

CSDP Research Programmer Job Simulation Task

Visualizations

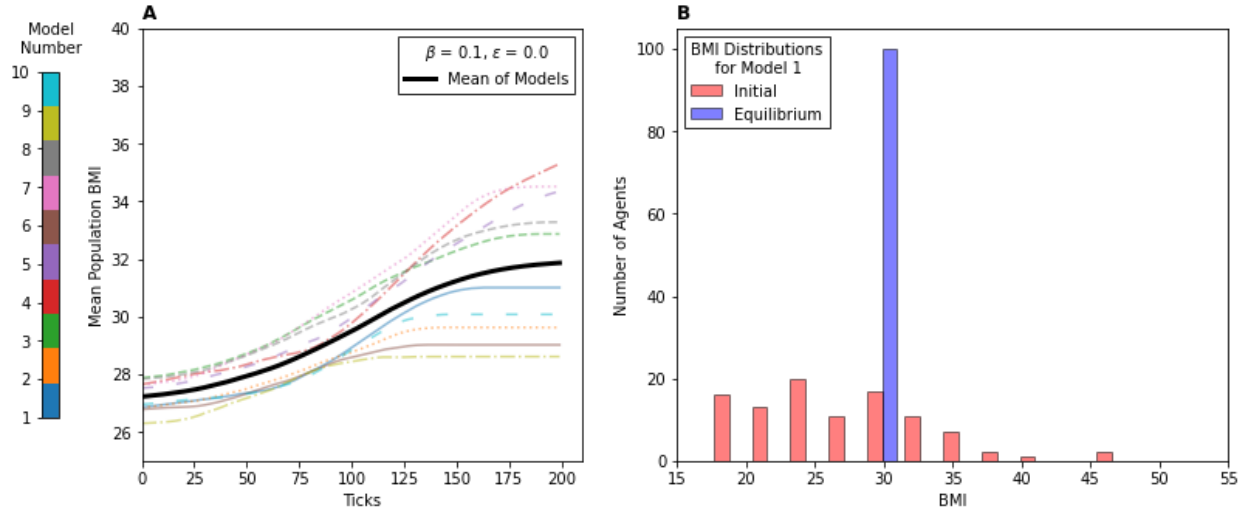


Figure 1. Agent-based model results from ten models with a low “rewiring probability”, $\beta = 0.1$, and a low “satisficing radius”, $\epsilon = 0.0$. The mean population BMI over the course of ten models was plotted, along with the mean of the ten models (A). Histogram of the initial (red) and final (blue) distributions of BMIs in the agent population (B).

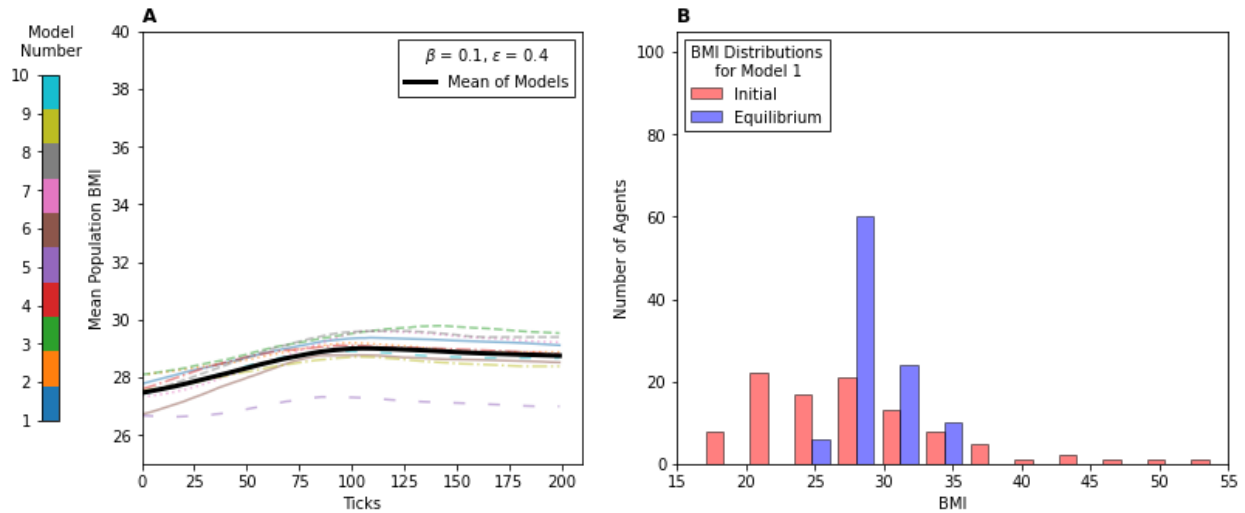


Figure 2. Agent-based model results from ten models with a low “rewiring probability”, $\beta = 0.1$, and a high “satisficing radius”, $\epsilon = 0.4$. The mean population BMI over the course of ten models, along with the mean of the ten models (A). Histogram of the initial (red) and final (blue) distributions of BMIs in the agent population (B).

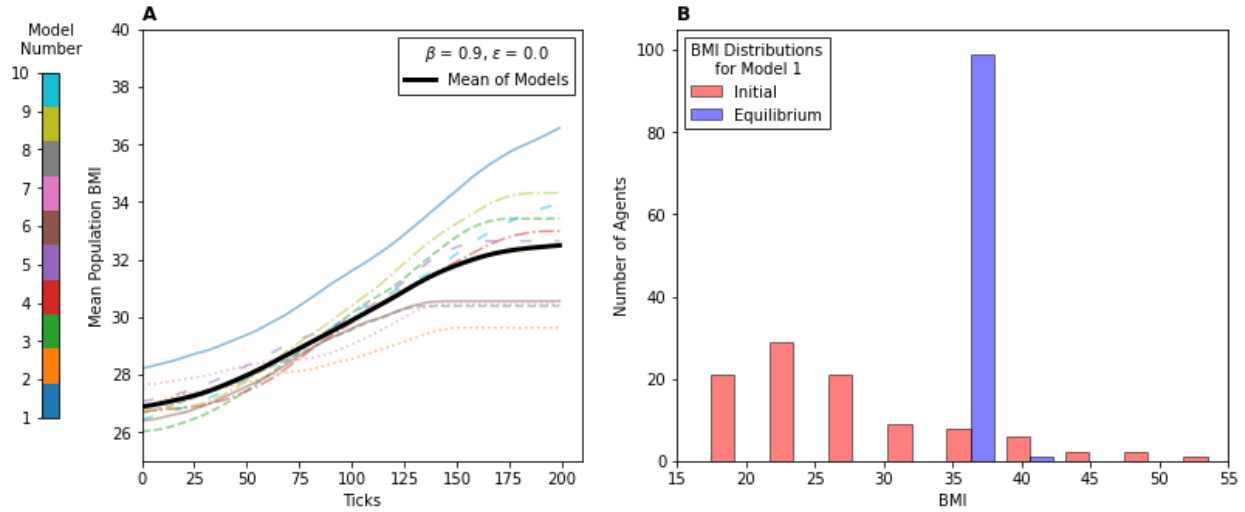


Figure 3. Agent-based model results from ten models with a high “rewiring probability”, $\beta = 0.9$, and a low “satisficing radius”, $\epsilon = 0.0$. The mean population BMI over the course of ten models, along with the mean of the ten models (A). Histogram of the initial (red) and final (blue) distributions of BMIs in the agent population (B).

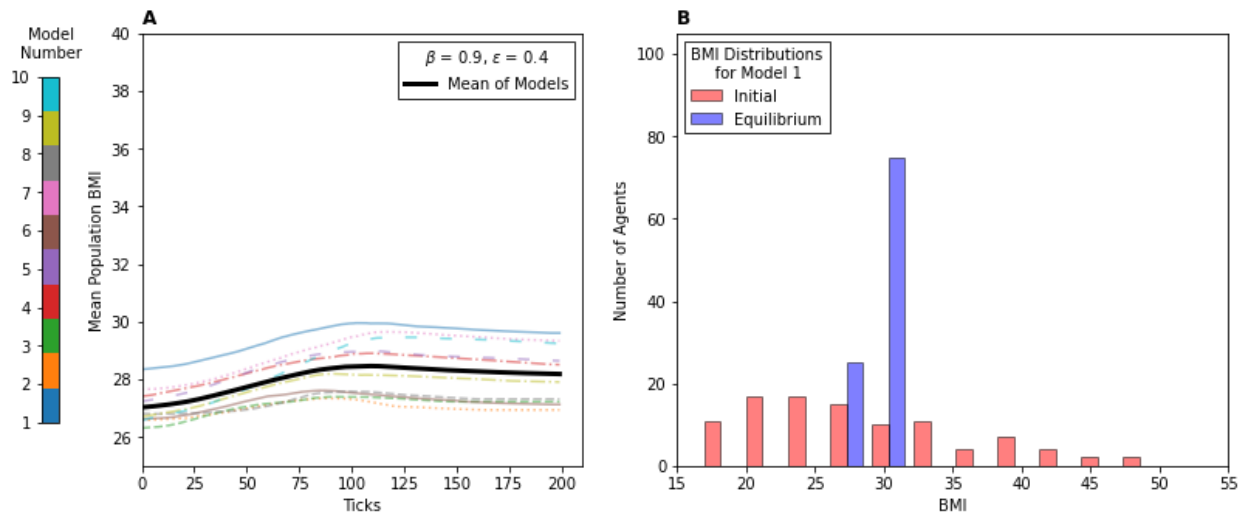


Figure 4. Agent-based model results from ten models with a high “rewiring probability”, $\beta = 0.9$, and a high “satisficing radius”, $\epsilon = 0.4$. The mean population BMI over the course of ten models, along with the mean of the ten models (A). Histogram of the initial (red) and final (blue) distributions of BMIs in the agent population (B).

Writeup

Across all four model conditions, the distribution of population body mass index (BMI) decreased in variance and the mean population BMI increased (**Figure 1–4**). Considering that individual agents move their BMI toward the mean of a population subset, it is reasonable that the population BMI variance decreases because every network is moving towards a central value. Individual networks are in turn influenced by the networks of their neighbors, which has a population level effect of agent BMI moving toward the mean of the population. The initial BMI distribution, $X \sim 15 + \text{Gamma}(\alpha = 4, \beta = 0.25)$, is right skewed, meaning initially the majority of the agents were below the population mean. This helps explain the observed mean population BMI increase, to some extent across all models, because the majority of agents were increasing their BMI to move towards the population mean.

The “satisficing radius” parameter (ϵ) appeared to have the largest impact on model results with larger values dampening the model effects, i.e., mean population BMI increasing and variance decreasing. Regardless of the rewiring probability, models with a satisficing radius of 0.0 resulted in a greater mean population BMI that was approximately 3 to 4 points higher than models with a satisficing radius of 0.4. This aligns with model intuition, that when agents are more sensitive to the BMI of their peers, model behavior is more dynamic. The rewiring probability parameter (β) appeared to have little impact on model behavior; however, it is possible that greater values of β increased model variance (**Figure 2 & 4**).