Schelling Segregation with Neutral Agents

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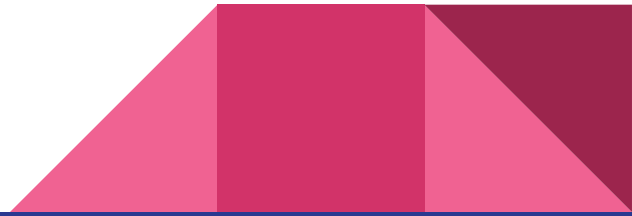
Background & Research Question

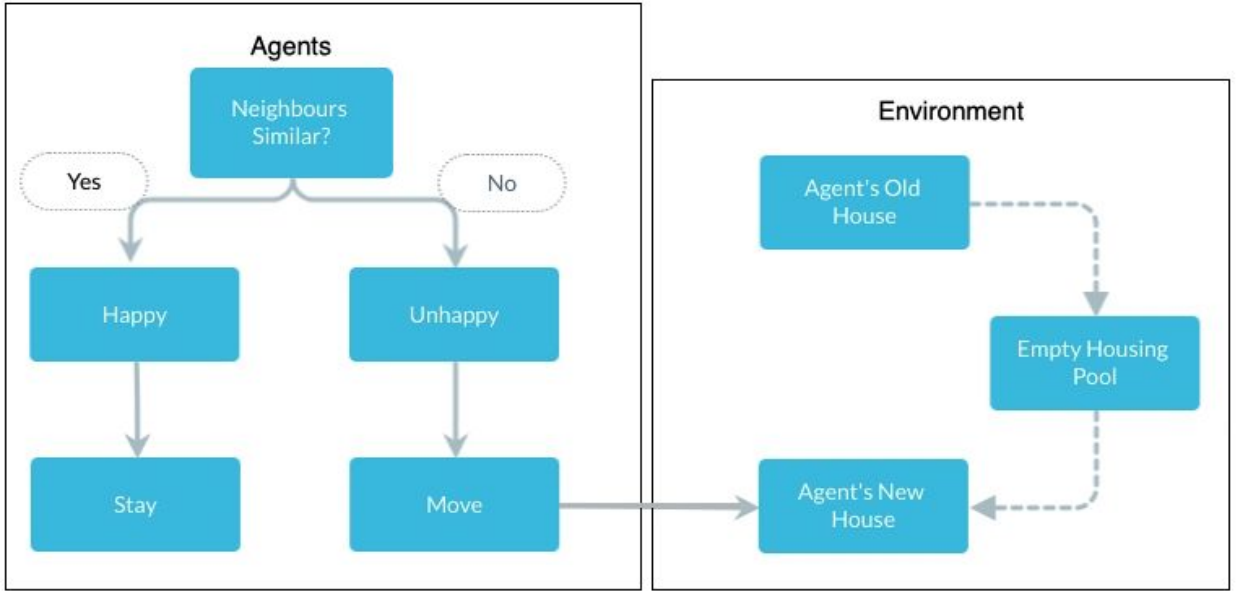
- Demographic Segregation
- Schelling Segregation Model
  - Neutral agents
  - Social Networks

- Does the introduction of neutral agents in a Schelling segregation model yield decreased segregation in comparison to a Schelling segregation model without neutral agents?
  - Total removal of segregation
  - Neighborhood tipping
  - Sensitivity analysis
  - Effects of social network on tolerance levels

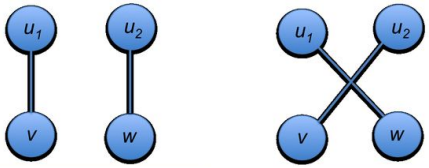


Methods

- Entropy
- Neutral agents
- Decision making
- $\theta = N_s/N$



Methods

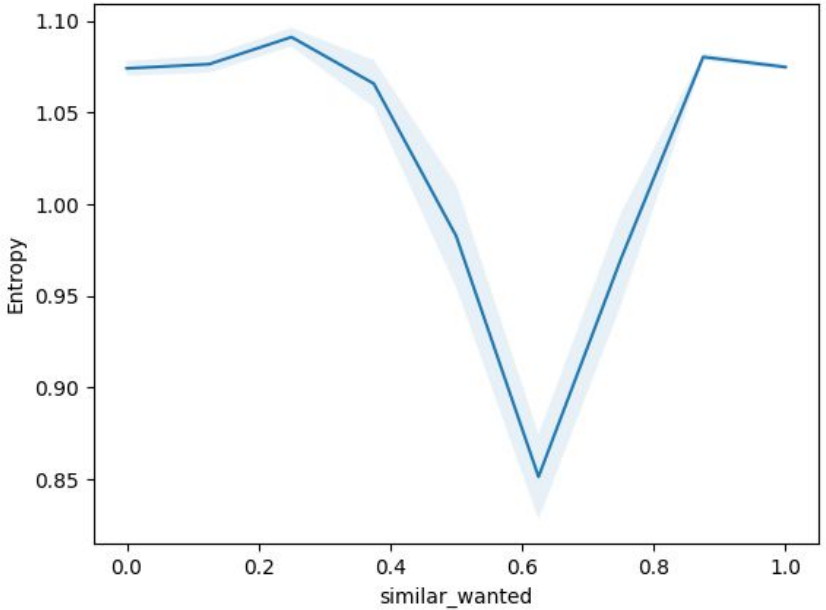


- Social network
  - Regardless of location
  - Erdős–Rényi graph
  - Neutral agents “convince” neighbors $\theta_{new} = \alpha * \theta_{old}$
  - Partly randomize at step
- Parameters

Table 1: Parameters with Bounds

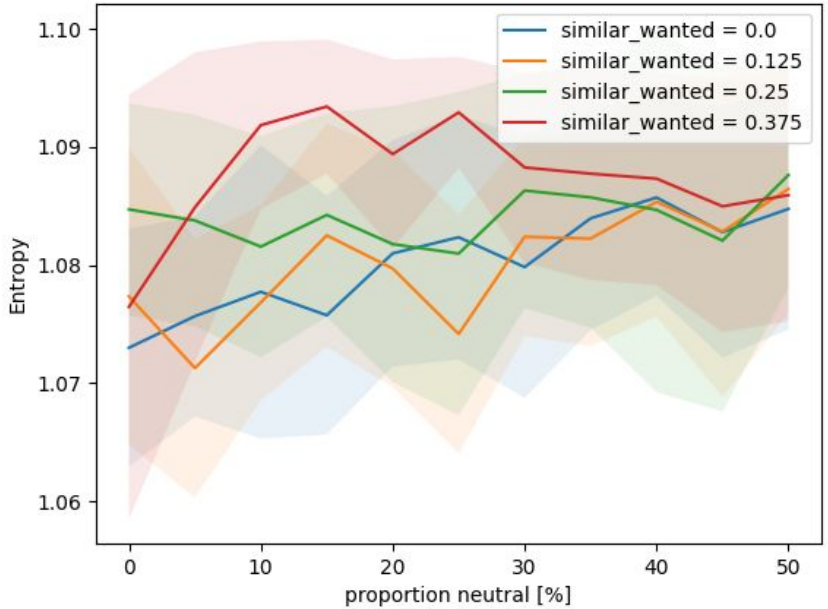
Parameter	Name	Bounds	Default
Size of grid (NxN)	Size	[5,101]	20
Proportion grid filled with agents	Density	[0.05,0.99]	0.75
Proportion neutral agents of total agents	Init_Neutral	[0.1,0.9]	0.33
Proportion of similar neighbours desired θ	Similar_Wanted	[0.01,1]	0.75
Distance agent scans neighbourhood	Radius	[1,5]	1
Erdős–Rényi parameter p	Network_p	[0,1]	0.04
Neutral agents "convincing" rate α	Decrease_Intolerance	[0.9,1]	0.99
Random edge swap parameter δ	Randomize_Part	[0,1]	0.5

Results - Verification original Schelling model



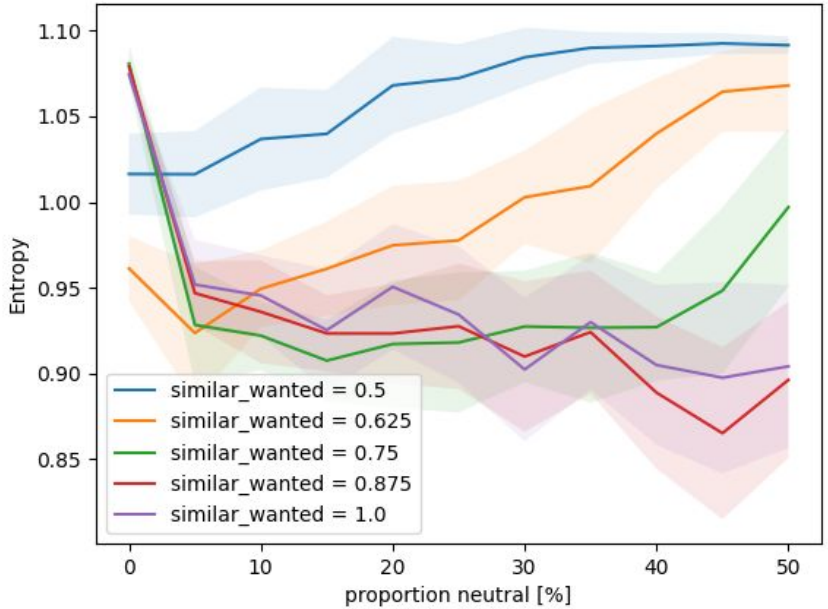
- No neutral agents
- Original Schelling model created segregation at $\theta > \frac{3}{8}$

Results - Impact neutrals on entropy I



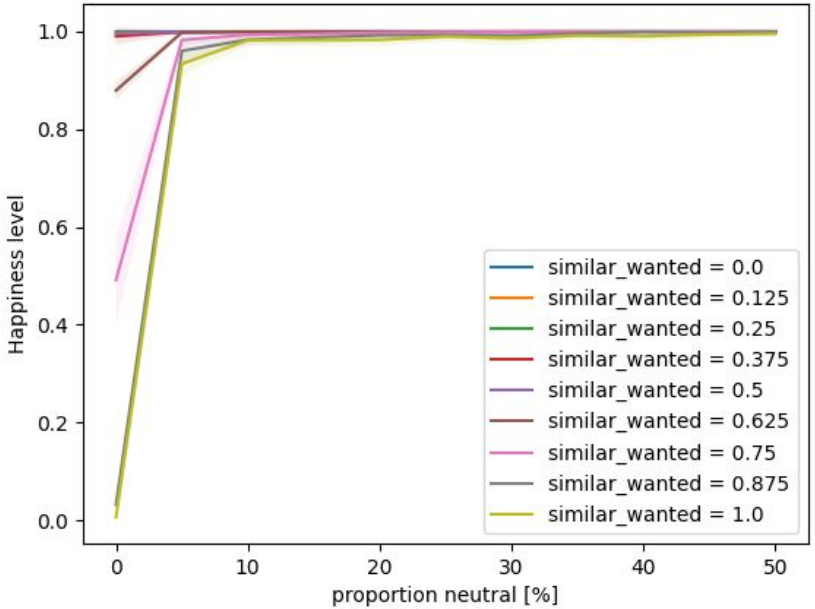
- No effect on neutrals noted for low values of θ

Results - Impact neutrals on entropy II



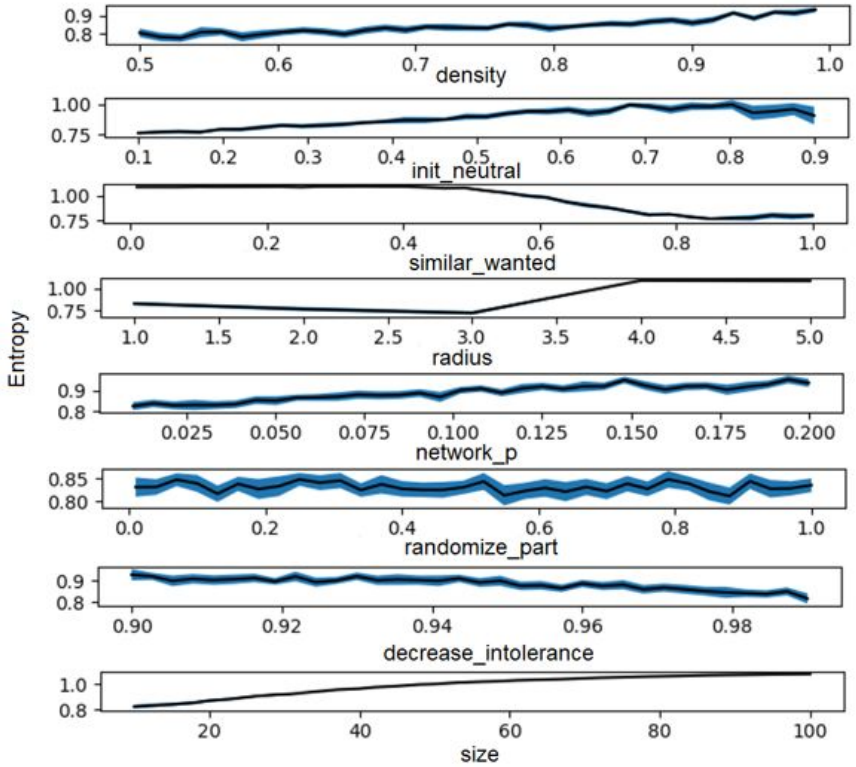
- Steady incline for θ = 0.5 and 0.625
- Drastic entropy drop when neutral agents are add for θ = 0.75, 0.875, and 1

Results - Impact neutrals on happiness



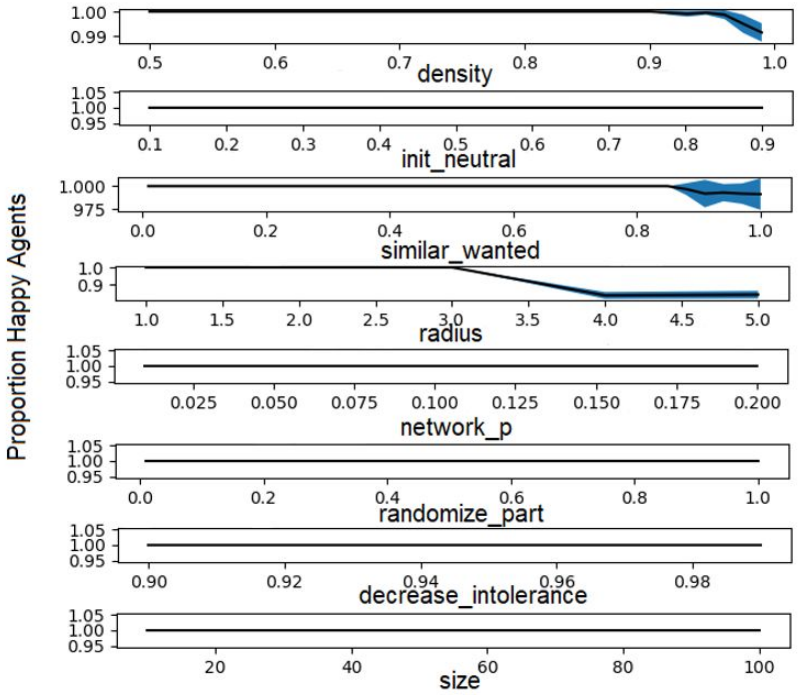
- Neutral agents increase happiness for all values of θ

Results - Sensitivity Analysis OFAT - Entropy



- 8D parameter space
- Aberrations within replicates high for randomize_part and decrease_intolerance

Results - Sensitivity Analysis

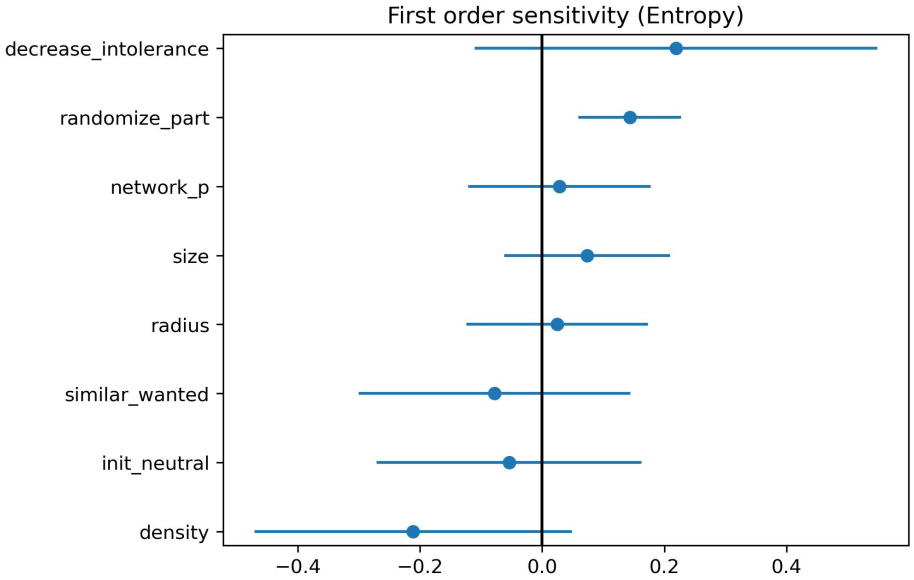


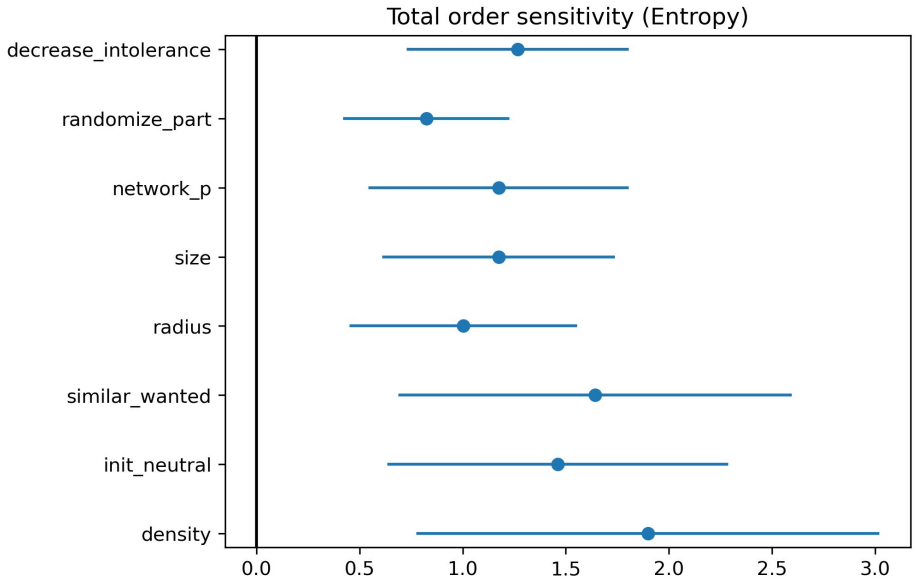
OFAT - Happy agents

- Initial values always converge to 100% Happy agents

Results - Sensitivity Analysis GSA - Entropy

All parameters influential

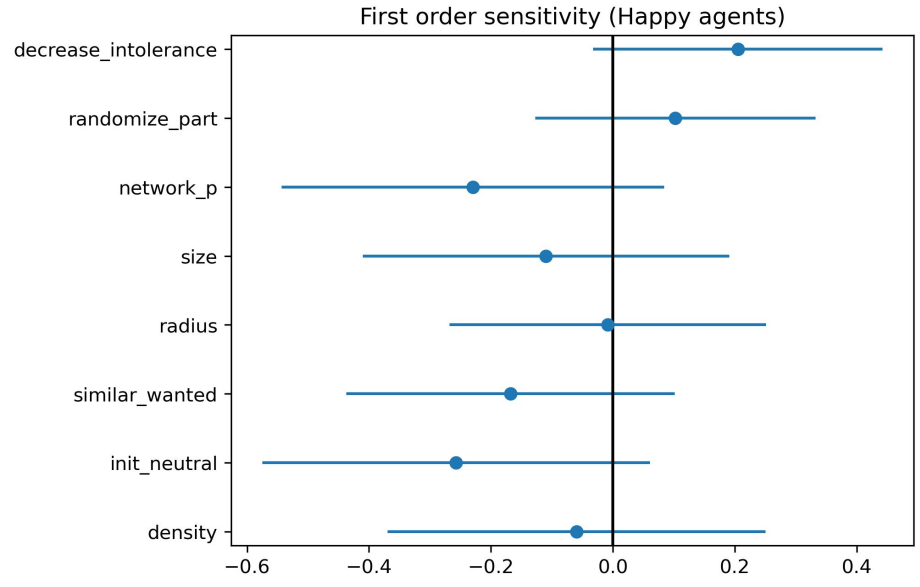


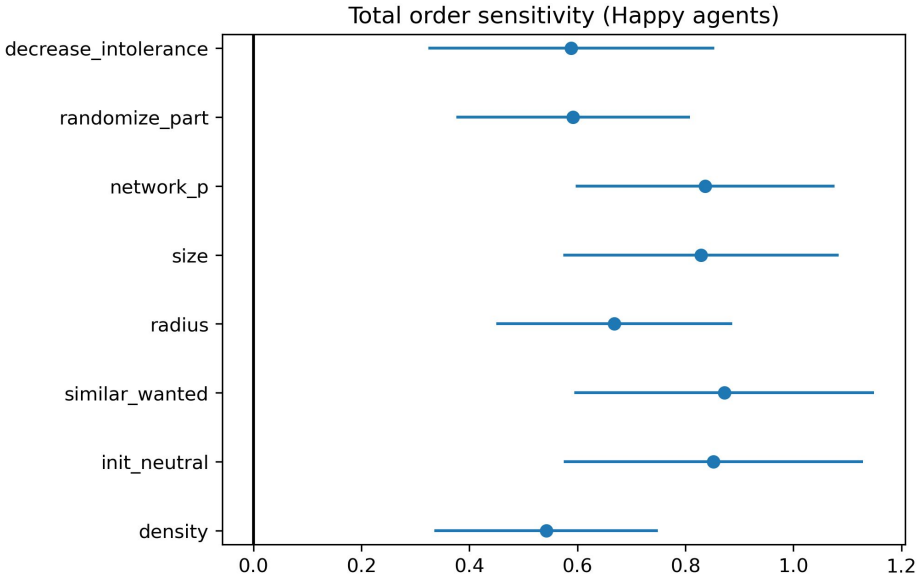


Results - Sensitivity Analysis

GSA - Happy agents

Keep all parameters





Discussion & Further Research

- Agent moving behavior
- Scope of segregation causality
- Geoschelling
- Neutral agent research