

***AccesSim : Simulation of
accessibility in urban settings and
experiments in teaching applications***

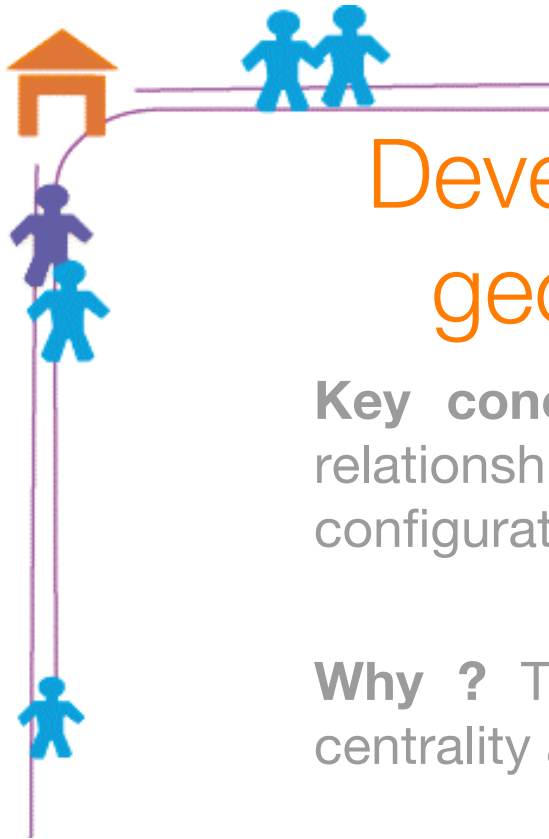
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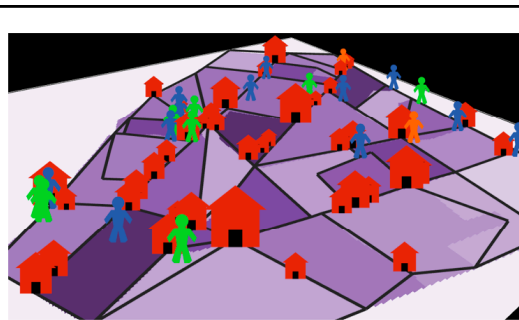


Developing a teaching tool of geographical core notions

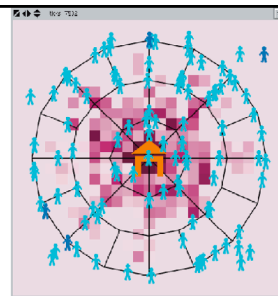
Key concepts : Accessibility in an urban setting, relationships between services localisations, network configuration, accessibilities of the services

Why ? To familiarize scholars with the notions of centrality and territorial inequalities

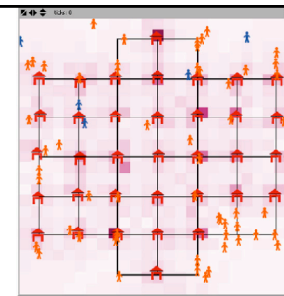
How ? By simulating it and by playing it !



Paris Neighbourhood

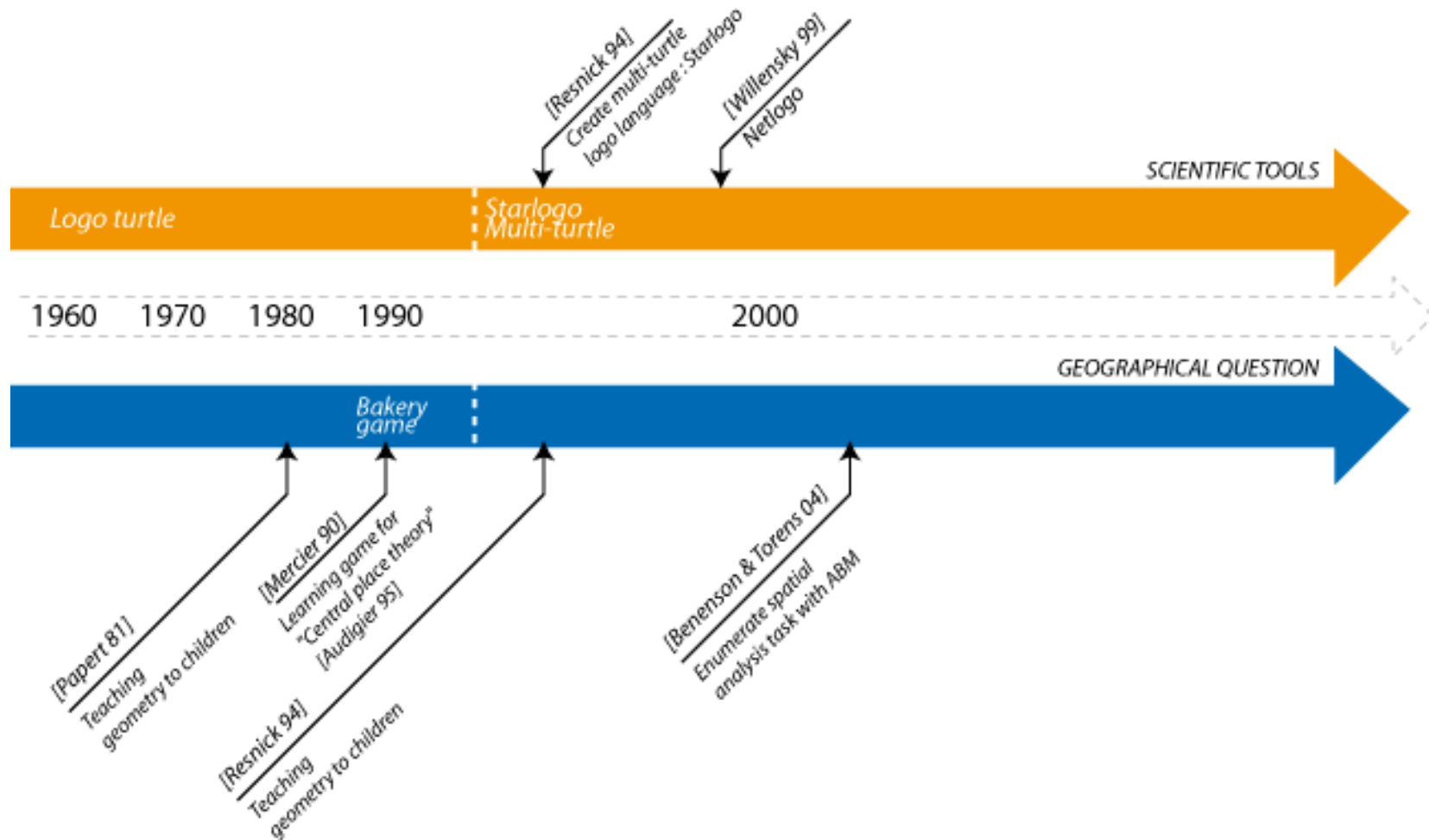


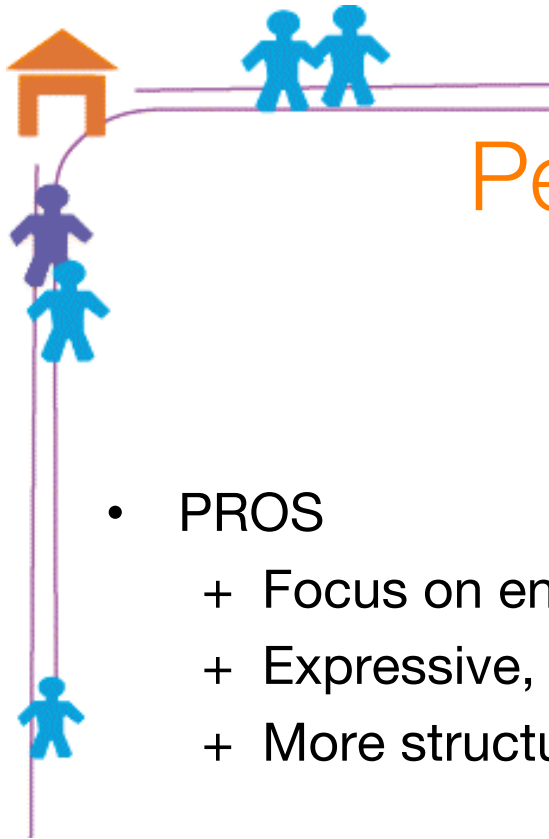
Radioconcentric
Neighbourhood



« Manhattan »
Neighbourhood

Scientific tools and geographical questions



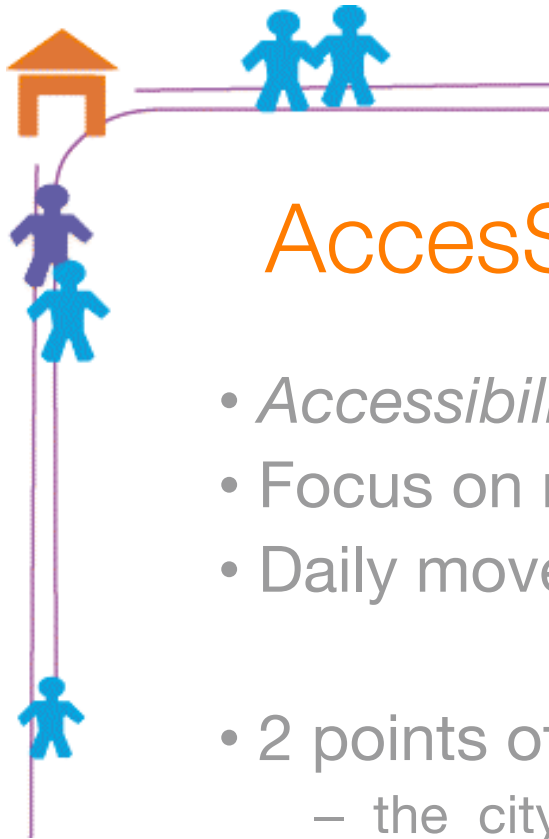


Pedagogy of agent-based representations ?

- PROS
 - + Focus on entities and their behaviors
 - + Expressive, heuristic, anthropomorphic
 - + More structure, less abstraction

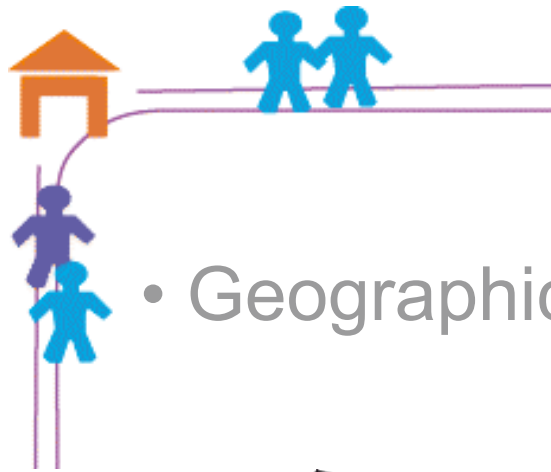


- CONS
 - The more realistic, the harder to analyse and to control
 - GUI's Simplicity hides internal complexity
 - Computation ~~reasonement~~



AccesSim : principles & framework

- *Accessibility* in an urban environment
- Focus on regular pedestrian movements
- Daily movements by residents to access services
- 2 points of view on *accessibility*:
 - the city resident : individuals equal needs to services access => *territorial planning*
 - the services : frequentation depends upon the overall accessibility and user potential => *geo-marketing*
- Benefit of the turtle Force : Netlogo modeling

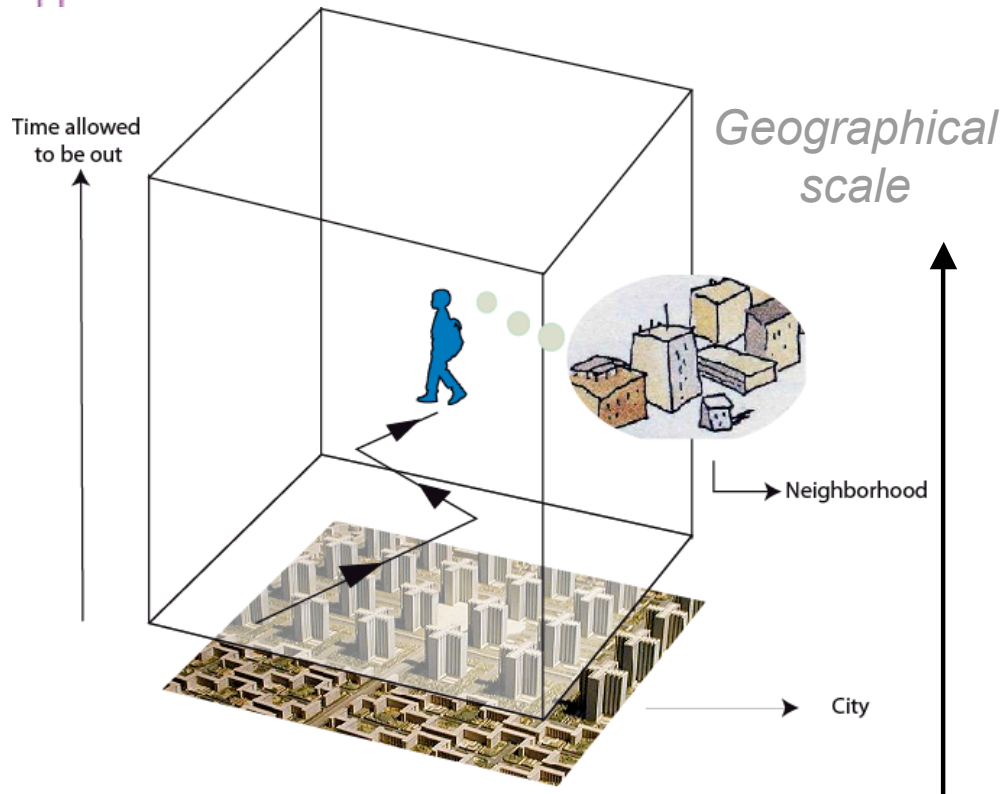


Scales and entities

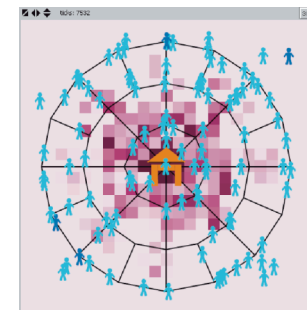
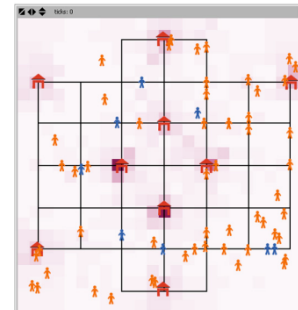
- Geographical reality

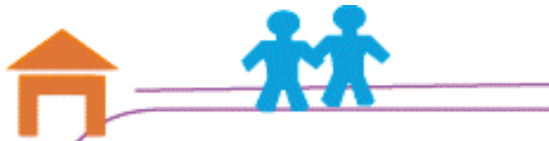
- Accessim

- Shops and people as individual agents



- Neighborhoods agents
- City transport network





Behaviors of the children-agents



Pioneers: Move randomly on the network (try to find new bakeries)



Followers : Choose the most popular *OR* the quickest path to the services.

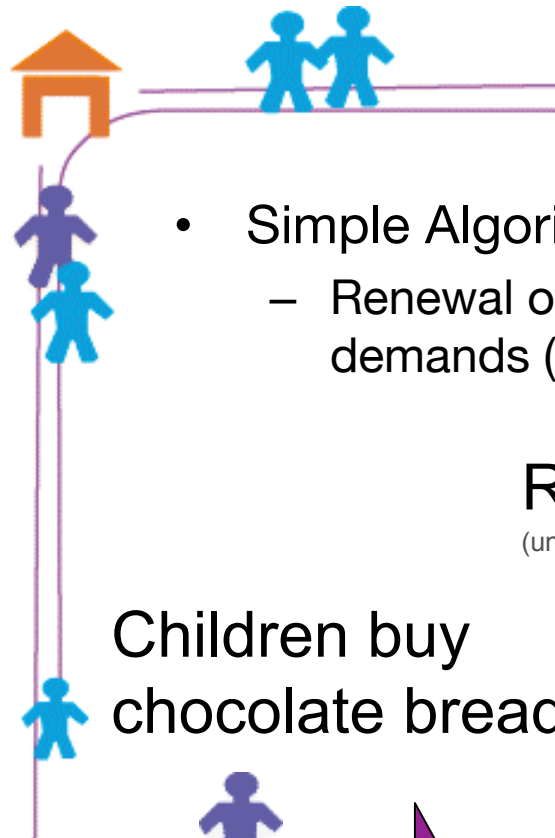


Their constraints

1. They ***need to go*** to the bakeries
2. They ***have to*** come back home after a ***fixed*** time
3. They ***memorize*** their current path only and its distance cost
4. They ***share*** this perfect information in their neighborhood

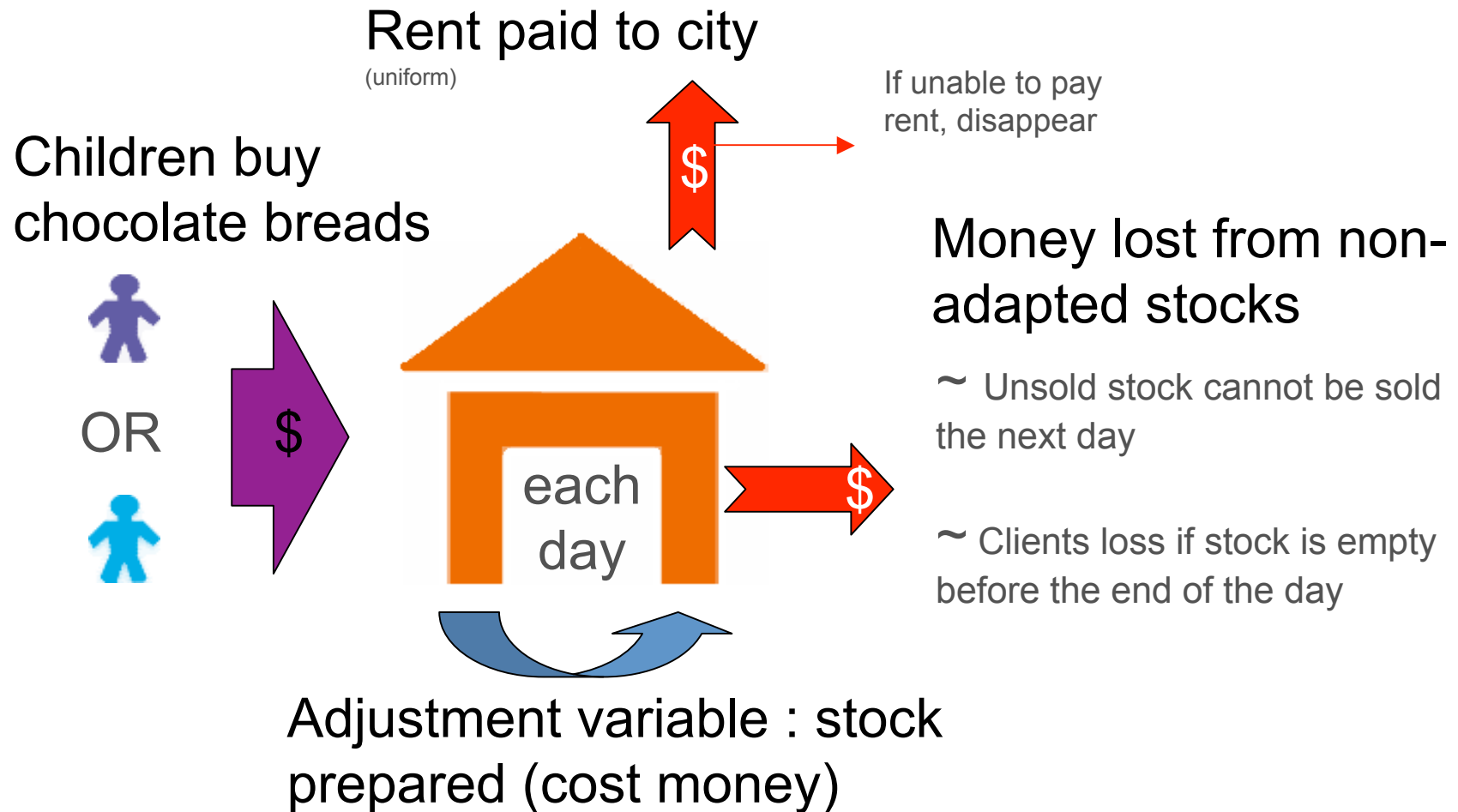
Their limits...

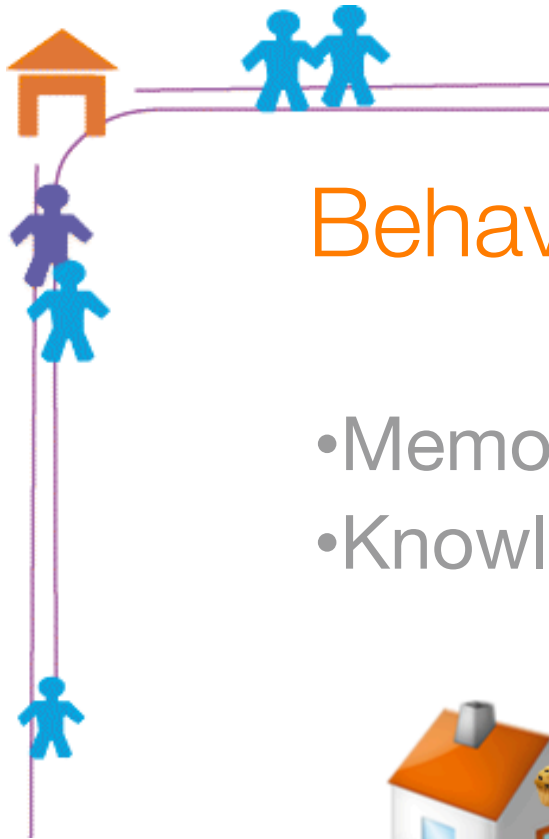
- They don't come back home... just disappear !
- They have no habits, each time looks like... the first time



Behaviors of the bakery-agents

- Simple Algorithm
 - Renewal of the stock is deterministic and based upon the children demands (adapted from Comets 2004)

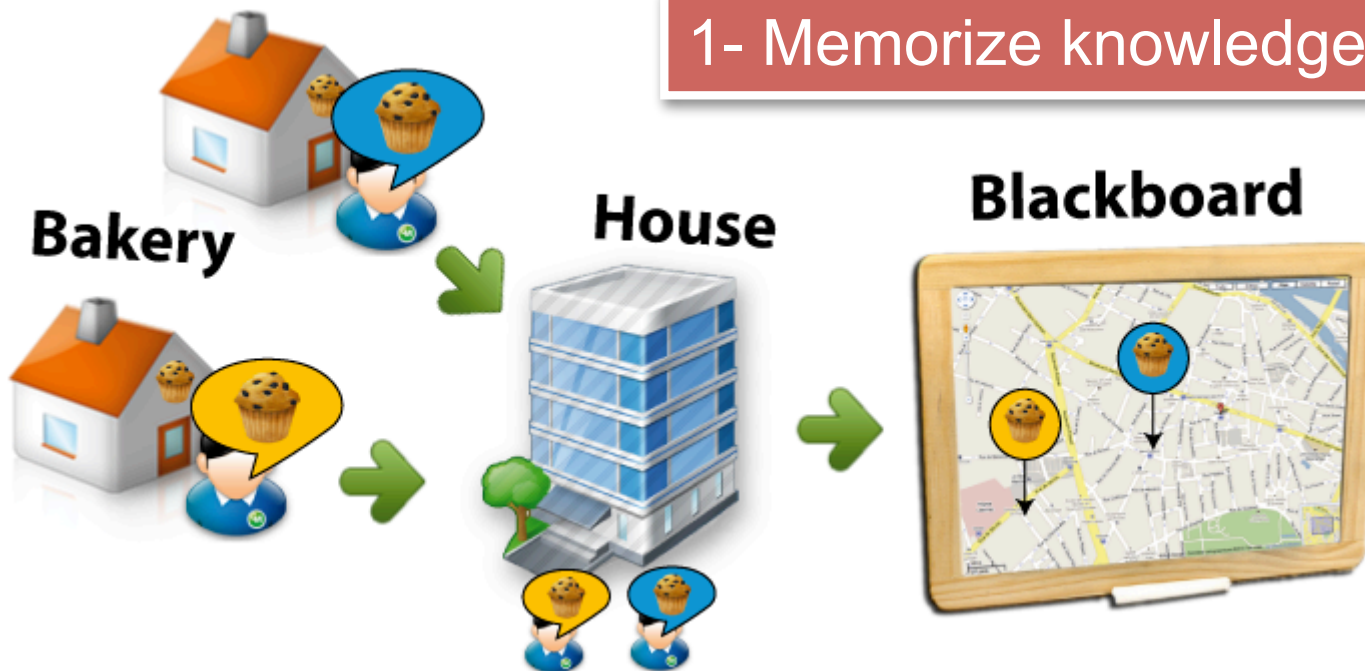


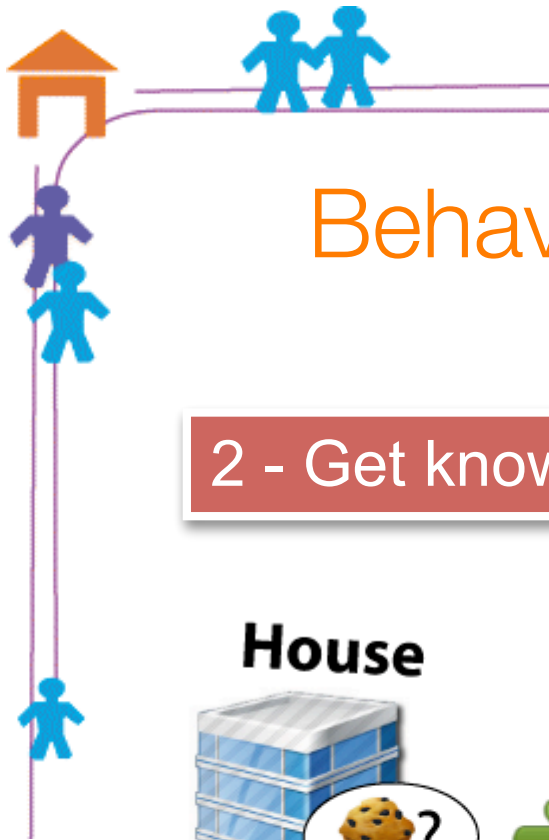


Behaviors of the neighborhoods

- Memory place 
- Knowledge associated 

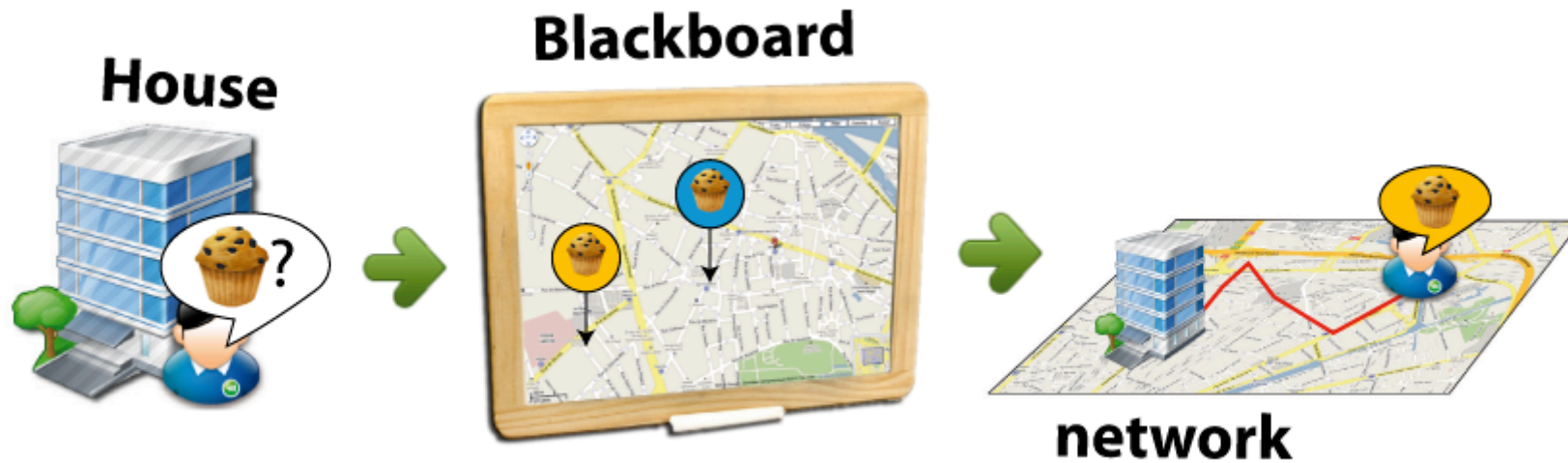
1- Memorize knowledge

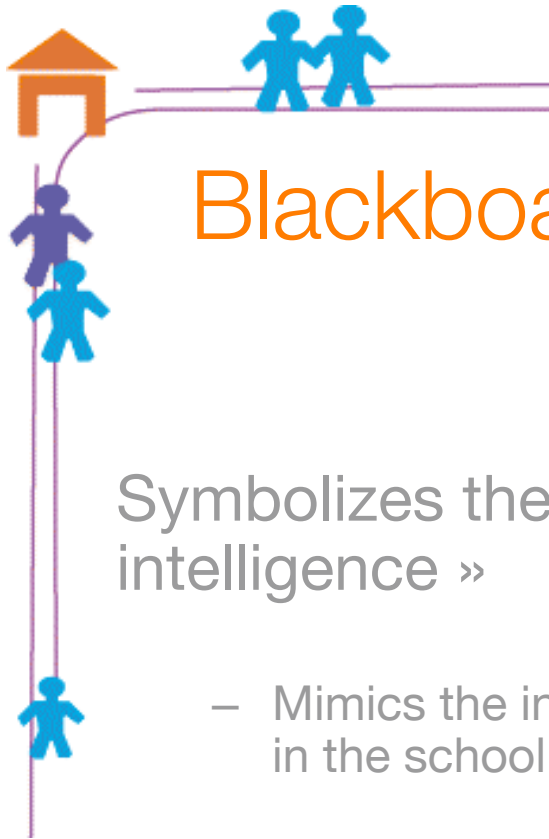




Behaviors of the neighborhoods

2 - Get knowledge





Blackboard communication and reactive optimization

Symbolizes the « collective intelligence »

- Mimics the information exchanged in the school yard
- Blackboard communication (shared read-write memory)
- On the long run results in reactive, non-intentional shortest path “optimization”
- Chocolate taste is let aside... :/





2 Games



• 2 roles for the child-player



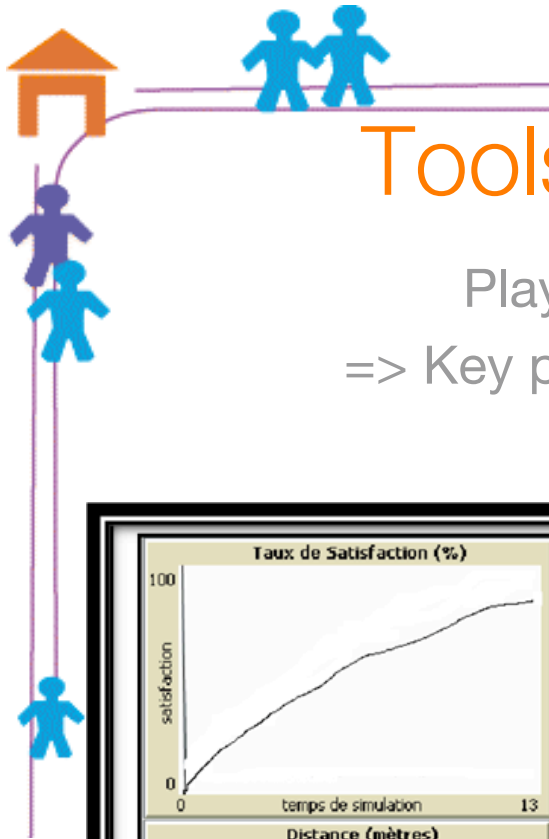
MAYOR

- GOAL : Be re-elected
- Starting point : already-constituted city (densities, networks)
- Has "authority" over the positioning of all the bakeries
- 3 real-time indicators to assess his development strategy:
 - The rate of satisfied children-agents (to MAX)
 - The average distance they walked (to MIN)
 - The wealth accumulated by the bakeries (to MAX)

• BAKER

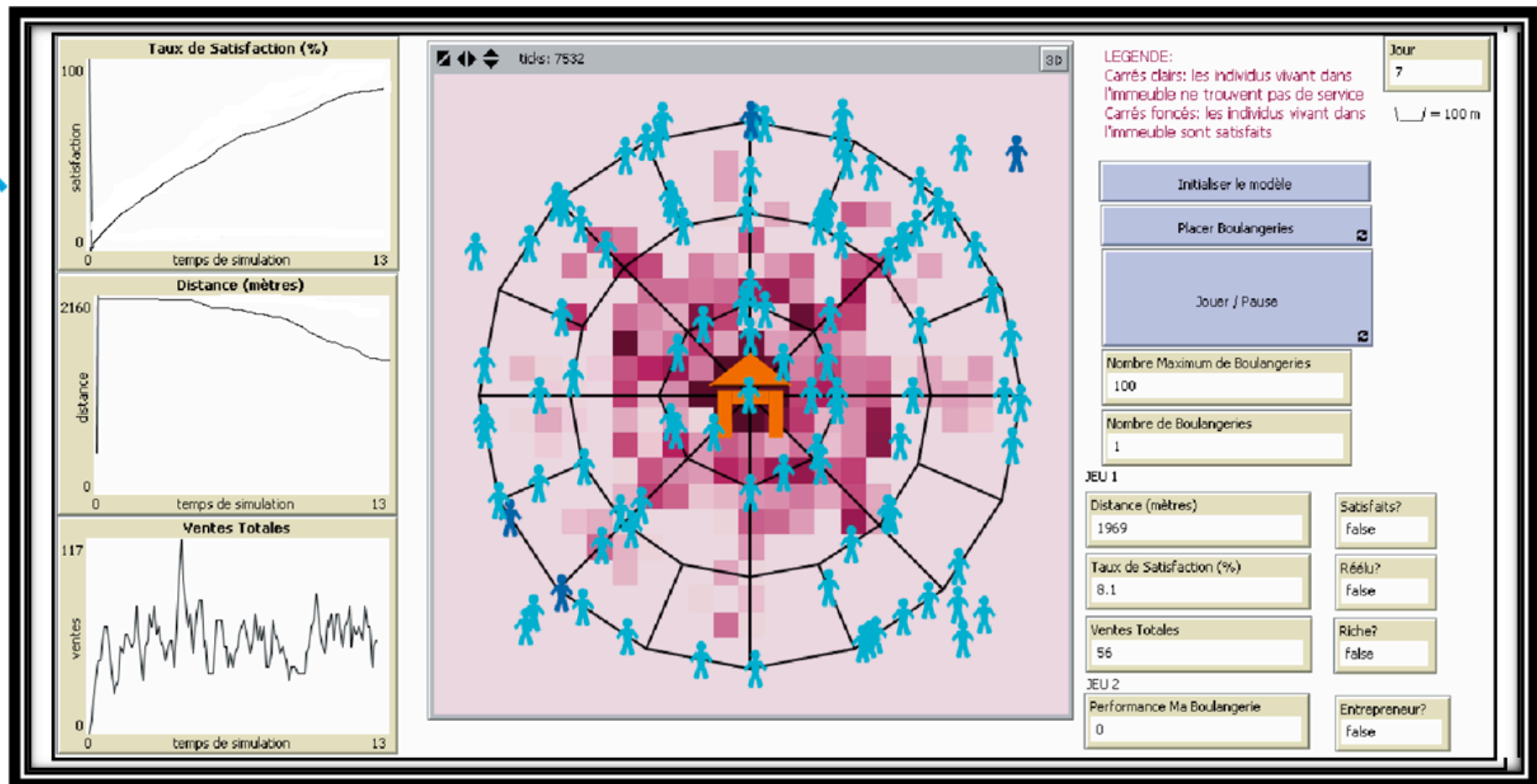


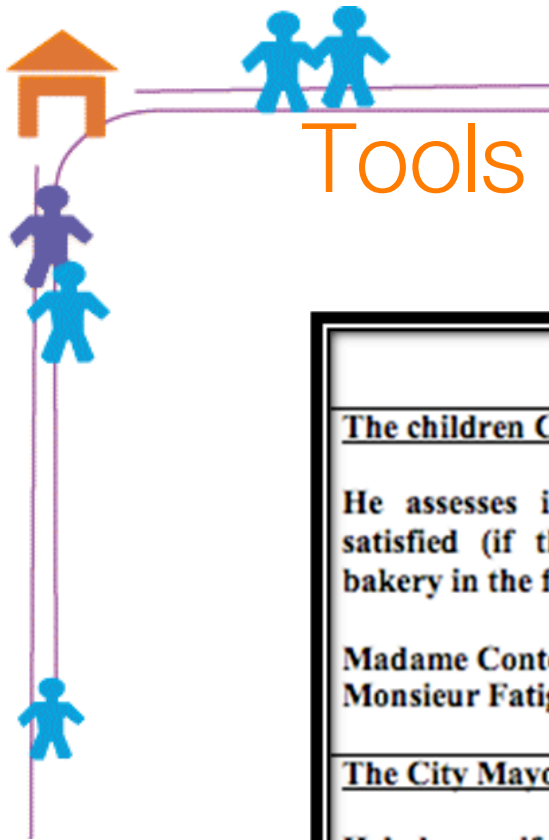
- GOAL : Be the most popular baker in town
- Starting point : already-constituted city (densities, networks) AND pre-located bakeries
- What's the best possible location for a new bakery ?
- Compares its development to that of other bakeries
- Bakeries disappear if not successful => trial and error strategies and on-the-fly visual evaluations









Tools for ABM Learning : GUI

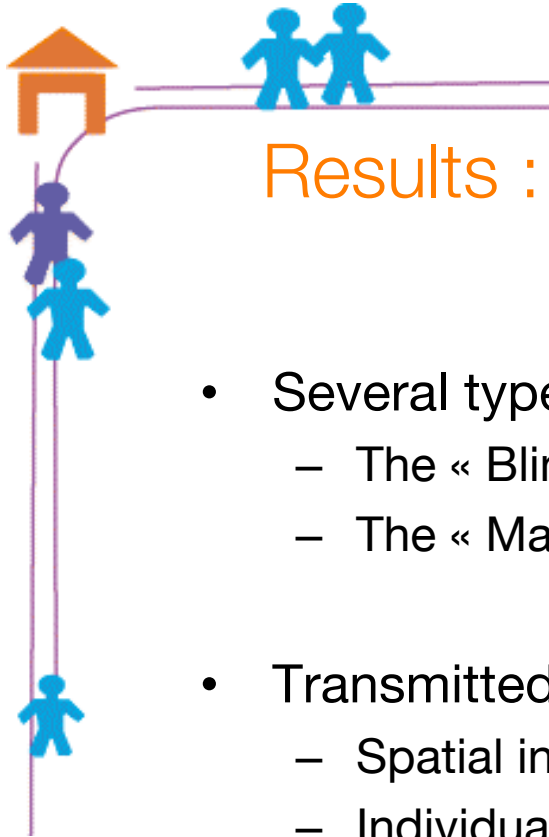
Player ergonomics vs developer ergonomics
=> Key parameters and indicators on the front only





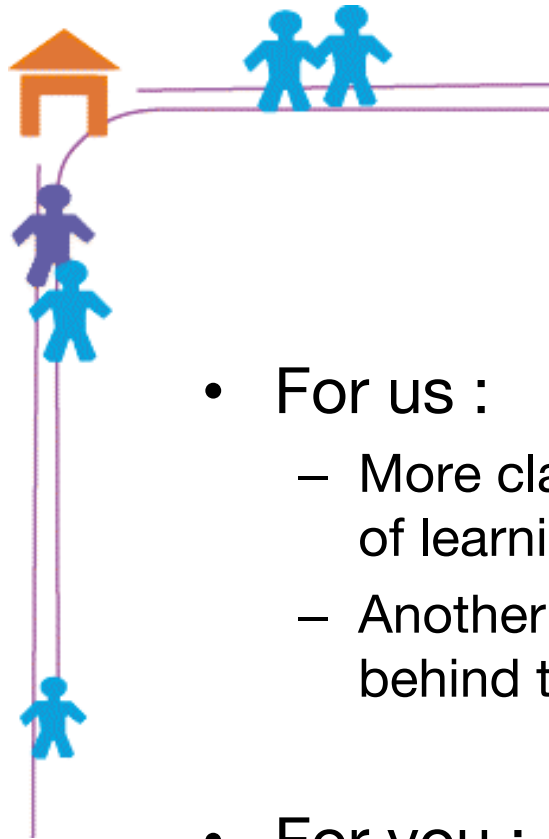
Tools for ABM Learning : restitution paper

	Satisfied (True)	Unsatisfied (False)
<p><u>The children Council chief:</u></p> <p>He assesses if the children are satisfied (if they can go to the bakery in the fixed time budget)</p> <p>Madame Contente= Miss Happy Monsieur Fatigué= Mr Tired</p>	<p>Madame Contente</p> 	<p>Monsieur Fatigué</p> 
<p><u>The City Mayor:</u></p> <p>He's happy if he is re-elected. For that, he needs at least of 50% children satisfied.</p> <p>Madame réélue= Miss re-elected Monsieur non-réélu= Mister non re-elected</p>	<p>Madame Réélue</p> 	<p>Monsieur Non Réélu</p> 
<p><u>Treasury Secretary:</u></p> <p>The bakeries have to sell a lot to pay a lot of taxes</p> <p>Monsieur Plein aux As= Mr Rich Monsieur Rien dans les Poches= Mr Poor</p>	<p>Monsieur Plein aux As</p> 	<p>Monsieur Rien dans les Poches</p> 



Results : Benefits from children and modelers points of view

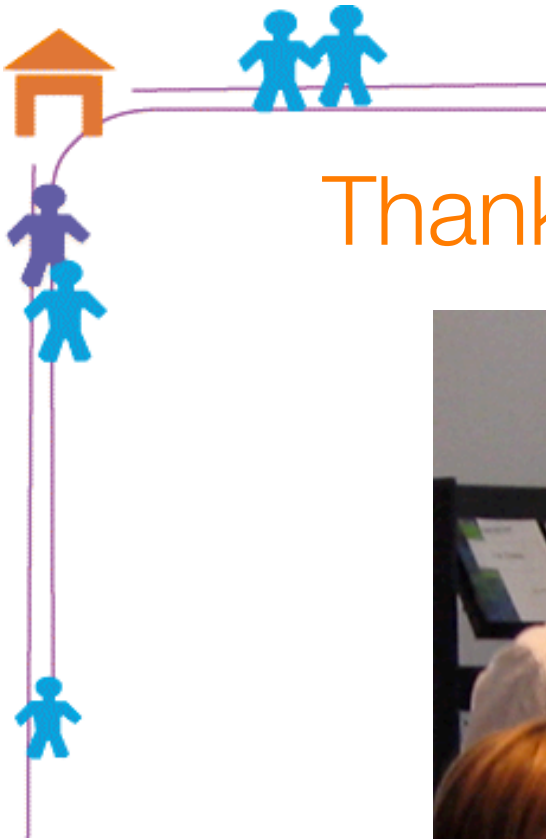
- Several types of player strategies
 - The « Blind red fish » strategy
 - The « Maths professor's son » strategy
- Transmitted notions
 - Spatial inequalities based on accessibility
 - Individual vs. Collective interests
 - Choices, compromises, multi-criteria decision support
 - Good identification of the child-player to the 2 roles
- Positive feedback for the team members on their own modeling projects



Perspectives

- For us :
 - More class experiments with more systematic investigation of learning efficiency
 - Another dimension of pedagogy : show the children the code behind the geography...
- For you :
 - Learn to cook and try to be the best baker in town => download **AccesSim** on the S4 modelling platform :

<http://www.spatial-modelling.info/ACCESSIM-French-version>



Thank you ! Any questions kids ?

