Rules of the Road
Compliance and defiance among the different types of cyclists

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ABSTRACT

Cycling in North America maintains risks that lower its perceived safety. These risks are often attributed to scofflaw cyclists - cyclists who ignore the rules of the road - rather than cylists' experiences, making improvements to cycling safety more difficult.

In response, this study generates a cyclist typology from a survey of 1,329 cyclists in Montreal, Canada and compares their rule-breaking behaviour.

It does so using a factor-cluster approach based on respondents' cycling behaviours, practices, and risk-taking.

We find that all cyclist types contravene traffic laws in similar ways, and only 0.6% of respondents consistently follow traffic laws. Breaking the law is often considered the safest option by respondents.

Targeted policies can be used to increase rule compliance of each cyclist type, including education, prioritising cycling infrastructure, and improving dedicated infrastructure.

CONTEXT & DATA

Montreal is considered among North America's most bikeable cities, yet its reputation has been sliding according to The Copenhagenize Index. Many areas of the city are considered too unsafe while infrastructure investment remains stagnant.

An opportunity to improve the safety of cycling came with the recent revision of local traffic laws, yet for the most part the rules of the road applying to cyclists remain identical to those applying to motorists.

2018 Montreal Cycling Survey

- Online travel behaviour survey active between May 15th and June 15th, 2018, in both French and English

- Shared via mailing list, social media, official McGill University media channels, cycling advocacy organizations, live TV interviews, and paper flyers

- Asks about personal characteristics, cycling behaviour and practices, risk-taking behaviours, and responses to four common rule-breaking scenarios

- Collected 1,391 responses, of which 1,329 are included for analysis
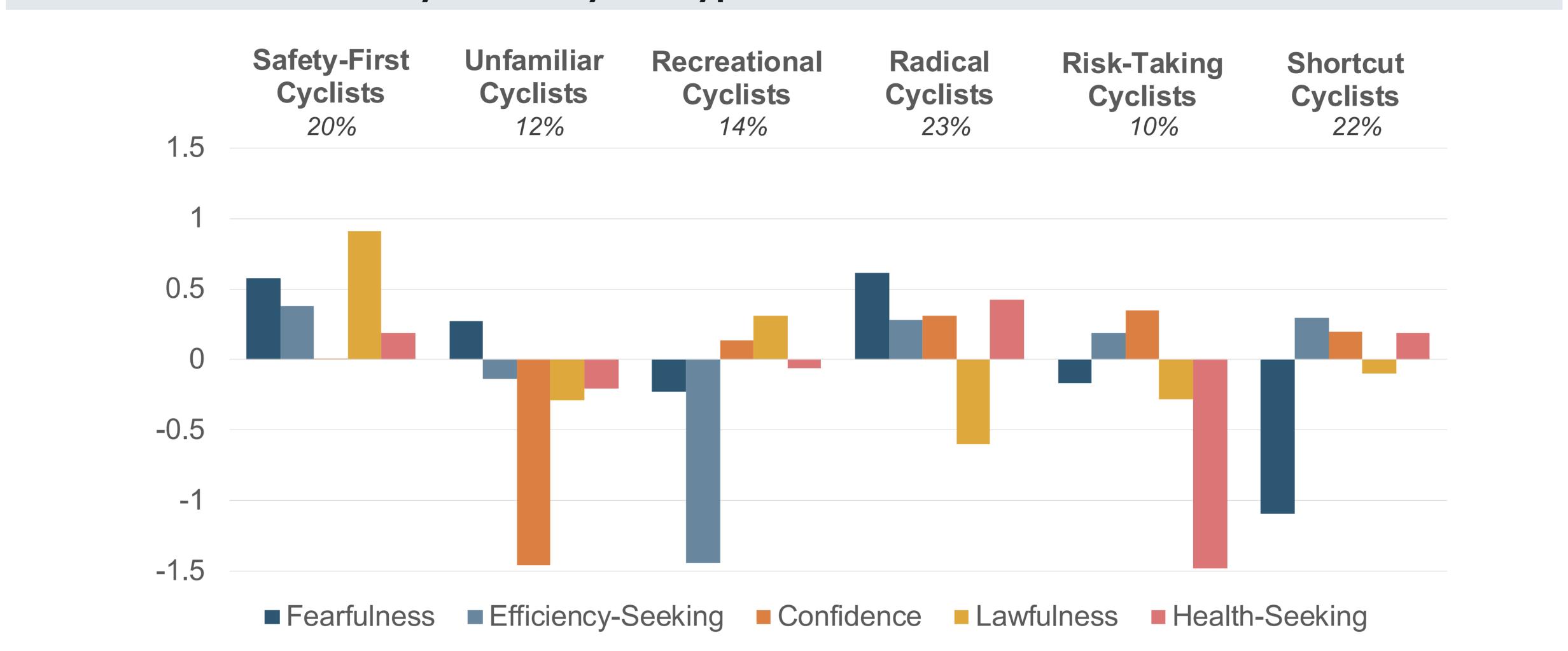
ANALYSIS

Principal Component Factor Analysis

Question/Variable	Factor Loading
Fearfulness	
How worried are you of potentially being injured in a cycling collision?	0.897
How worried are you of potentially being involved in a cycling collision?	0.891
Efficiency-Seeking	
How important is taking the fastest way from A to B in your decision to cycle now?	0.804
How important is predictability of travel time in your decision to cycle now?	0.761
How important is the low cost of cycling in your decision to cycle now?	0.527
Confidence	
How confident are you in your cycling ability?	0.644
How confident are you in your knowledge of cycling rules, according to the Quebec Highway Safety Code?	0.613
Lawfulness	
Thinking of my typical behavior in the past year, I always follow the Quebec Highway Safety Code while cycling.	0.823
Thinking of my typical behavior in the past year, I use signals for all of my movements while cycling.	0.435
Health-Seeking	
How important are environmental reasons in your decision to cycle now?	0.74
How important are health reasons in your decision to cycle now?	0.513

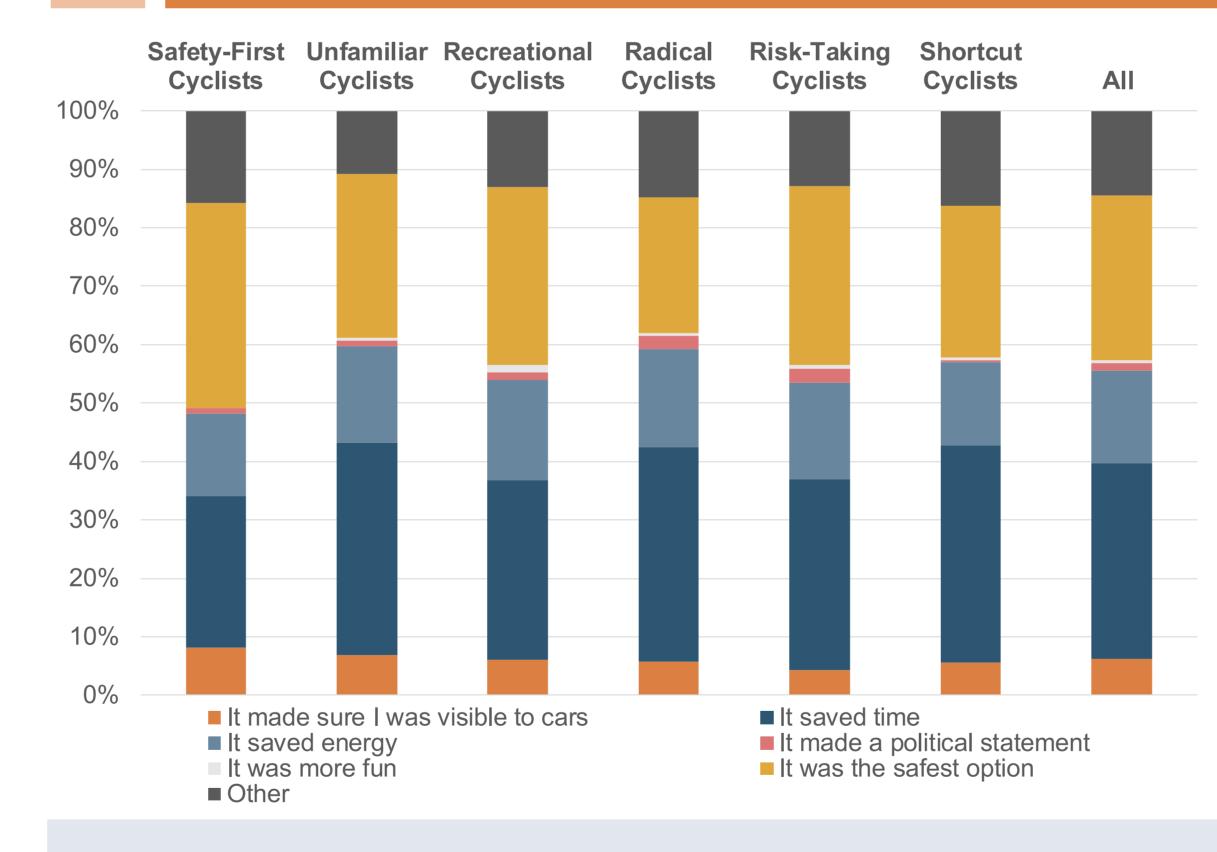### K-Means Cluster Analysis: Six Cyclist Types

Safety-First Cyclists 20% | Unfamiliar Cyclists 12% | Recreational Cyclists 14% | Radical Cyclists 23% | Risk-Taking Cyclists 10% | Shortcut Cyclists 22%

Legend: Fearfulness, Efficiency-Seeking, Confidence, Lawfulness, Health-Seeking

CYCLIST TYPE PROFILES

|	Safety-first Cyclists	Unfamiliar Cyclists	Recreational Cyclists	Radical Cyclists	Risk-taking Cyclists	Shortcut Cyclists
Demographic						
Age (years)	42.4	41.0	50.2	40.3	43.4	43.1
Cycling experience (years)	16.3	13.0	17.5	17.2	18.0	20.2
% female, non-binary, or other	0.51	0.73	0.30	0.35	0.27	0.37
% student	0.08	0.25	0.05	0.12	0.10	0.11
% retired	0.07	0.06	0.22	0.04	0.06	0.07
Trip Behaviour						
Commute distance (km)	6.71	7.02	6.80	6.07	6.72	5.67
# of weekly work trips by bicycle	4.77	2.83	2.65	4.88	4.06	3.93
# of weekly grocery trips by bicycle	1.00	1.01	0.56	1.36	1.10	1.07
# of weekly leisure trips by bicycle	2.42	2.28	1.60	2.87	2.61	2.29
% who cycle in winter	0.27	0.14	0.14	0.43	0.36	0.37
Mode Behaviour						
% who when not cycling, drive	0.25	0.23	0.43	0.23	0.26	0.25
% who when not cycling, take public transport	0.76	0.82	0.61	0.73	0.74	0.73
% who when not cycling, walk	0.42	0.56	0.34	0.39	0.42	0.41
% who use BIXI	0.40	0.46	0.22	0.44	0.55	0.38
% agree, cyclists should always have the right-of-way	0.54	0.58	0.49	0.69	0.51	0.55
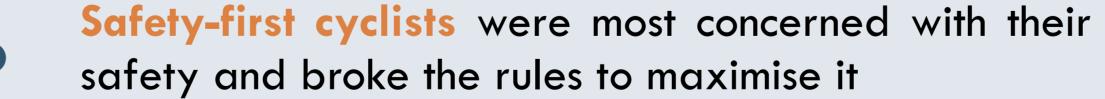
- The respondents are skewed older and more male than the Montreal average.

- Recreational cyclists are the oldest at 50.2, while radical cyclists are the youngest at 40.3

- Risk-taking cyclists are the biggest users of BIXI, Montreal's local bikeshare system.

RULE-BREAKING RATIONALE & RULE-BREAKING BEHAVIOUR

Legend (left chart): It made sure I was visible to cars; It saved energy; It was more fun; Other; It saved time; It made a political statement; It was the safest option

Legend (right chart): All choices follow Code; One choice follows Code; Three choices follow Code; No choices follow Code; Two choices follow Code

- Safety-first cyclists were most concerned with their safety and broke the rules to maximise it

- Radical cyclists were most concerned with saving time and energy

- Risk-taking and radical cyclists were most likely to choose rule-breaking for fun or to protest

- Rule-breaking is similarly rationalized by all types

- Radical cyclists broke the rules most, followed by risk-taking, unfamiliar, shortcut, safety-first, and recreational cyclists

- Radical cyclists broke the rules in at least half the scenarios posed to them

- Even the most rule-abiding cyclist types - safety-first and recreational cyclists - never saw more than 2% of their members consistently following the rules

DISCUSSION & CONCLUSIONS

Rule-breaking by cyclists is a rational choice that maximises safety & efficiency, not a reckless action by a few scofflaw cyclists. Planners, policy makers, and law enforcement should target specific cycling types when rethinking cycling strategies and laws for their region and can do so in four policy areas:

TRAINING & PRACTICE
Improving cyclist confidence requires early childhood training and education concerning bicycle use and safety

INFRASTRUCTURE
Countering fearfulness requires a minimum grid of dedicated infrastructure that reduces exposure to collisions. The rules of the network should be communicated through network design
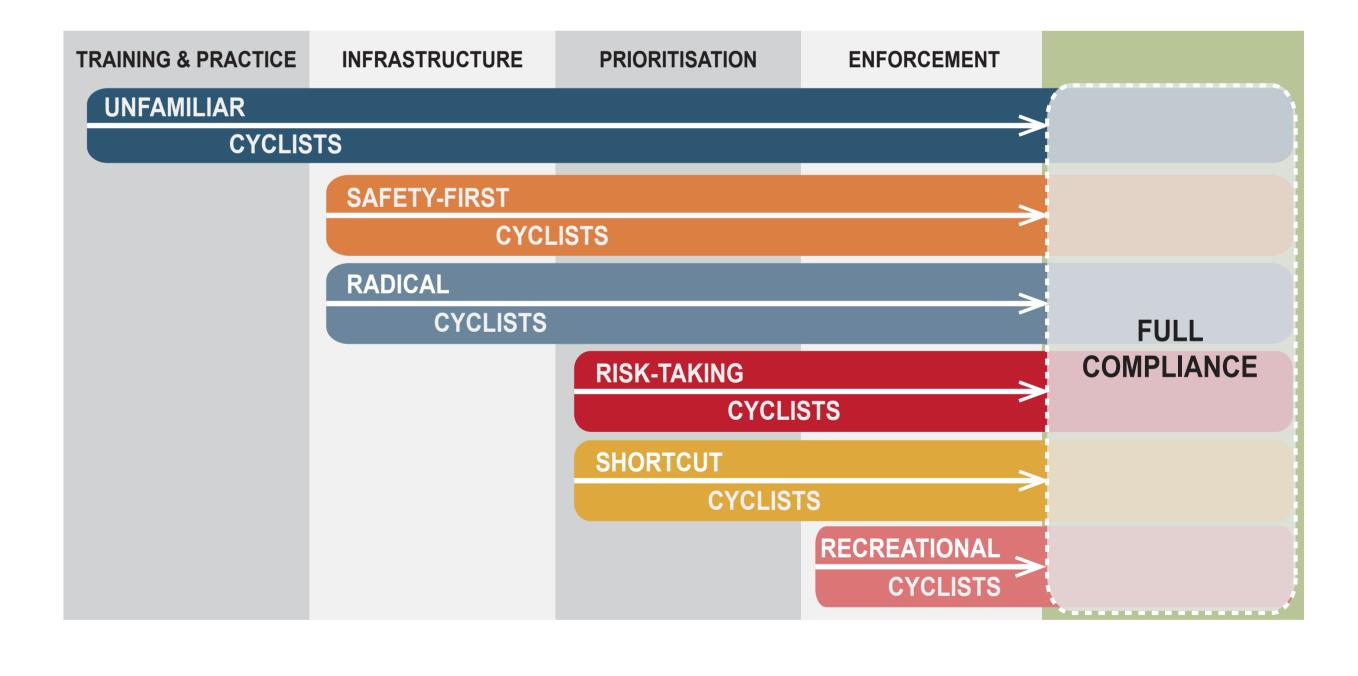
PRIORITISATION
Emphasize the efficiency of cycling by providing synchronised signal corridors and allowing cyclist ROW at signed intersections

ENFORCEMENT
There will always be a need for continued enforcement of up-to-date and sensible rules for all cyclist types

Targeting Cycling Policies for Rule Compliance

ACKNOWLEDGEMENTS