Social togetherness model

This model seeks to simulate a specific aspect of the behavioral sink: the transformation of eating into a socially driven activity. By observing feeding behaviors and their impact on social dynamics, we examine how "togetherness necessities" drive clustering and exacerbate the behavioral sink`s effects.

Environment structure

- Four interconnected rooms: upper right (UR), upper left (UL), lower right (LR), and lower left (LL). There are three two-ways-bridges in between UR-LR, LR-LL and LL-UL. Each room contains a feeder, and rats must choose where to feed daily.

- Rats can move between adjacent rooms through these bridges.

Agents: rats

- Social Togetherness Necessity (STN): Each rat has a dynamic necessity for social eating, that is developed with conditioning of eating as social activity. Rats adjust their STN based on the group sizes they feed with.

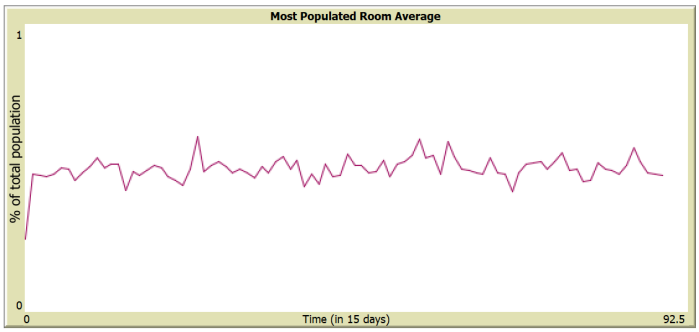
- Feeding Windows: Each rat has its own time window during the day where it will want to feed. Rats decide where to feed by evaluating nearby rooms, and choosing the one that matches their social necessities the best during this window.

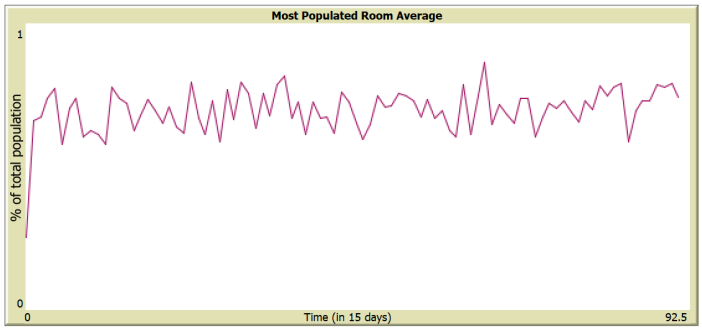
- Periodically, new-born will replace other rats, maintaining a constant population size and introducing fresh eating dynamics.

Observations

- Allowing more flexible eating schedules (i.e. more resources and more time with them), allow for social togetherness to thrive, leading to more clusters. This echoes on the ease to partake in social activities and conditioning from it. (First picture denotes the average total population percentage in the most populated room, where rats have (unique)

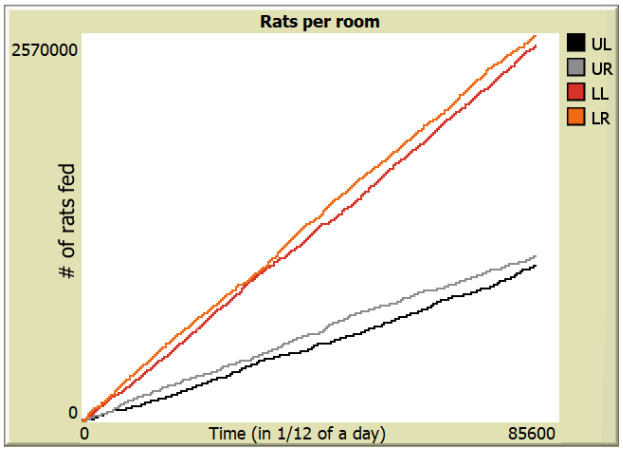
feeding windows of size 25% of the day. In the second picture the feeding window is 90%)



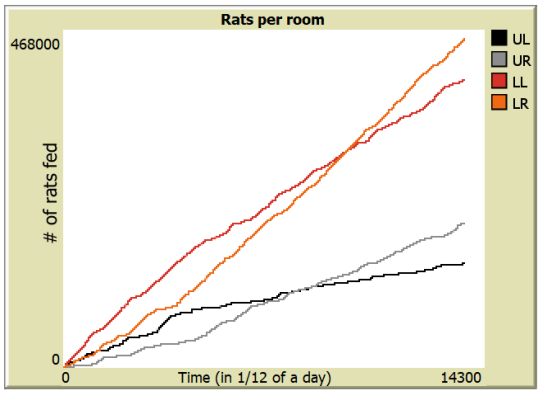


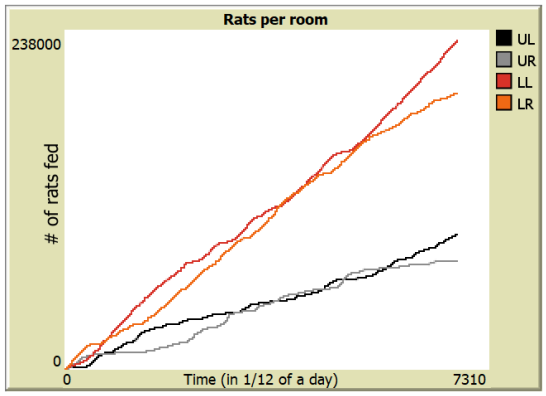
- After the system is well established, new generations hardly have any influence on social behaviors of the enclosure, and quickly fall into the system`s structure.

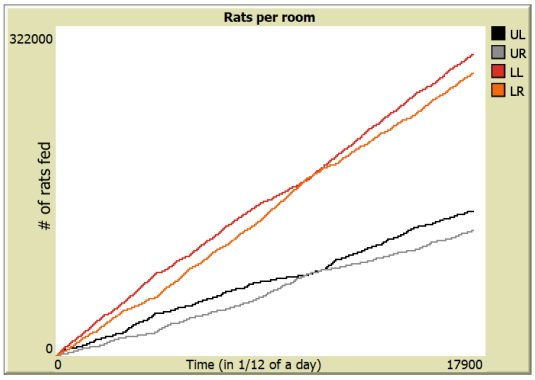
- Two lower rooms are consistently among the most crowded. This reflects the self-reinforcing nature of clustering and the connectivity.



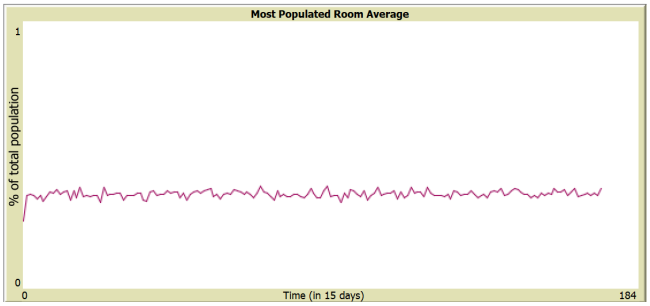
- Total room population ends up emerging in pairs. Either lower right and upper left are the most populated (comparing upper and lower as different categories, as described above), or lower left and upper right. This happens as the population adjacent to the most populated rooms will be driven to them, making it their social hub, while mice established more distantly will suffice their smaller social needs there, without necessity of clustering.

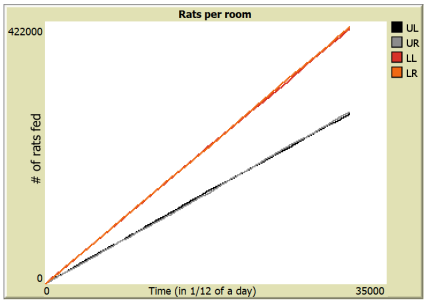






  - By removing social aspects, we see this dynamic wanishes:





- Over a long period of time, the conditioning coefficients become irrelevant (as long as they are bigger than 0), the bigger part of the colony will self-reinforcing a togetherness behavior.

- Beyond a certain point, increasing the number of rats feeding in the same room no longer significantly affects their social conditioning. This saturation effect creates plateaus in clustering growth, limiting how crowded a room can become.
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