

# A Dynamic Game Model of Collective Choice in Multi-Agent Systems

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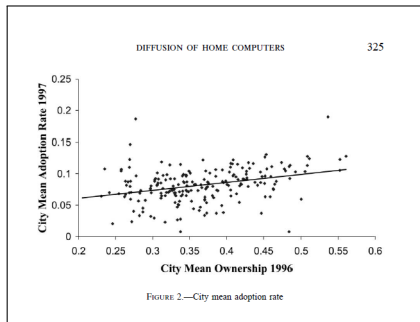
**GERAD's Students Day**

April 11th, 2017

# Example - Social effect and the diffusion of home computers

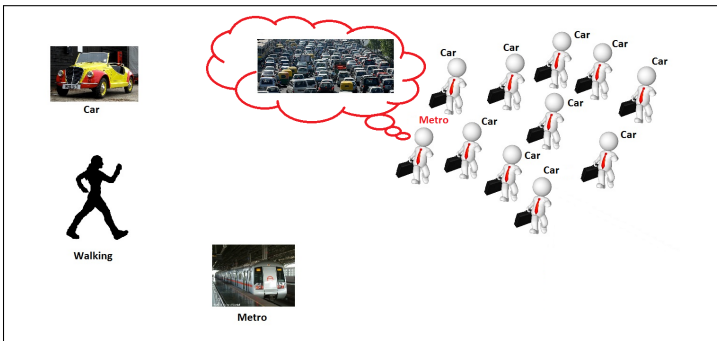
## A study by Goolsbe and Klenow [Goolsbe and Klenow '02].

- Samples of 208 U.S. cities.
- $x$ -axis = Fraction of households owning a computer at the beginning of 1997.
- $y$ -axis = Fraction of households not owning a computer at the beginning of 1997 that bought during 1997.



# What are the collective choice problems ?

- The collective choice problems are concerned with situations and decision making when a large number of agents make a socially influenced choice amongst different alternatives.

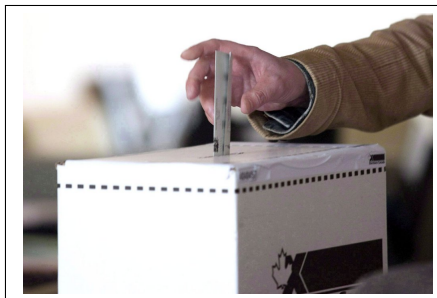


# Example 1 - Robotics



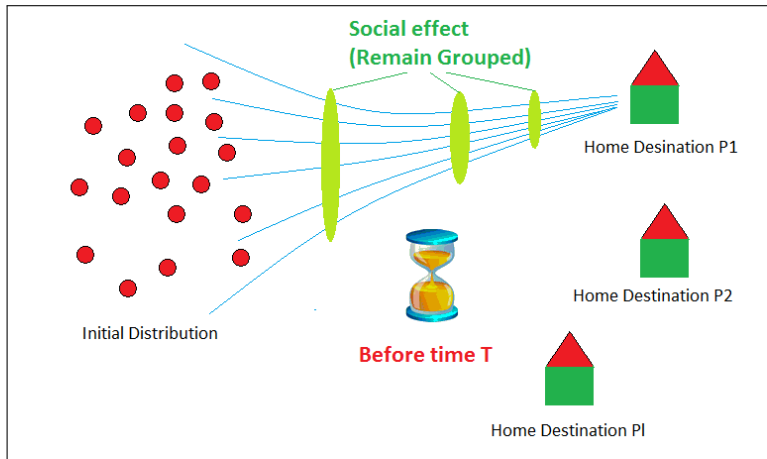
- Collection of robots exploring an unknown terrain.
- Multiple potential sites of interest to visit (**Discrete choices**).
- The robots must stay as much as possible grouped to carry out some collective tasks (**Social effect**).

## Example 2 - Elections



- A group of voters are choosing among a set of candidates (**Discrete choices**).
- Along the path to choose a candidate, changing one's opinion requires an effort but deviation from the majority's opinion involves a discomfort (**Social effect**).

# Problem Statement



# Questions

- How do the agents act on the individual level?  
Do they make their choices before or while moving ?
- Can one anticipate the macroscopic behavior of the population, i.e. the distribution of the agents between the alternatives ?
- If yes, are there multiple potential macroscopic behaviors?
- What is the necessary information to anticipate this macroscopic behavior?
- How does the strength of the social effect influence the macroscopic behavior?
- How the presence of an advertiser affects the individual and macroscopic behaviors?

# Thank you