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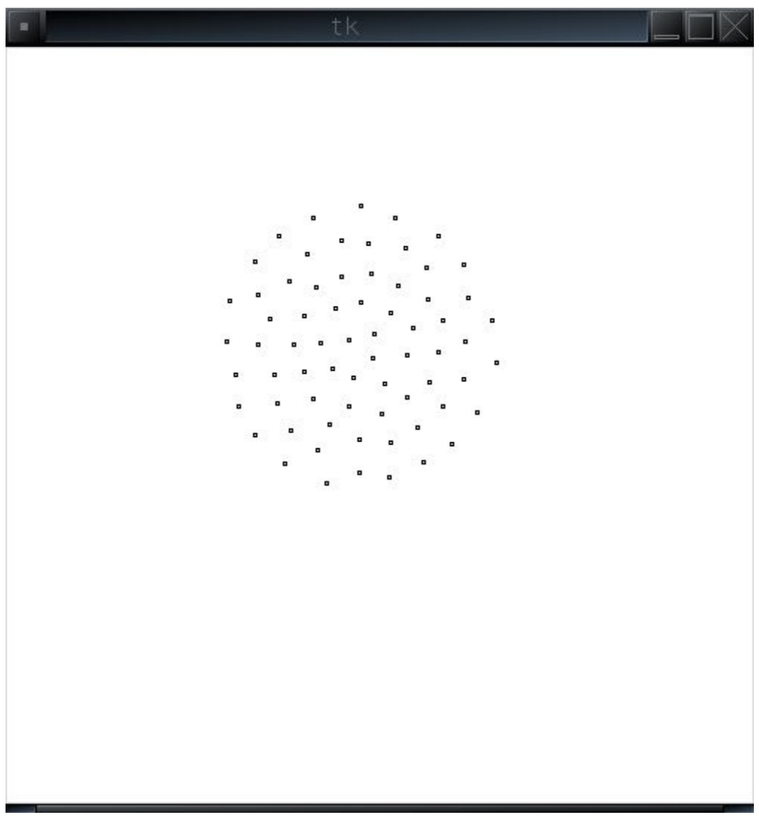
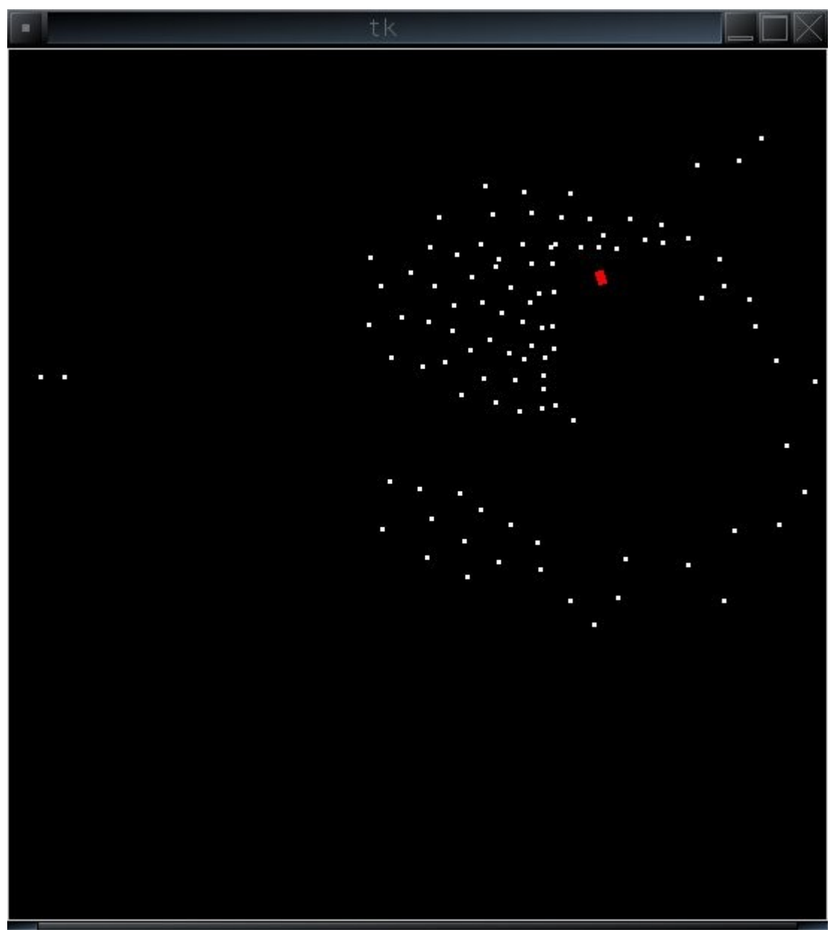
Evolving Sheepdog and Cutting Horse Behavior in a Simulated Flock

The focus of this project is attempting to evolve the behavior of a single agent or small group of agents so that they can effectively direct the movement of a much larger group.



This figure shows a Herd. The variables controlling this were hand tuned to preserve responsiveness while keeping the herd stationary.

Guide to terms:
Flock: Group of agents who's behavior is mutually codependent They are meant to simulate the behavior of flocking animals, such as fish, birds and cattle. Flocking behavior depends on three basic rules: Separation, Cohesion and Alignment
Boid: Name for an individual member of a flock. A combination of "droid" and "bird".
Herd: A Flock that is stabilized, tends to sit in place instead of being in constant motion. Similar to livestock rather than a flock of birds. Relies on the same algorithm as a Flock.
Sheepdog: An agent who's behavior is intended to direct a flock through its own motion. A sample task for a sheepdog might be getting the flock as close to a goal location as possible.
Herding: The behavior of the sheepdog controlling the flock. This is the goal of this project.
Cutting Horse: An agent who's goal is to separate a single Boid from the Flock, using its own motion. In livestock, cutting horses are used to give access to a single animal.



This figure shows a Herd reacting to the presence of a Sheepdog.

Progress on the evolutionary aspect of this project is ongoing. The first generation has been produced, and automated trails should begin in February.

Further reading:
"Flocks, Herds, and Schools: A Distributed Behavioral Model, Craig Reynolds

Low Stress Methods for Moving and Herding Cattle on Pastures, Paddocks, and large Feedlot Pens, Temple Grandin