



Improving Multi-Level Interactions Modelling in a Multi-Agent Generalisation Model: First Experiments

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Outline

Motivation: multi-level interactions

Interaction modelling using PADAWAN

Case study

Context: agent oriented models for generalisation

- Existing multi-agent models :
 - AGENT (Ruas 1999)
 - CartACom (Duchêne 2004)
 - GAEL (Gaffuri 2008)
- Buildings, roads ... → agents trying to generalise themselves, choosing algorithms.

Transversal and Hierarchical Interactions



AGENT (Ruas 1999)



Transversal and Hierarchical Interactions



CartACom (Duchêne et al. 2012)

Transversal and Hierarchical Interactions

GAEL (Gaffuri et al. 2008)





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- What we are able to manage:
 - Hierarchical interactions between a feature and its components (a block and its building).
 - Only hierarchical or only transversal interactions.
- What we would like to manage:
 - Hierarchical interaction between a object and another one located inside (a road and included bus stations).
 - More complex interactions than only hierarchical or only transversal.



Object involved both in hierarchical and transversal relationship.

Object involved in more than one hierarchical relationship.







"Diagonal" interactions.

- We assume that a more generic way to model multi-level interactions would help.
- Recent progress in multi-level modelling in multiagent simulation field.
- Especially one interesting model: PADAWAN (Picault and Mathieu 2011).

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- Multi-agent multi-level simulation models (Picault and Mathieu 2011)
- Three interesting features :

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- Three interesting features :
 - Hierarchical relationships.
 - Generic way to express interactions, the conditions of their executions and the way they are triggered.
 - Generic way to link interactions to agents using interaction matrices.

 Multi-agent multi-level simulation models (Picault and Mathieu 2011)

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Source/ Target	Ø	Store as Host	Client	Store	Item	Alarm	Source/ Target	Ø	Store as Host	Client	Store	Item	Alarm
Store as Host			Inform	Open Close	SellOff Remove	SwitchOf	Store as Host			Inform	Open Close	SellOff Remove	SwitchOf
Client	Explore	Pay Exit		Enter	Take	Activate	Client	Explore	Pay Exit		Enter	Order	Activate
Store		Pay%	Attract				Store		Pay%	Attract			
Alarm	Ring	Alert					Alarm	Ring	Alert				

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Generic way to link interactions to agents using interaction matrices.

Adaptation of AGENT

- Issue: different ways to express behaviour.
 - AGENT: Constraints driven interactions.
 - PADAWAN: Interactions are selected.
- Adaptation: advices of constraint to trigger interaction.

• Result





Avec Padawan

Sans Padawan

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Case study: introduction



Roads 1:25k



1:50k

Case study: introduction



Roads 1:25k



1:50k

Case study: introduction



Roads 1:25k



1:50k

Case study: modelling

• New kind of agent: dead-ends estate.



Case study: modelling

• New kind of agent: dead-ends estate.

- New constraints: "is there enough room on this side of the dead-end" (left and right).
- New action.

Case study: results



Buildings from BDTopo, IGN Road: 1:50k







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Conclusion

- Unsolved problems identified.
- Adaptation of AGENT to PADAWAN.
- First thoughts and experiments for a multilevel agent solution.

Perspectives

- Handle more interaction types in the model.
 - First step: adaptation of CartACom and GAEL to PADAWAN.
- Orchestration of agents.

Thank you !