Observation of Child Pedestrian near School: Conflicts and Behaviours

Workshop "Observation and Modelling of Pedestrian Behaviour in Urban Areas"
4 mai 2015

Projet ESSAIM (Environnement Scolaire Sécuritaire et Analyse des Interventions Municipales)

Outline

- The ESSAIM project: main objective
- Data collection
- Results
  - 1 – In-situ observations
  - 2 – Vehicle-Pedestrian interactions
- What's next?

The ESSAIM project

To study the potential impact of urban planning and road safety measures (at the municipal level) on child pedestrian safety around schools and parks

1-Analysis of behaviours in various road environments

2-Comparison of risk perception with actual behaviours

3-Creation of a toolbox for municipalities willing to improve road safety around schools and parks

Team ESSAIM

- **University Researchers**
  - Jacques Bergeron, Psychology, Univ. de Montréal
  - Marie-Soleil Cloutier, Geography, INRS-UCS
  - Juan Torres, Urbanism, Univ. de Montréal
  - A special thanks to our friends for France for the observation grid (Marie-Axelle Granié)

- **Vélo-Québec partnership** (À Pied, à Vélo, Ville Active)
  - Annick St-Denis

- **Students** in *psychology, urban studies, urban planning, geography*

Data collection

A process in 3 steps

1) Choice of schools and pedestrian crossings to be observed
2) Training of the observers
3) Actual data collection (summer 2013-2014)

Step 1: Choice of the schools

- 1 km proximity zone (PZ) around schools
  - Sampling based on filled questionnaires in Québec, Gatineau, Montréal (île, Laval, Longueuil, Sainte-Julie)
- Creation of a spatial database with environmental variables (n=9)
- Classification in SIX school types according to those variables
  - 24 schools in FIVE types
  - 12 schools without “urban modifications”

Step 2-3: Direct « naturalistic » observations

- Adaptation of the **Granié behaviour observation grid**
  - Additional questions for children
- Additional grid for the **vehicle** (including a conflict diagnosis)
- Additional grid for the **environmental characteristics** (pedestrian crossing, whole intersection and adjacent streets)
  - Traffic light, pavement marking, length of the crossing, one-way, traffic calming measures, cycle path

- Three teams of 3 students
  - Observations in the morning (30 minutes before school starts)
  - May-June and Sept-Oct (no winter months)
  - Training for 10 days
  - Use of Ipads
  - Traffic counts for each observed crossing (a year later)

Conflict diagnosis

Interaction with compliance

Ex: The car let the pedestrian go first and go straight before the pedestrian is on the other curb

Interaction with pedestrian non-compliance

Ex: pedestrian cross in front of a vehicle on red light

Interaction with vehicle non-compliance

Ex: The car did not let the pedestrian first

Interaction with both non-compliance

Ex: pedestrian cross on red while the car also turn on red

Potential crash

EX: Avoidance manoeuvre from one of the two

Results

In-situ Observations

About the environment around observed crossings

- Near schools (median=83m) and parks (median=56m)
- Mostly on Mtl Island (60%) and surroundings (23%)

- Half of the observations at intersections with an **adult school crossing guards**

- 57% of the observations at crossings with a **stop sign**
  - 29% with a traffic light

- **Speed limit** was not visible (no sign) for half of the crossings
  - 30% had a 30 km/h road sign nearby

About the observed children

- Half boys/girls and half 5-8/9-12 years-old
- Almost 75% of them were NOT ALONE approaching the curb (with a parent or friends)
- Almost half of the were *playing, eating or talking* approaching the curb
- For those who stop at the curb, 75% were waiting on the curb (vs on the pavement)

Observed behaviours
Head movement (looking toward…)

	Before crossing		While crossing	
	#	%	#	%
the light	138	6.9	58	2.9
traffic	428	21.5	290	14.6
people	642	32.3	525	26.4
the ground	467	23.5	719	36.2
electronic device	27	1.4	25	1.3
Straight ahead	1182	59.5	1318	66.3
everywhere	246	12.4	202	10.2

NOTE: n=1988 for each behaviour, more than one possible answer

Observed behaviours

Traffic light phase

	Before crossing		While crossing	
	#	%	#	%
Straight green arrow	35	6.1	0	0
Green	241	42.4	132	23
Yellow	6	1	11	1.9
Red	163	28.4	152	26.5
Missing data	124	21.3	277	48.3
TOTAL	573	100	573	100
Silhouette	382	73.9	80	15.4
Blinking red hand	71	13.6	202	38.8
Red hand	42	8.1	60	11.5
Missing data	26	4.4	179	34.4
TOTAL	521	100	521	100

NOTE: *n=573, including 521 with pedestrian light*

Results

Vehicle-Pedestrian interactions near schools

Vehicle-Pedestrian interactions near schools

- 204 interactions* near schools

		Nombre	%
Age group	5-8 years old	116	56.9
	9-12 years old	88	43.1
Gender	boys	104	51
	girls	100	49
Type de véhicule	**voiture**	**178**	**87,3**
	autobus/camion	9	4,4
	Taxi/moto	4	2,0
	vélo	11	5,4

*(i.e. vehicule on the crossing at the same time than the observed child)

Interaction types

- **NONE were a « conflict » per se (no collision avoidance)**

	Nombre	%
Interaction with compliance *Ex: The car let the pedestrian go first and go straight before the pedestrian is on the other curb*	138	67.7
Interaction with pedestrian non-compliance *Ex: pedestrian cross in front of a vehicle on red light*	4	1.9
Interaction with vehicle non-compliance *Ex: The car did not let the pedestrian first*	57	27.9
Interaction with both non-compliance *Ex: pedestrian cross on red while the car also turn on red*	5	2.5

Where are these interactions?

- When there's a **SCHOOL GUARDS**, 92% of all observations were WITHOUT INTERACTION
  - Without a school guards, it's only 77%
- When there's a **LOCAL ROAD**, 86% of all observations were WITHOUT INTERACTION
- 9% of all observations were an interaction at intersections with a **MAJOR ROAD**

Logistic modelling of observed behaviours

Logistic Model

Child-related Independent Variables (x)

Variables	N	%
Not alone when crossing (children or adult)	**138**	**67,6**
Other pedestrians nearby when crossing	84	41,2
Waiting on the curb	22	10,8
Looking at the ground (before and while crossing)	38	18,6
Looking straight ahead (before and while crossing)	44	21,6

Logistic Model

Crossing Built Environment-related Independent Variables (x)

Variables	N	%
Length of the crossing under 10m	84	41,2
One-way at crossing	42	20,6
School guards at crossing	82	40,2
Stop sign	**153**	**75,0**
Pavement marking	**175**	**85,8**
Central island	18	8,8
Parking permitted within 5m of the crossing	91	44,6
Cycle path at intersection	55	27,0
Curb extensions (bulb-outs)	40	19,6
Major road at intersection	**141**	**69,1**
Local road at intersection	**196**	**96,1**

Logistic models

Y	R^2 Nagelkerke	Significant variables	OR
Pedestrian priority	0,23	School guards at crossing	2,11*
		Stop sign	4,76***
		Pavement marking	3,90**
Interaction without vehicle compliance	0,18	Length of the crossing under 10m	2,86**
		Pavement marking (-)	0,25**
		Central island	45,85***
		Cycle path at intersection (-)	0,18***
		Local road at intersection	89,13***

***p < .001; **p < .01; *p < .05

What's next?

- Look more closely at those models
  - X variables that are "too strong"?
- Analyse results in comparison to:
  - Focus group data (with children)
  - Questionnaires (filled by parents)
  - Other environmental data
- Workshop with the team and other municipal professionals (sept. 2015)

MERCI!

L'équipe ESSAIM:

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Et tous les étudiants impliqués!