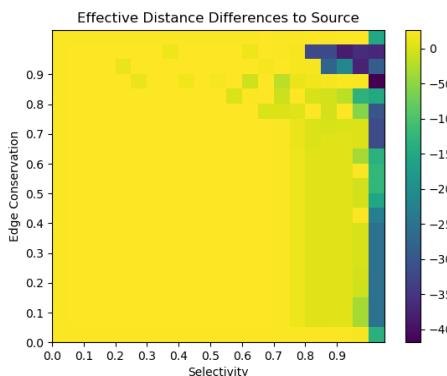
Outgoing edge adaptation



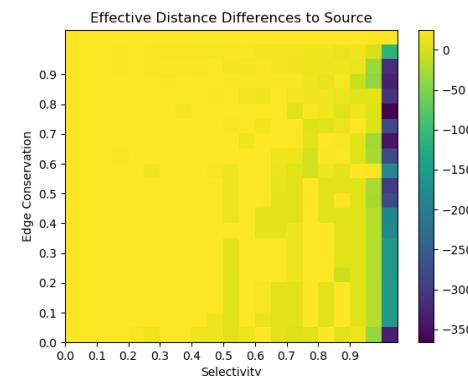
Outgoing edges conserved



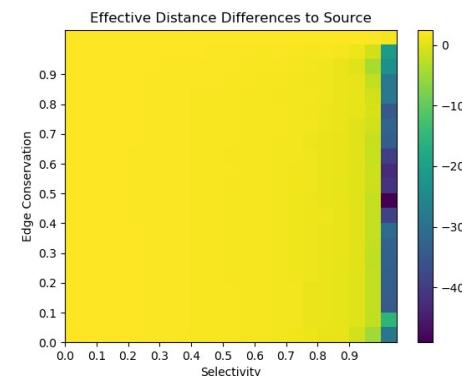
All reversed



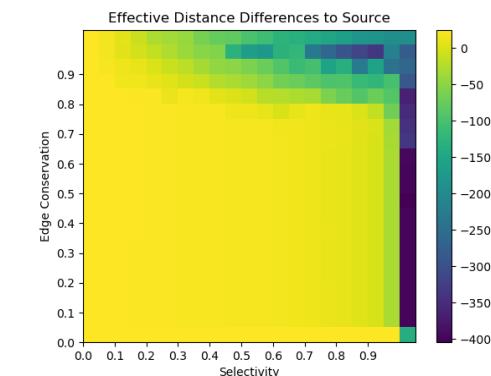
ED + A



ED + C



A + C

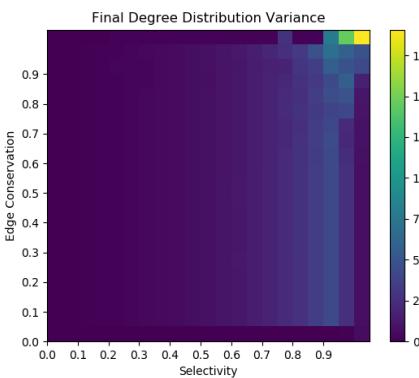


Power Law Seeding (exponent 8)
& Sparse Edge Initialization $\gamma = 1.2$

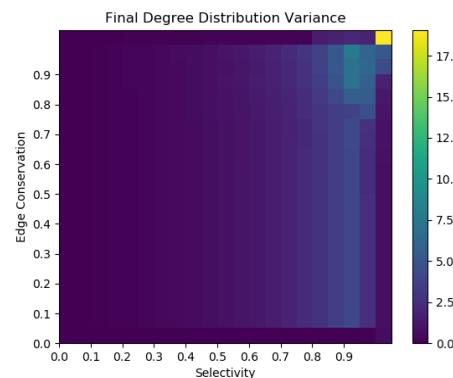
Degree Distribution Variance

Log variance of the *total edge values* distribution

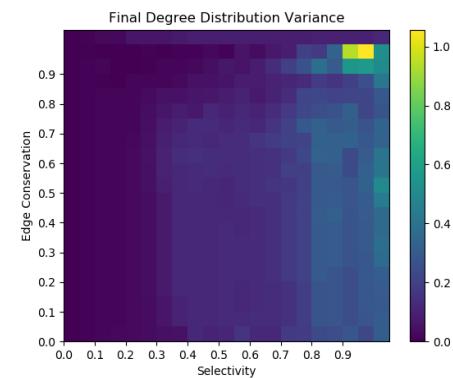
Base Case



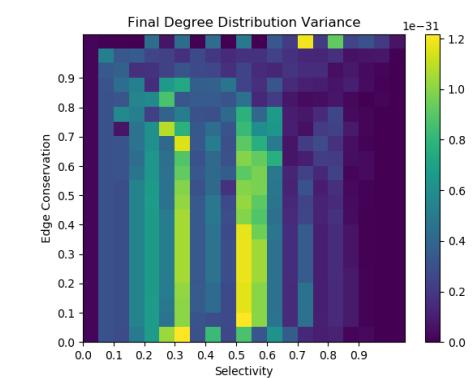
to source Eff. Dist.



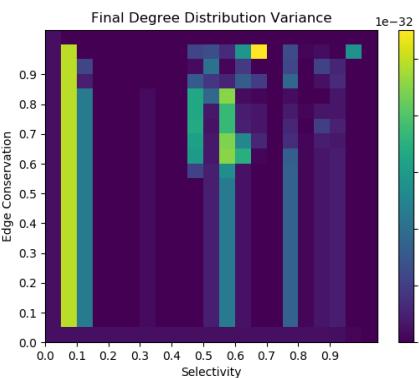
Outgoing edge adaptation



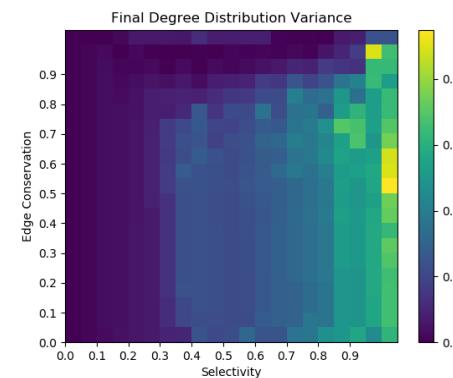
Outgoing edges conserved



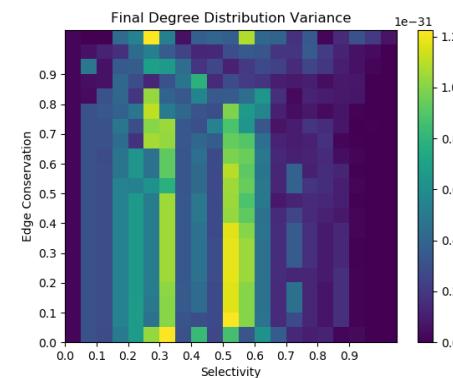
All reversed



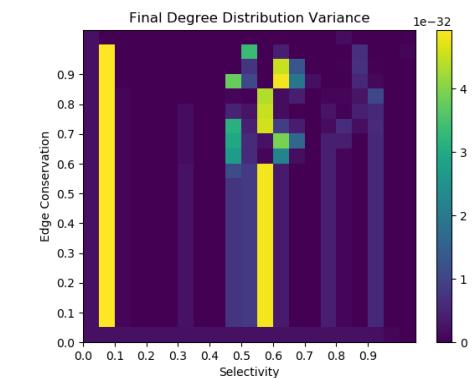
ED + A



ED + C



A + C

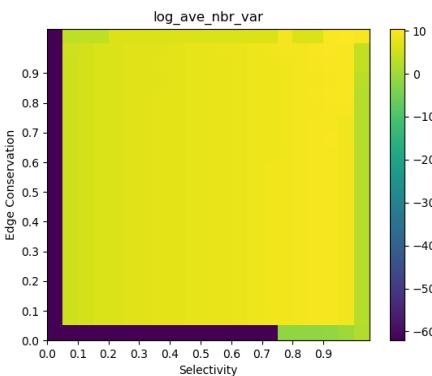


Power Law Seeding (exponent 8)
& Sparse Edge Initialization $\gamma = 1.2$

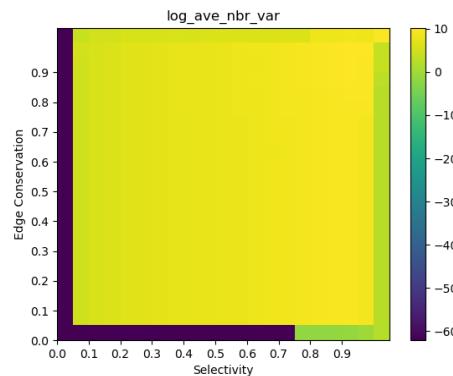
Average Neighbor Variance

Log average neighbor out degree (*at last time step*) variance

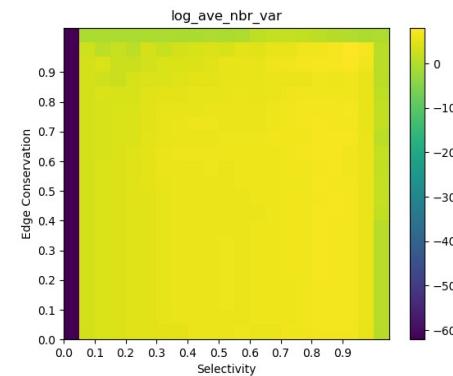
Base Case



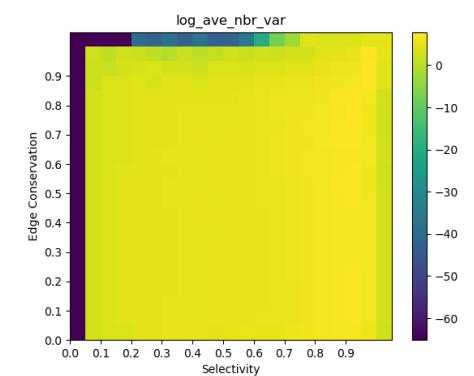
to source Eff. Dist.



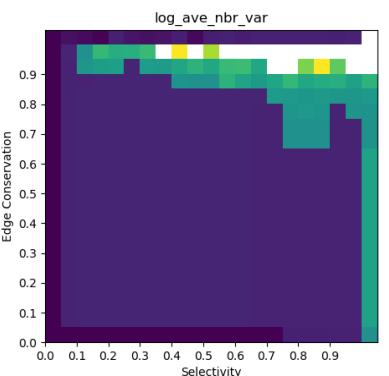
Outgoing edge adaptation



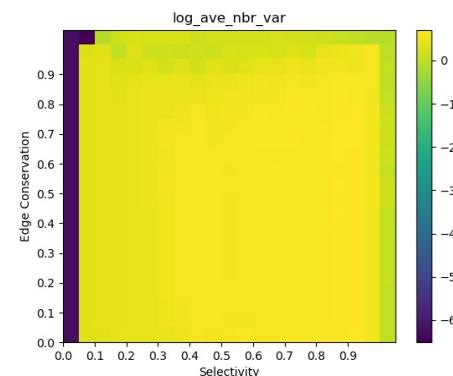
Outgoing edges conserved



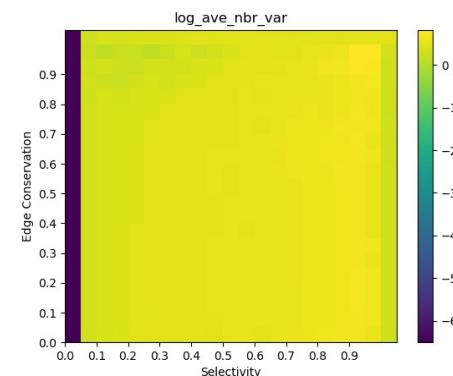
All reversed



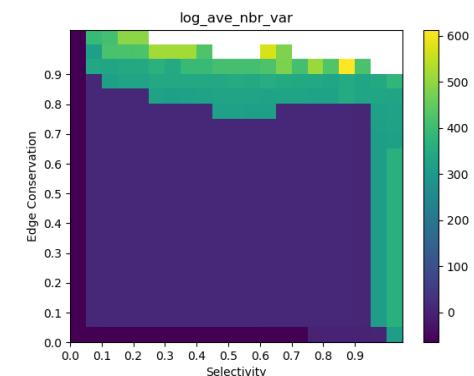
ED + A



ED + C



A + C



Power Law Seeding (exponent 8)
& Sparse Edge Initialization $\gamma = 1.2$

Comparison of Model Mechanics Directionality

All simulations performed with **random** seeding, edge conservation and selectivity ranges from 0 to 1 in intervals of 0.05, $\delta = 10$, 50 nodes, 500 runs, equilibrium distance of 100, **undirected sparse scale free** $y = 1.2$ **edge initialization**.

Titles list mechanics whose behavior was reversed from the base:

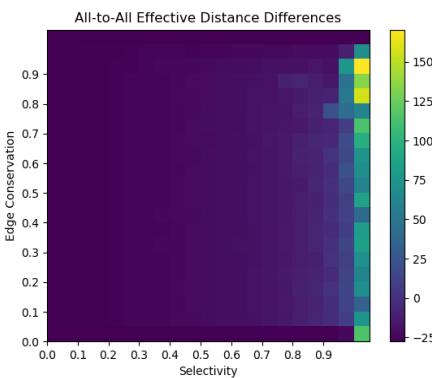
ED → Effective Distance is calculated *to the source* rather than *from it*

A → Nodes adapt *outgoing* edges (not incoming)

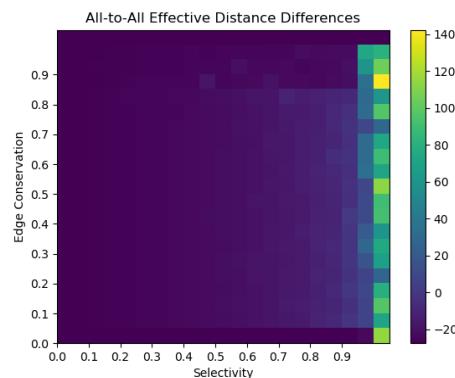
C → A node's sum total *outgoing* edges are conserved (=1)

All-to-All Effective Distance

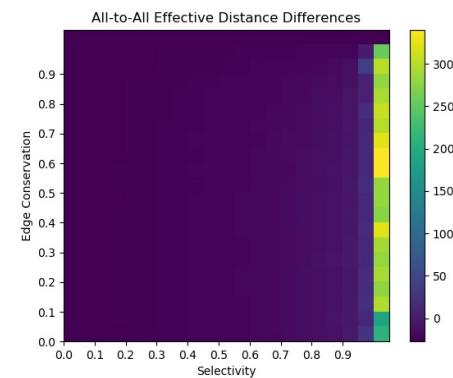
Base Case



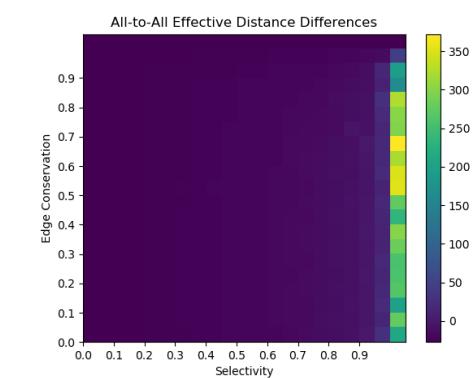
to source Eff. Dist.



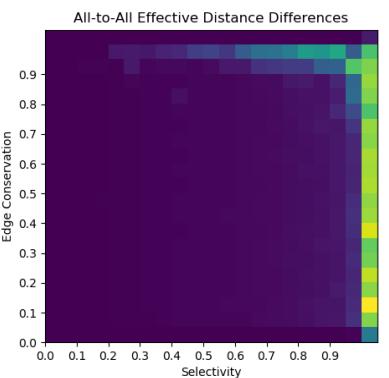
Outgoing edge adaptation



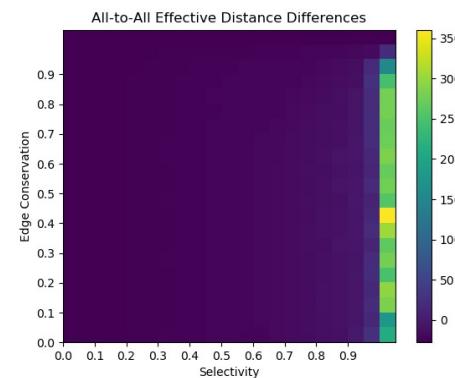
Outgoing edges conserved



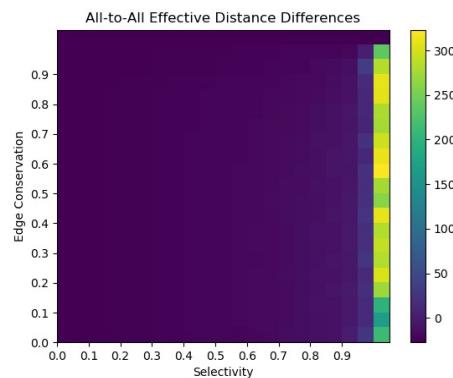
All reversed



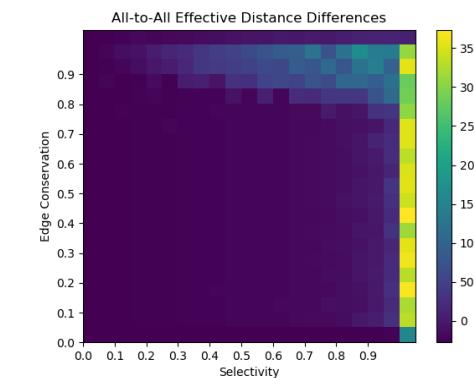
ED + A



ED + C



A + C

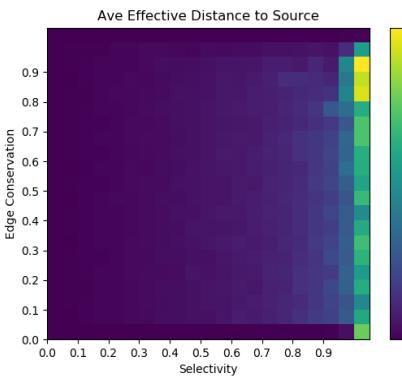


Random Seeding with
Undirected Sparse Edge Initialization $\gamma = 1.2$

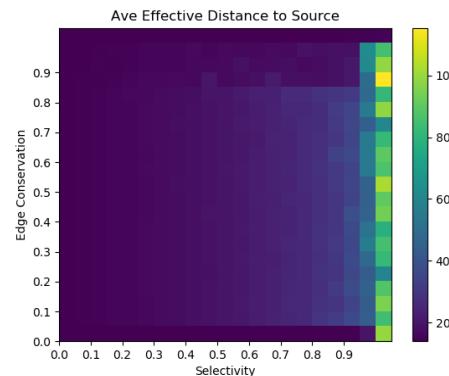
Mean Effective Distances

i.e. Mean Effective Distance over entire run time

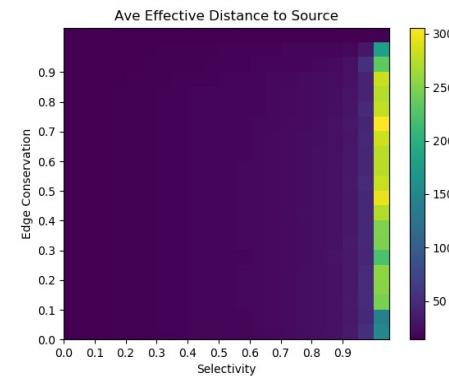
Base Case



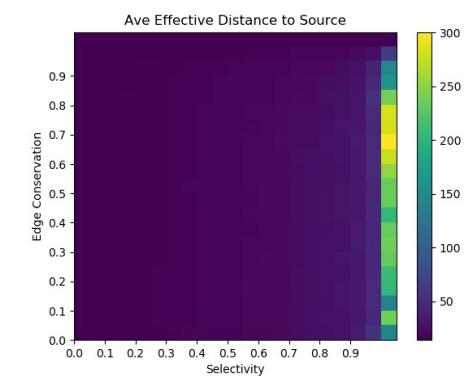
to source Eff. Dist.



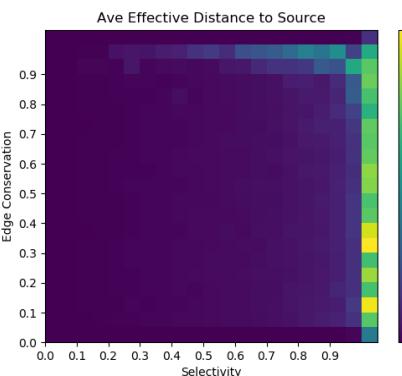
Outgoing edge adaptation



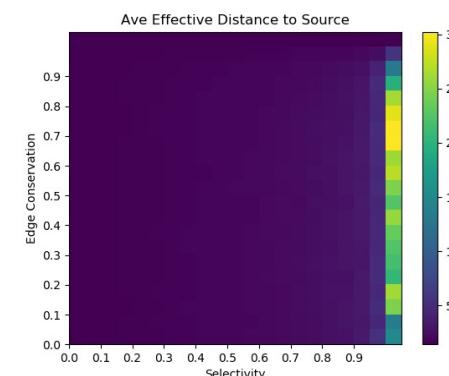
Outgoing edges conserved



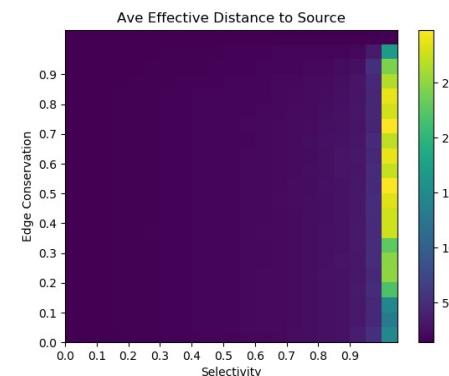
All reversed



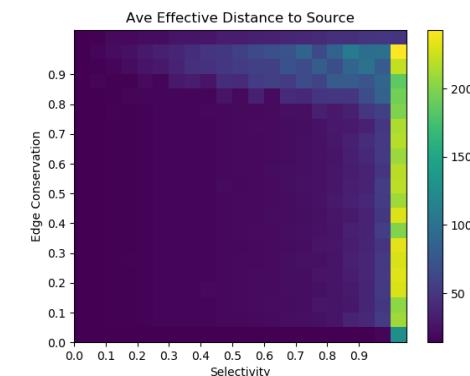
ED + A



ED + C



A + C

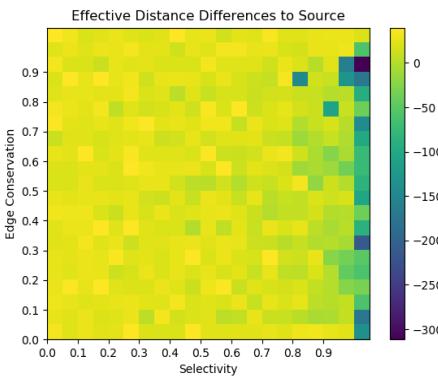


Random Seeding with
Undirected Sparse Edge Initialization $\gamma = 1.2$

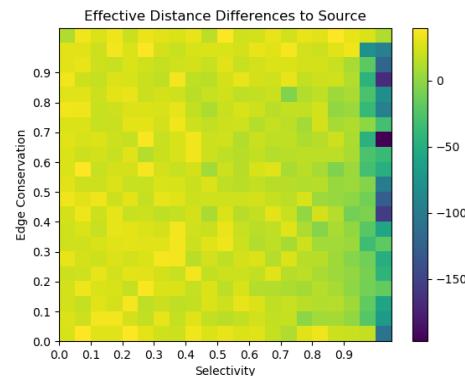
Effective Distance Differences

Effective Distance to source at end subtracted from at start

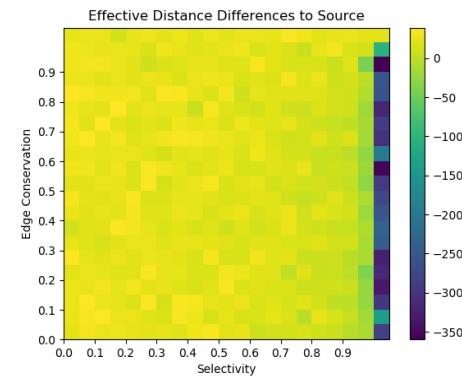
Base Case



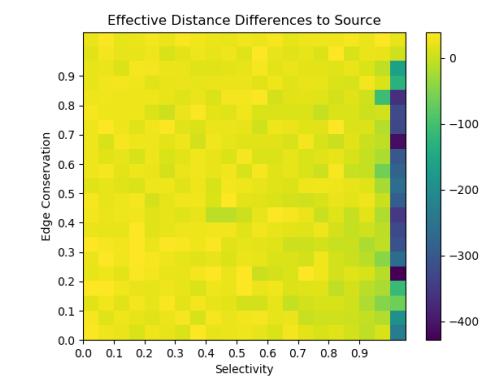
to source Eff. Dist.



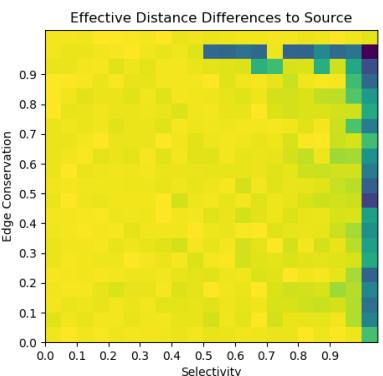
Outgoing edge adaptation



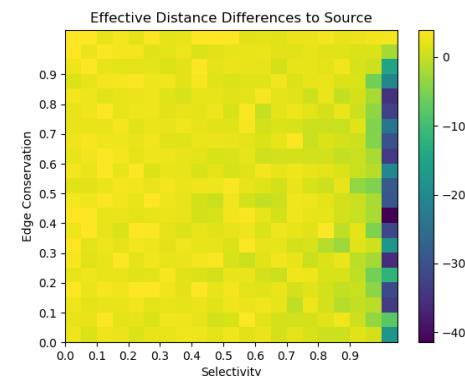
Outgoing edges conserved



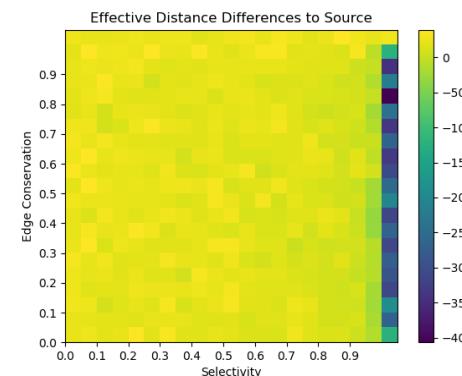
All reversed



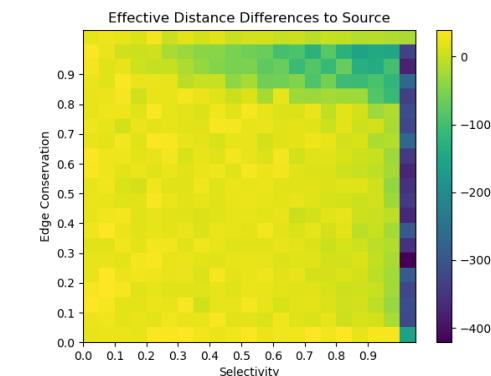
ED + A



ED + C



A + C

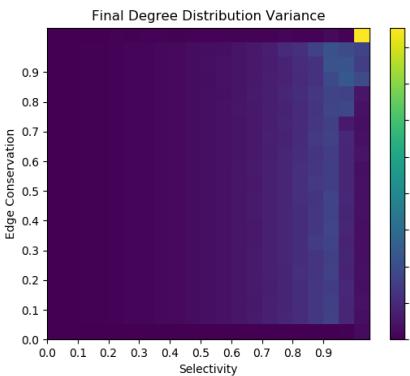


Random Seeding with
Undirected Sparse Edge Initialization $\gamma = 1.2$

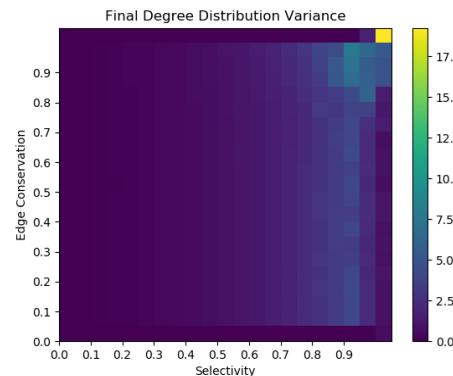
Degree Distribution Variance

Log variance of the *total edge values* distribution

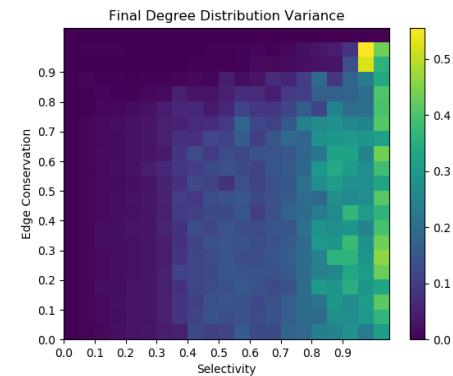
Base Case



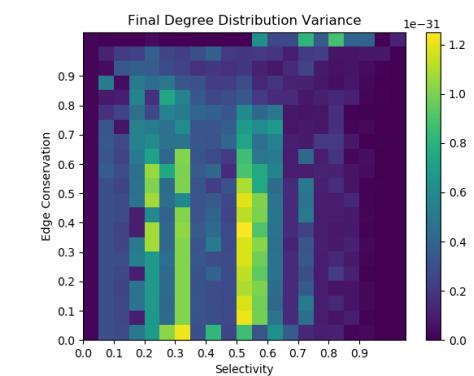
to source Eff. Dist.



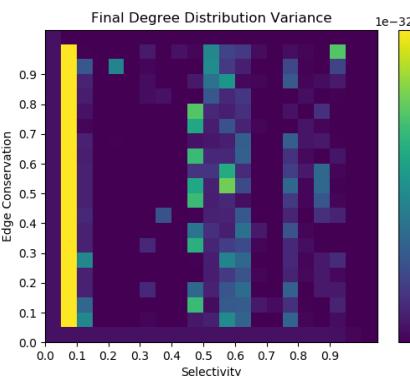
Outgoing edge adaptation



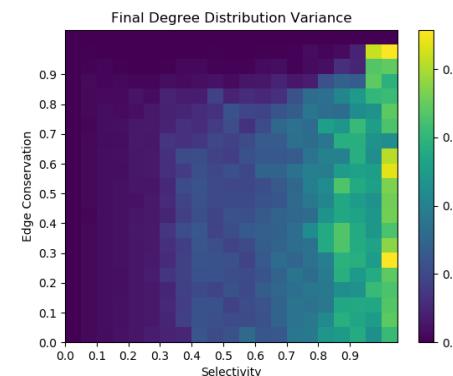
Outgoing edges conserved



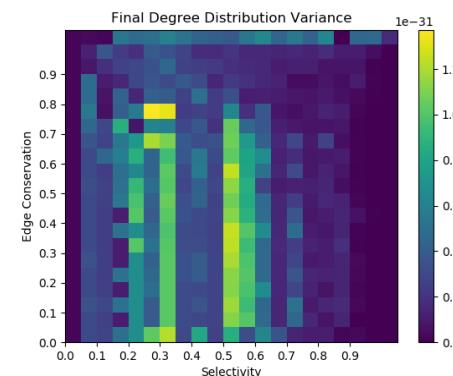
All reversed



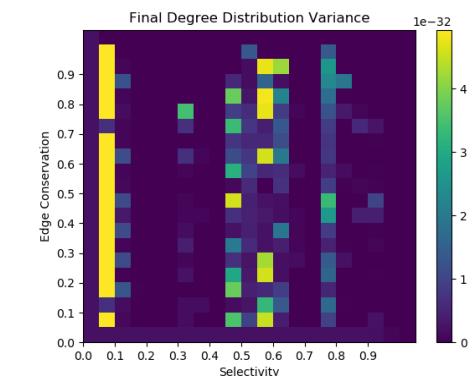
ED + A



ED + C



A + C

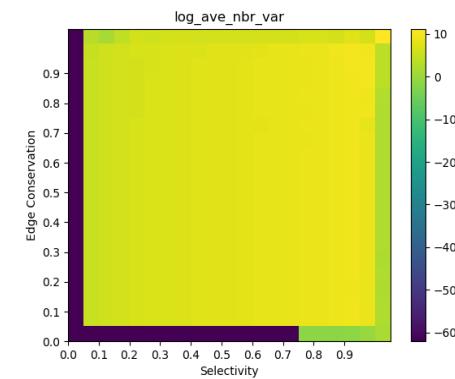


Random Seeding with
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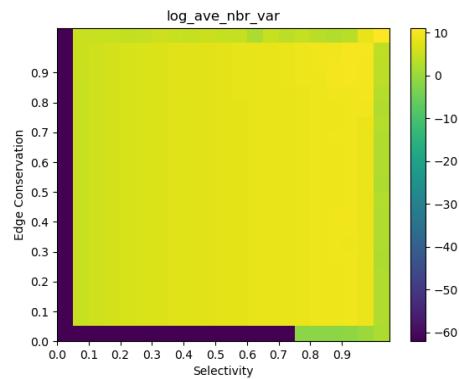
Average Neighbor Variance

Log average neighbor out degree (*at last time step*) variance

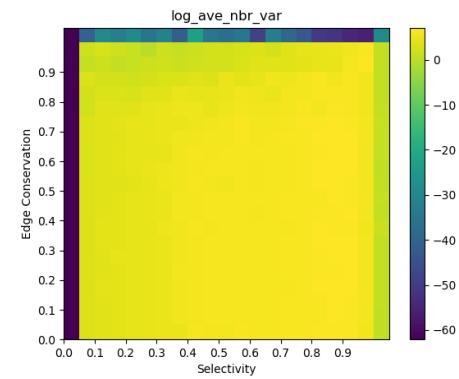
Base Case



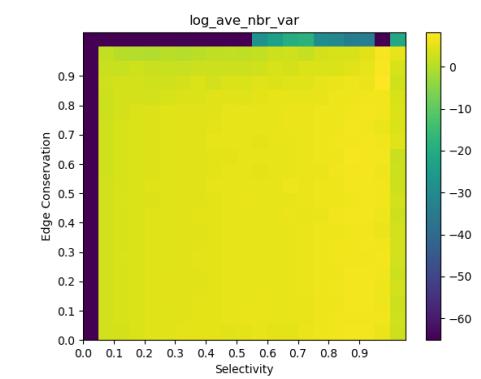
to source Eff. Dist.



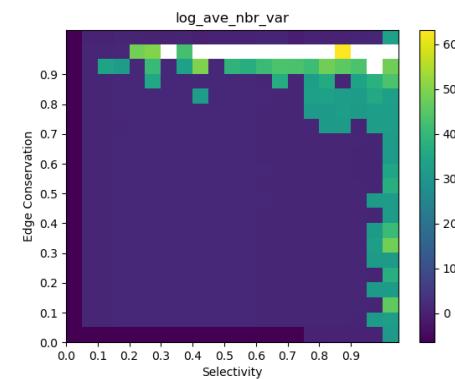
Outgoing edge adaptation



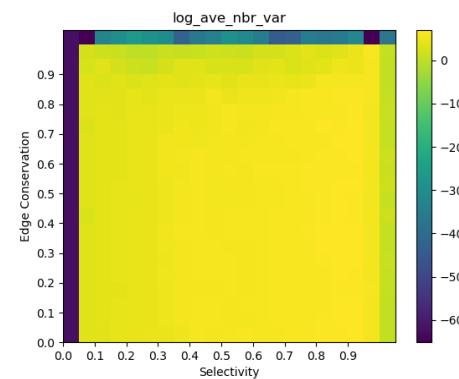
Outgoing edges conserved



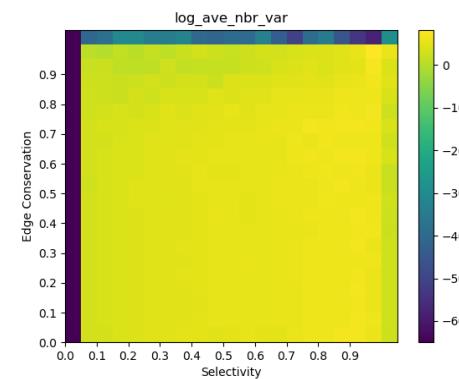
All reversed



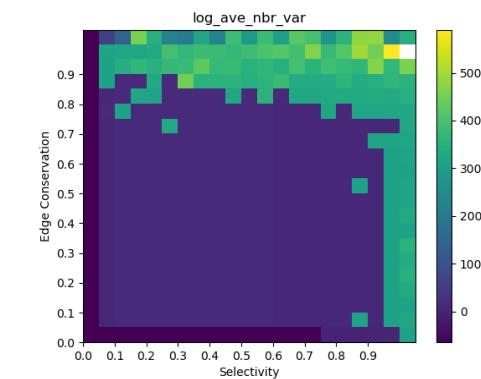
ED + A



ED + C



A + C



Random Seeding with
Undirected Sparse Edge Initialization $\gamma = 1.2$