## IMPACT OF VARYING SURVEY DESIGN ON REPORTED TRAVEL SATISFACTION

### ABSTRACT

Research has shown that the way of asking a survey question or the order in which it is received can influence responses.

Surveys are frequently used by transport professionals to better understand the psychology behind travelers' level of satisfaction in order to derive policies.

Awareness of how survey design may impact responses to satsifaction-related questions is vital for future policy analysis and development.

This study examines the effects of seasonality, question wording, and question order on travel satisfaction in a University commuter travel survey.

Using a series of t-tests and binary logistic regression models, we confirm the presence of question order and wording effects on reported satisfaction levels. We also observe differences in trip satisfaction due to seasonality.

### DATA

#### 2017-2018 McGill University Commuter Survey

An online travel behavior survey targeted at faculty, staff and students at McGill University in Montreal, Canada.

Respondents were asked to recall their most recent trip to McGill and specify the transport mode(s) used, personal characteristics and satisfaction with their last trip.

In addition, they were asked to rate their satisfaction with their typical trip to McGill during a specific weather condition:

- Fall respondents: "warm and sunny day"
- Winter respondents: "cold and snowy day"

#### Question order design in survey







\* 95% significance level

#### Satisfaction with last trip (Comparisons A and C)

**Pedestrians** report significantly **lower satisfaction** levels in winter compared to fall in both scenarios.

#### Satisfaction with typical trip (Comparisons B and D)

**O Pedestrians:** difference between satisfaction on "warm and sunny day" and "cold and snowy day" >>> difference between seasons for last trip

• All mode users: higher satisfaction during "warm and sunny day" compared to "cold and snowy day"

### PART A: SEASONAL IMPACTS

#### **Evaluation framework**

#### Independent t-tests

ario			Walk	Transit	Drive				
		Sonson of survey distribution	Average satisfaction						
		season of survey distribution	level						
	Α	Last trip in Fall	4.32	3.87	3.46				
		Last trip in Winter	4.02	3.85	3.7				
		Δ <sub>fall-winter</sub>	0.3*	0.02	-0.24				
		Question wording	Averc	Average satisfaction					
		Quesnon wording	level						
	В	Typical warm and sunny trip (fall)	4.61	3.83	3.91				
		Typical cold and snowy trip (winter)	3.04	3.26	3.01				
		Δ <sub>typical fall-typical winter</sub>	1.57*	0.57*	0.9*				
		Season of survey distribution	Average satisfaction						
	C	Jeuson of solvey distribution	level						
		Last trip in Fall	4.63	4.15	3.84				
		Last trip in Winter		4.04	4.04				
		Δ <sub>fall-winter</sub>	0.6*	0.11	-0.2				
		Question wording	Average satisfaction						
		Quesnon wording		level					
	D	Typical warm and sunny trip (fall)	4.68	4.14	3.74				
		Typical cold and snowy trip (winter)	3.6	3.69	3.4				
		Δ <sub>typical fall-typical winter</sub>	1.08*	0.45*	0.3*				

### PART B: QUESTION ORDER AND QUESTION WORDING EFFECTS



#### "First question asked" (1 - satisfied) to first question asked

		Wa	ılk			Tra	nsit			Drive			
Variables	Fall		Winter		Fall		Winter		Fall		Winter		
	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	
Satisfaction with	2 007	***	0 4 4 7	**	2 2 5 2	***	1 051		2 544	***	0 9 2 7	**	
typical trip	3.997		0.047	**	2.252	~~~~	1.051		2.500		0.037		
Personal characteristics													
Gender: Male	1.077		0.922		1.682	**	1.41	**	0.576		1.128		
Age	1.05	*	1.031	*	1.02	*	1.015	**	0.999		1.048	*	
High income	0.796		0 7 2 2	**	1 002	*	2 224	***	2 976	**	0 5 9 5	**	
(ref = low income)	0.780		2./ 33		1.005		2.224		3.070		0.565		
Middle income	1 4 5 0		2217	***	0.042		1 4 4 0	***	2050	**	0 5 2 4	***	
(ref = low income)	1.030		2.317		0.903		1.009		3.030		0.524		
			Trip c	hara	cteris	tics							
Average													
temperature	1.043		1.007		1.015		1.043	***	0.891	**	1.047		
(Celsius)													
Precipitation (cm)	0.974		0.967		1.002		0.944	*	1.05	**	1.007		
Snow on ground	0.007		0 009		1.05		1 0 1 2	*	0 970	*	1 005		
dummy	0.77/		0.770		1.05		1.012		0.072		1.005		
Travel Time (min)	0.997		1.001		0.971	***	0.976	***	0.961	***	0.998		
Number of	400		162		770		1055		220		101		
respondents	400		403				1055				174		

\*\*\* 99% significance level, \*\* 95% significance level, \* 90% significance level

Fall respondents are more likely to answer their first satisfaction question with satisfied response when typical trip satisfaction is the first question asked.

The opposite is observed for winter respondents, except for transit users.

#### **Evaluation framework**

#### Binary logistic regressions

**Dependent variable:** binary satisfaction rating

#### "Second question asked"

**Dependent variable:** binary satisfaction rating (1 - satisfied) to second question asked

		Wa	k			Tra	nsit			Drive			
Variables	Fall		Win	ter	Fall		Winter		Fall		Winter		
	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	
Satisfaction with	3.128	**	0 1 4 2	***	0.872		0 204	***	1.799		0.188	***	
typical trip			0.112				0.001		1 //		0.100		
Satisfaction with	16 100	***	0 070	***	0 102	***	L	***	10 / 90	***	2 052	***	
first question	10.177	0.27			7.102	0.000			17.407		5.755		
Personal characteristics													
Gender: Male	0.679		1.213		0.803		0.938		0.776		1.166		
Age	1.024		1.025		1.001		1.020	**	1.015		1.017		
High income	1 000		1 4 2 0		0.050	**	1.004		0 5 5 5		1 1 7 7		
(ref = low income)	ef = low income)		1.028		2.233		1.554		0.555		1.127		
Middle income	1.012		1 070	**	1 402		1 0 1 0		0 252		0 0 5 2		
(ref = low income)	1.013		1.0/9		1.493		1.210		0.352		0.853		
			Trip c	hara	cteris	tics							
Average													
temperature	1.043		1.007		0.978		1.020		1.089	*	0.983		
(Celsius)													
Precipitation (cm)	0.974		0.967		1.008		0.976		1.036		1.013		
Snow on ground	0.007		0.000		0.040		1 002		1055		0.000		
dummy	0.997		0.998		0.949		1.003		1.055		0.900		
Travel Time (min)	0.997		1.001		0.993	*	0.987	***	1.001		1.000		
Number of	400		160		770		1055		220		104		
respondents	400		403		//0		1055		220		174		

Winter respondents are significantly less likely to answer their second satisfaction question with a satisfied response when typical satisfaction is the second question asked.

Being satisfied with the first question, regardless of question, increases likelihood of having a satisfied response to **second question**, especially in fall.

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<b>3</b> "Last trip	ord	er"	&	4	<b>"T</b>	ypi	cal	trip	or	der	"		
	Dependent variable: Satisfaction with last trip												
Independent variable	(Comparison 3) Walk Transit								Drive				
	Fall		Wi	nter	Fall		Winter		Fall		Winter		
	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	
Scenario 1 (ref = scenario 2)	1.023		0.444	***	0.529	***	0.492	***	0.833		0.630		
		Dep	oende	ent va	riable (Co	: Sati mpa	sfacti rison	on w 4)	vith ty	pical	trip		
Independent variable		W	alk			Tra	nsit						
	Fall		Wi	nter	Fall		Winter		Fall		Winter		
	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	OR	Sig.	
Scenario 1 (ref = scenario 2)	0.343	***	0.852		0.550	**	0.686	**	0.427	**	0.431	**	

\*\*\* 99% significance level, \*\* 95% significance level, \* 90% significance level dds ratio are presented and personal trip characteristic variables were omitted from the table

In fall and winter, likelihood of being satisfied with typical trip is lower when it is asked second (except for winter pedestrians).

#### CONCLUSIONS

- Active mode users are more affected by harsh winter **conditions** shown by lower satisfaction in winter than fall
- O Differently-worded typical trip questions may evoke +/emotions that could exaggerate reported satisfaction
- **Question wording effects** are visible for fall respondents as they are more likely to report being satisfied with typical trip on "warm and sunny day" rather than last trip
- **O** Subtractive question order effects are present regardless of wording; respondents are less satisfied with their typical trip when it is asked second than first
- A split-ballot methodology is recommended for travel surveys to offset the effects of question order while using same wording to minimize question wording effects

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