

Rational Superstition



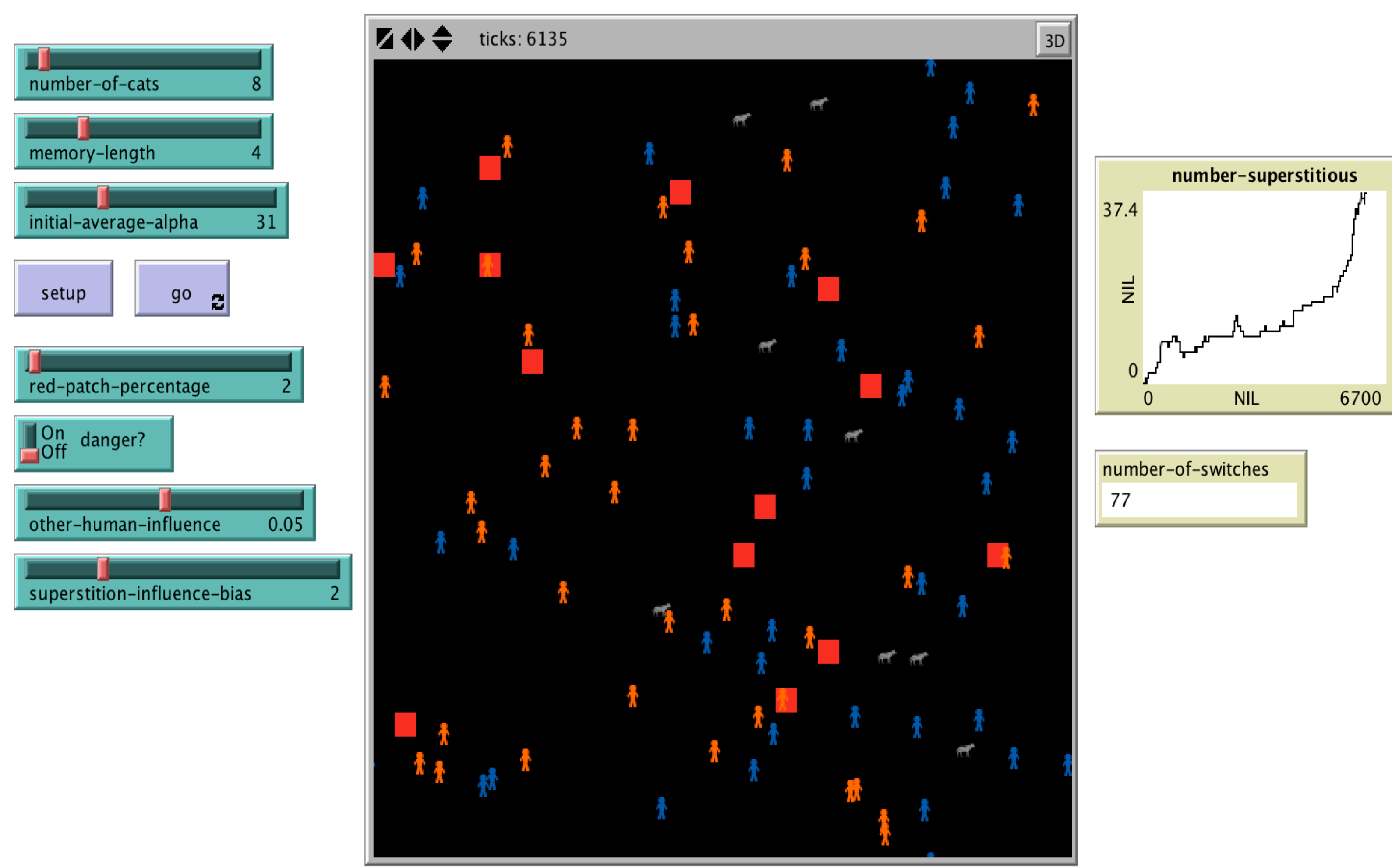
Introduction

Driving Question: How does superstition arise from overall rational humans?

Superstition is often seen as a by-product of irrational behavior and a significant misunderstanding of the mathematics behind statistics. However, the assumption that humans naturally don't understand the mathematics side of statistics has faced scrutiny. This model aims to display that significantly more rational humans than traditionally assumed can become superstitious.

Model

- Agents are humans, cats, and patches.
- There is a possible superstition that cats cause red patches.
- Humans have an alpha value that relates to their threshold to believe.
- Humans log cat sightings and whether or not the cat was on a red patch.
- If the probability of their memory containing as many red patches as it does by chance is greater than that humans.
- Superstitious humans increase the alpha of other humans.



Parameters

- Number of cats – How many cats are in the world
- Memory length – How many of the most recent cat sightings a human remembers
- Initial average alpha – The value about which humans normally distribute their alpha values
- Red patch percentage – Average frequency of patches turning red
- Danger? – Whether or not superstitious humans run away from cats
- Other human influence – how much a human adjusts their alpha based on other superstitious or non-superstitious humans
- Superstition influence bias – How much more superstitious humans influence other humans compared to non-superstitious humans (meant to simulate some sort of attraction to the novelty or convenience of the superstition).

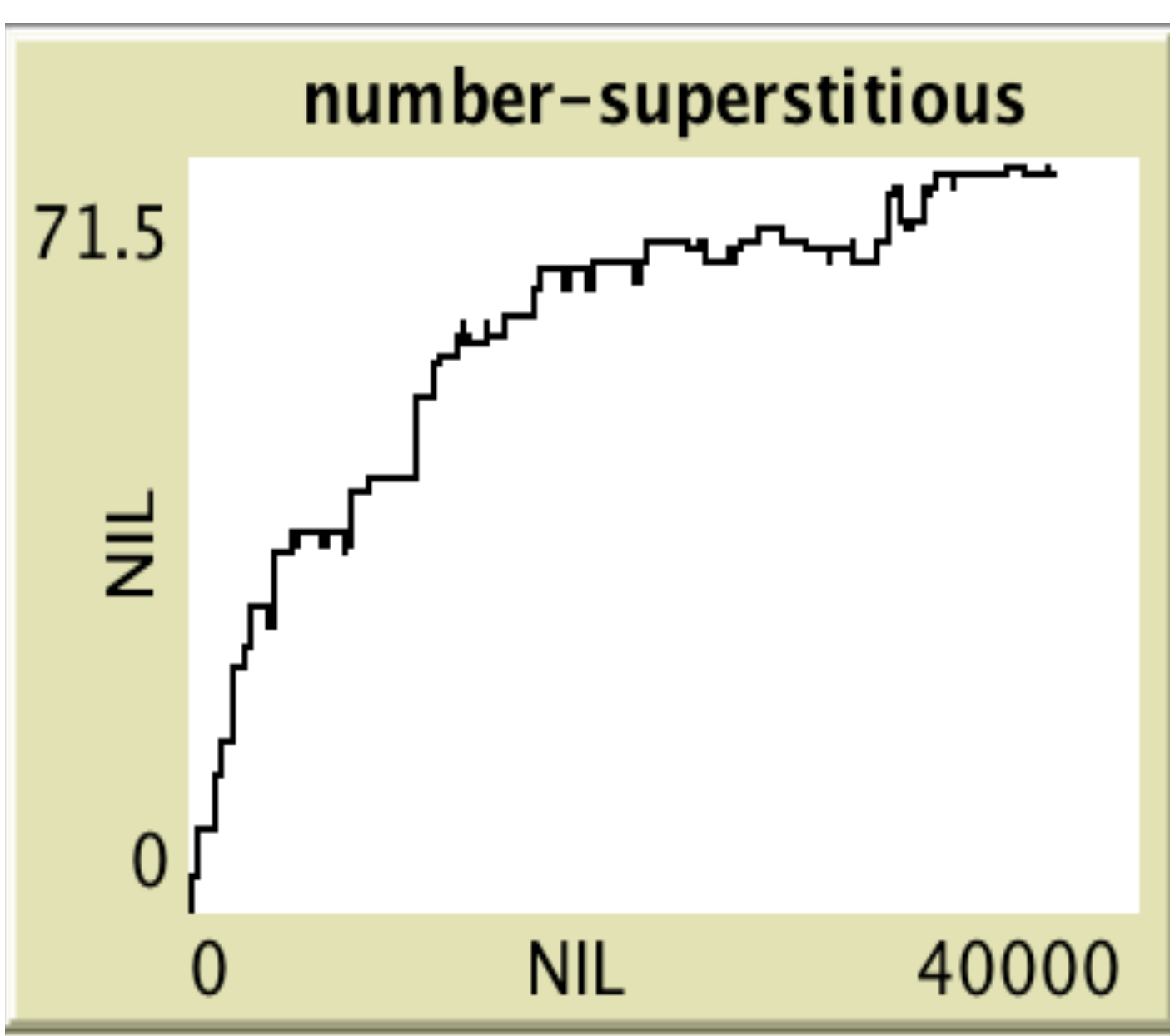
Results

Superstition is possible

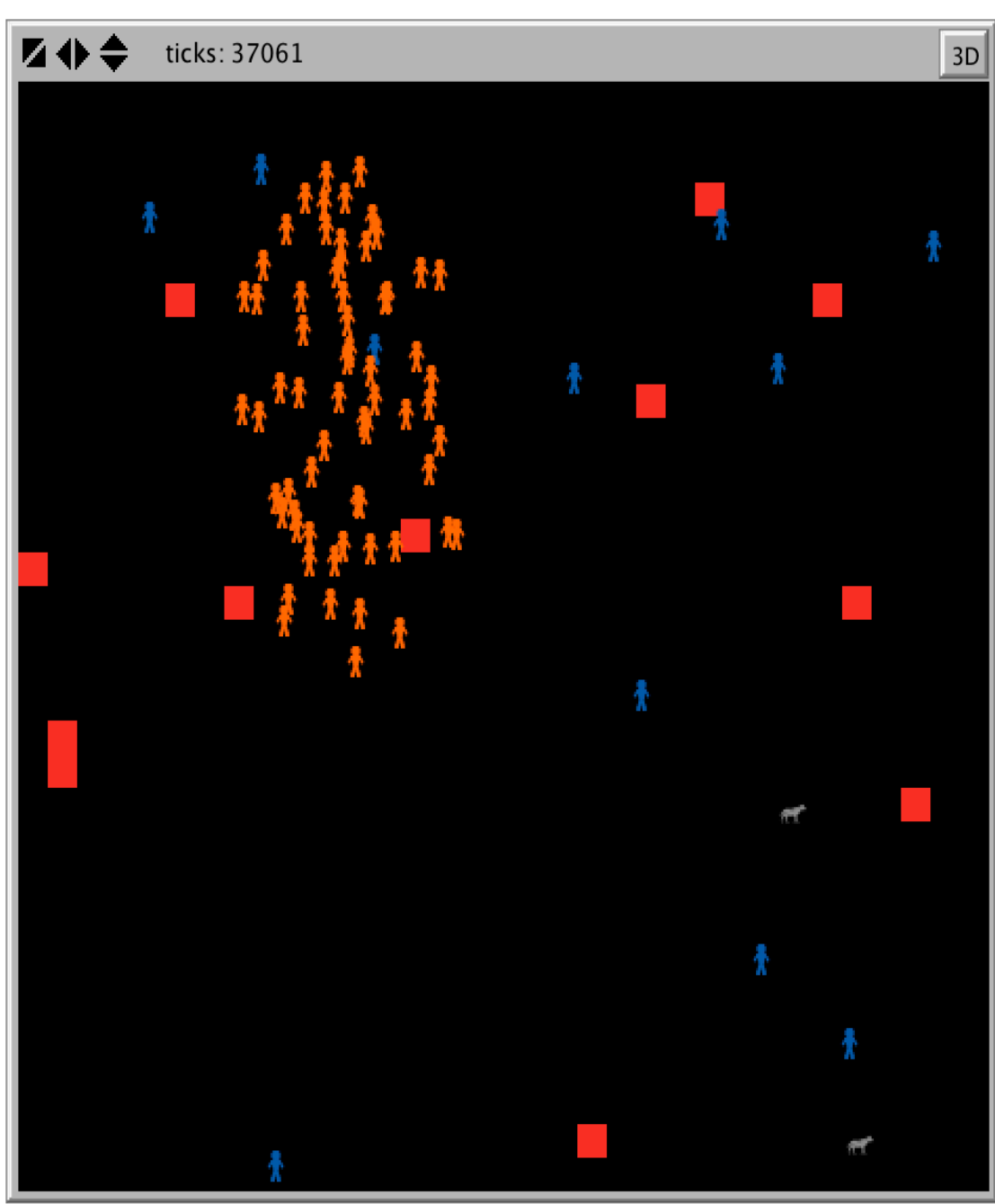
- While it requires relatively specific situations, it's clear that superstition under this model is possible.

Limited Data is Key

- Anything that prevents humans from gathering data enables superstition to occur more easily.
- This includes lowering the number of cats or the number of red patches, lowering the memory length, or introducing danger.



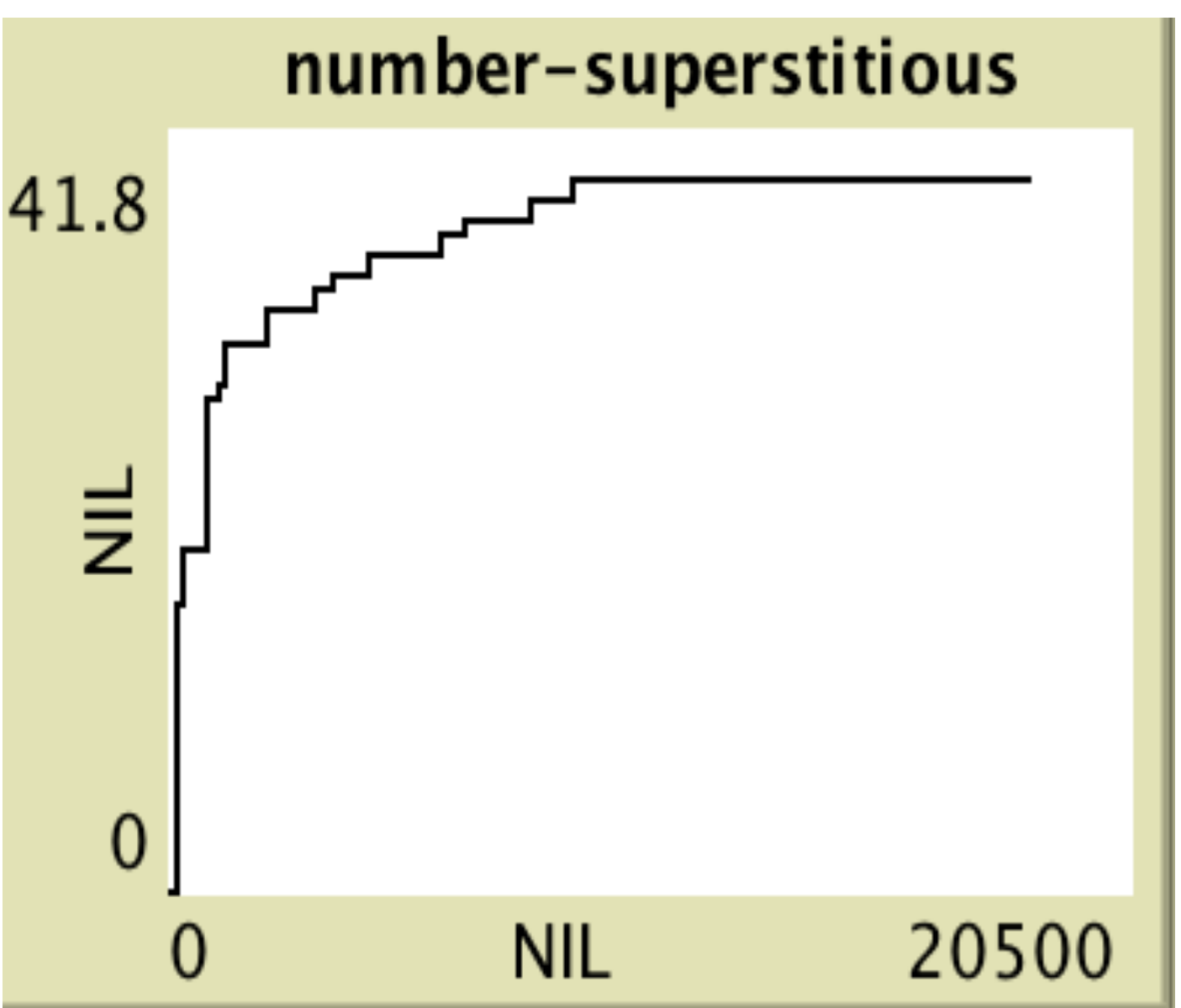
Minimized data parameters along with no human influence or bias leading to full superstition



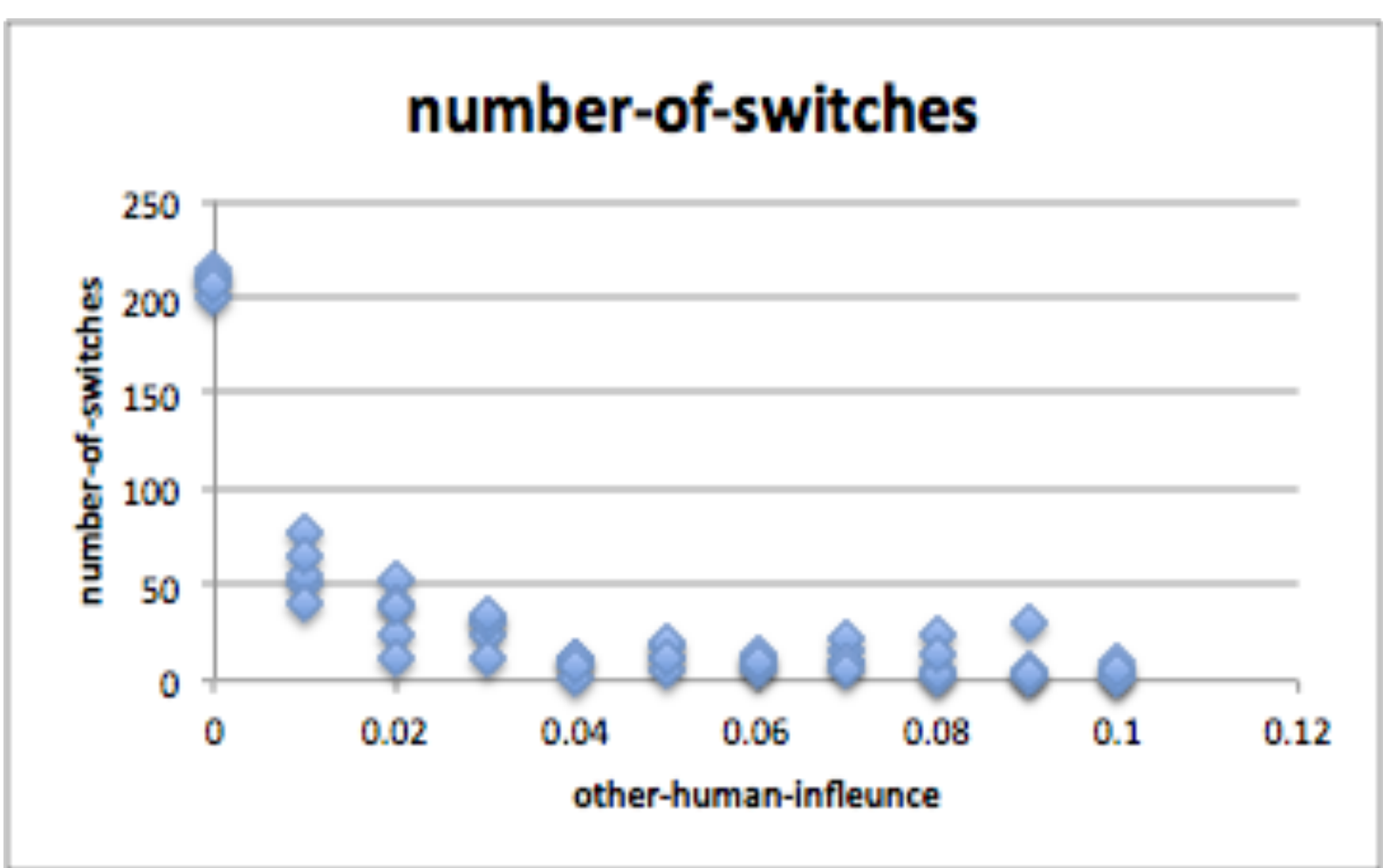
Superstitious humans avoiding a cat, preventing them from losing their superstition

Communication Stabilizes

- The introduction of any level of communication greatly decreases the number of times the humans convert to belief or unbelief.



Same settings as before, but with some human influence keeping it stable and only reaching about half superstition



BehaviorSpace experiment on the number of switches vs. other-human-influence with no bias towards superstition

References

Cosmides, L., Tooby, J.: Are humans good intuitive statisticians after all? Rethinking some conclusions from the literature on judgment under uncertainty. *Cognition* 58, 1-73 (1996)

Beck, J., Forstmeier, W., 2007. Superstition and belief as inevitable byproducts of an adaptive learning strategy. *Hum. Nat.* 18, 35

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