**Dynamic Models of Segregation**

* Had both a linear model and 3d model
* There were two different types
  + Immediate neighbors (Spatial proximity model)
  + By zone (Bounded-Neighborhood model)
* As people move to become content with the number of like neighbors that they can handle forces other people to move due to their surroundings not being what they want
* If there’s a minority it becomes even more segregated because all the minority have to cluster in order to meet their color threshold
* Tipping – phenomenon where a new minority enters a neighborhood in sufficient numbers causes the earlier residents to start evacuating

**Generating Textures on Arbitrary Surfaces Using Reaction-Diffusion**

* generate textures and patterns on 3d surfaces
* Chemicals diffuse and interact with each other, promoting or discouraging growth of other chemicals
* Spots pattern
  + Run algorithm and freeze large spots
  + Run again in the open space to create small spots
* Leopard pattern
  + Large spots first
  + Cells are frozen and a and b concentrations -> 4
  + Smaller spots tend to form AROUND large spots due to concentration values
* Lionfish
  + Large stripes formed first
  + Small stripes form in-between “frozen” large stripes
* Giraffe
  + Irregularly shaped spots initially created
  + Stripes form between the spots to create the “web-like pattern called reticulation” [1]
* Mesh Generation
  + The points need to be spread evenly across a 3D object
  + The points repel each other so each has an equal distance from every other point
* Took a very long time to generate reaction-diffusion on 3D surfaces

**The Dissemination of Culture**

* Tries to explain why people become more similar over time, but don’t become completely similar
  + Uses culture as its base
* Goes over how people become similar:
  + State formation – national state where everyone is alike due to their nationality
  + Succession conflicts – when one society wins a war over another and forces their culture on them
  + Transnation integration – agreements for free trade and travel, so people from other cultures move in, move to other cultures
  + Domestic cleavages – politics of democracies
* Goes over how they grow apart
  + Social differentiation – groups actively distance themselves from each other. Ethnic groups as an example
  + Fads and fashion – an attempt to be different from the norm
  + Preference for extreme views – views that are very different from the norm
  + Drift – random changes in individual traits can lead to differences between subgroups. Such as languages evolving
  + Specialization – weird interests that could be resistant to social influence
  + Changing environment or technology
* Uses agent based models to model culture
* Model has attributes that are modeled by a list of numbers
* People have matching ‘cultures’ if the position in the array is the same number
* People who are similar to each other become more similar to each other over time
* With probability similar to the # of similar traits it will change one trait of its 4 neighbors
* Over time all areas become the same except for stable regions where there are 0 common traits
* Shows how some traits can survive social influence
* Shows when there are few key aspects to a culture it’s easy for all to become the same, but when there are lots of key aspects it becomes difficult

**Self-organized Shortcuts in the Argentine Ant**

* Argentine ant continuously finds a short path between its nest and the food
* Set up an experiment to prove this
* Have multiple paths that lead to food
* All paths have a Y shape as to not dissuade ants from taking either path
* At the beginning each path has 50% chance of taking it
* Ants leave pheromone as they go towards a path and after they come back
* All ants can only follow pheromone, otherwise they walk around randomly
* Eventually all ants take the short path
  + They will take that path even if a shorter path is introduced later since it is established with pheromone
* Visual Memory: Similar experiment performed under red light gave similar result, which implies there is no visual memory in effect.
* Directional memory: Initially marked the shorter path ants with color, and then changing paths with newer one (without trail). Marked ants followed both paths randomly.
* Temporal Memory: repetition of the experiment on same nests did not change the distribution of outcomes.

**Ant System: Optimization by a Colony of Cooperating Agents**

* Tries to find an algorithm for finding shortest path based on ants
* Ants in the algorithm
  + Chooses next town according to trail + distance
  + Cannot revisit towns
  + Lays trail after completing tour
* Is tabu heuristic based
  + The objective for the Tabu Search algorithm is to constrain an embedded heuristic from returning to recently visited areas of the search space, referred to as cycling. The strategy of the approach is to maintain a short term memory of the specific changes of recent moves within the search space and preventing future moves from undoing those changes. Additional intermediate-term memory structures may be introduced to bias moves toward promising areas of the search space, as well as longer-term memory structures that promote a general diversity in the search across the search space.
* heuristic is used for algorithms which find solutions among all possible ones ,but they do not guarantee that the best will be found,therefore they may be considered as approximately and not accurate algorithm
* Synergistic effects
  + Best results when # agents = # nodes
* Initialization
  + Uniform distribution better than all ants starting on same node
* Got within 3.3% of optimum

**Individual Experience Alone Can Generate Lasting Division of Labor in Ants**

* As ants succeed in foraging, the ants want to continue
* Here we will show that, all else being equal, ant workers engage in distinct functions in accordance with their previous experience
* Trained ants by foraging experience
  + Track successful and non-successful ants
* Chose Cerapachys biroi breed of ant
  + Phasic reproduction - New generation of workers occur synchronously every 34 days
  + Thelytoky Parthenogenesis - Form of asexual reproduction - full/half clones
  + Same cohort = Same age, size, shape & development conditions
  + Homogeneity helps for control
  + Birth>Foraging>Statary(Pupating & Laying)>Foraging
* Ants successful in foraging were more likely to forage
* Ants that failed in foraging were more likely to do brood work

**Dynamic Scheduling and Division of Labor in Social Insects**

* The paper involving painting a truck
* Agents bid for resources and the agent with the highest bid gets the resource
  + This is used for paint stations to paint a truck
    - The paint station with the highest bid gets to paint the truck
    - Bids higher if the truck is the same color as the last truck in its queue
* Insect colonies kind of bid for tasks to do based on factors such as:
  + Food availability
  + Predation
  + Climatic conditions
  + Phase of colony development
  + Time of year
* All insects have thresholds for doing a certain task
  + The ones that are good at the task, or are motivated due to one of the above conditions will act first
  + Other insects will eventually do the task if it reaches their threshold, thus covering when it’s needed
  + This makes it so all insects aren’t doing the same things at the same time
* Market based approach to the painting trucks problem
  + Try to take another truck the same color as current color
  + Take important jobs (high priority)
  + Take any job to stay busy
  + Do not take another job if queue is full
  + Booths bid based on their ability to do the job efficiently, low cose, minimal delay
  + Resulted in 10% reduction in paint usage and half as many paint changovers
* Ant based approach
  + Instead of bidding a demand is given for each color given by the sum of priorities of the unassigned trucks in each particular color
  + Once a truck is assigned that booth’s demand for that color increases where every other booth’s demand decreases
* Conclusion
  + Need more research to see if ant approach is efficient
  + They don’t know how it competes with the market approach since they don’t actually know how it works since it’s not a public algorithm

**Effective Choice in the Prisoner’s Dilemma**

* I know a lot about this one
* Niceness was good
* Ways to win
  + Niceness
  + Forgiveness
  + Scores against the kingsmakers types
* Kingsmakers were the aggressive types

**Reputation Helps Solve the Tragedy of the Commons**

* Tragedy of the commons is that if a public resource is free some people will overuse that resource making it hard to sustain
* Had an experiment where they had a public goods game and an indirect reciprocity game
* Public goods game
  + People donated to a game that all of them shared the wealth
  + The people running the experiment would double the amount people gave to the game
  + People started with $5
  + They had to donate a portion of the $5 to be shared by the group
* Indirect reciprocity game
  + People knew the amount people donated in the public goods game
  + They could give money to people in this game
  + People tended to give more money if they gave more in the public goods game
* Researchers found that people would donate more in the public goods game if they knew other people would know what they donated in the indirect reciprocity game
* Everyone used an anonymous pseudo name

**Emergence of Scaling in Random Networks**

* I did this one

**Toward a Containment Strategy for Smallpox Bioterror: An Individual-Based Computational Approach**

* Made a model about smallpox spreading through a community
* Everyone is assumed to not have a natural immunity to smallpox
* Check spread based on family units and going to school/work as well as the hospital
* Also had a morgue for all that died
* Mass vaccination – preemptive measure to vaccinate everyone before a possible outbreak
  + Risky since 1/1000000 people will die from it
  + Some people cannot get it since they have weak immune systems
* Trace vaccination – vaccinate everyone who had contact with a person infected
  + Reactive measure
  + Hard to find all of the people
* Results and what is recommended
  + 100% family trace vaccination
  + 60% mass vaccination (portion of population unlikely to experience negative side effects)
  + 100% of hospital workers
  + Quarantine of infected individuals

**The untapped potential of virtual game worlds to shed light on real world epidemics**

* WoW had a ‘virus’ spread in the game
* Potential for using MMOs for studying outbreak spread
* People started in the capital cities then it extended out, with the NPCs being constant spreaders
* Positives of using an MMO
  + Real-people controlling, so more accurate results
  + Unexpected results
* Negatives of using an MMO
  + No morality, people might intentionally spread the virus
  + Takes a long time to simulate
  + Cannot have as many subjects as a completely simulated experiment
* Hearth stones and releasing pets that still have the virus then releasing them later