

Travel-based Multitasking: How Does it Influence the Value of Travel Time?

Alexander Malokin

<amalokin@ucdavis.edu>

Patricia L. Mokhtarian

Giovanni Circella

Institute of Transportation Studies

University of California, Davis

Behavior, Energy & Climate Change Conference
Sacramento, CA

11/13/2012

Overview

{

1. Motivation
2. Data highlights
3. Preliminary results
4. Future prospects

}

Research background

Conventional wisdom: daily travel presents **disutility** and ought to be **minimized**.

Is commuting time actually **wasted**? Consider a range of **activities** one can engage in while traveling (+ ever growing **ICT opportunities**).

Is there a **link** between people's **attitudes** and **behavior** towards **fragmented time** (**multitasking propensities**), **monetized benefits of travel time** (**its value**) and **mode choice**?

Survey design

Part A: Attitudes and Personality

Part B: Multitasking Attitudes

Part C: Time Use Expectations and Preferences

Part D: Attitudes toward Waiting

Part E: Perceptions of Four Transportation Commute Modes

Part F: A Recent Commute Trip

Part G: “Internet Access On-the-Go”

Part H: Daily Commute

Part I: Sociodemographic Traits

→ more than 800 original variables

Data collection effort

Mode-specific:

- * SacRT
- * Capital Corridor (Amtrak)
- * BART
- * Yolobus

Organization-specific:

- * Google
- * Commuter Club
- * UC Davis



Email-blast:

- * Infogroup

Mail-blast:

- * BulkMail

Panel:

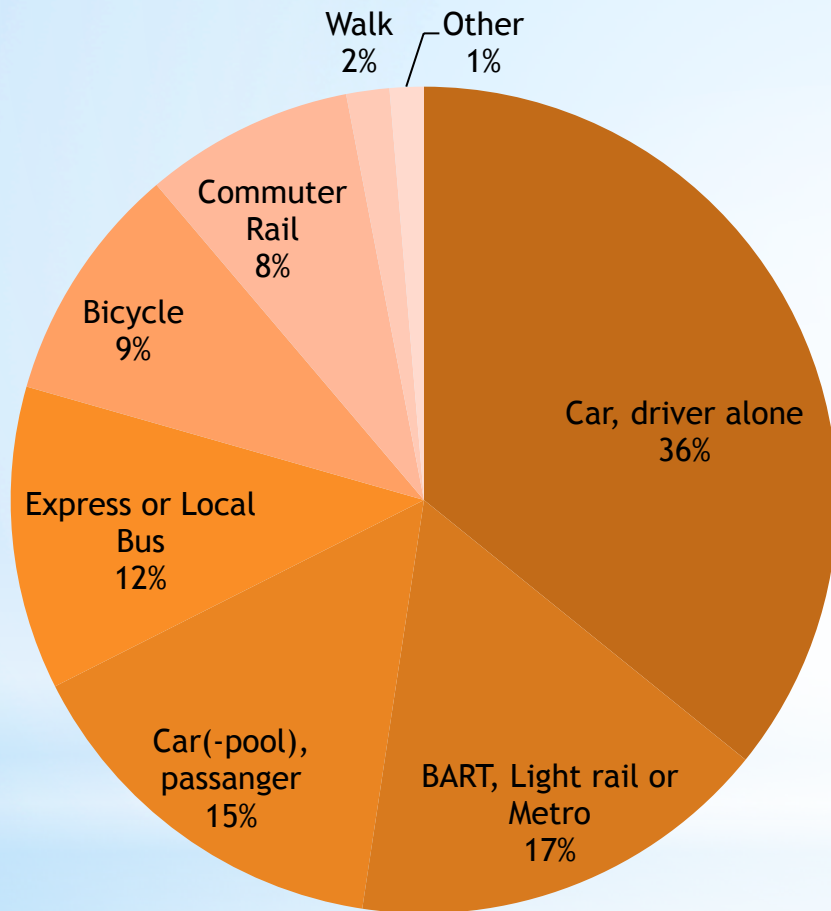
- * Survey Analytics

3 weeks of ~3,000 paper survey distribution +

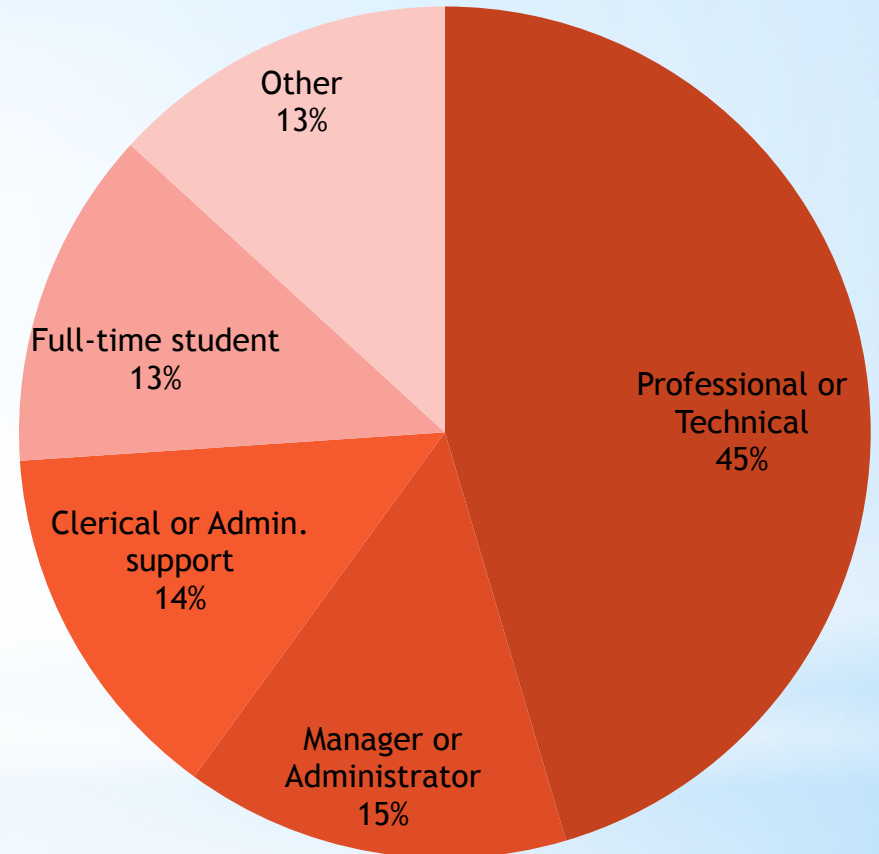
3 months of ~30 varieties of web surveys online +

6 months of data entry, filtering and conditioning

Data highlights (N = 2849)



N(miss) = 1



N(miss) = 10

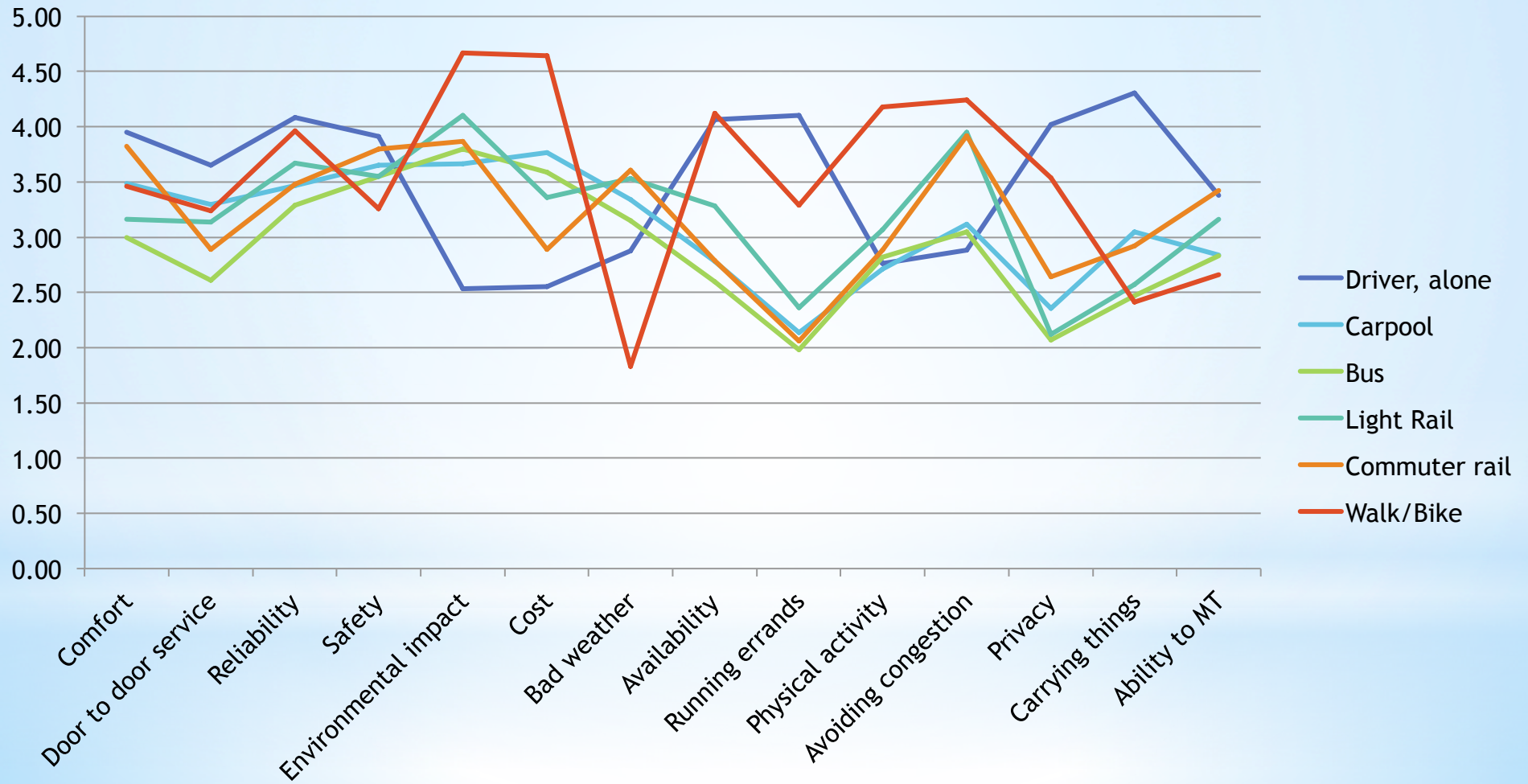
Data highlights (N = 2849)

Crosstabulation of HH income and stated commute duration, row %

	Less than 15 minutes	15-30 minutes	31-45 minutes	46 minutes - 1 hour	1 - 1½ hours	1½ - 2 hours	More than two hours	Total
Less than \$25,000	35.1	33.5	10.9	8.4	5.4	4.2	2.5	239
\$25,000 to \$49,999	22.8	33.4	18.2	13.2	7.3	4.3	0.8	395
\$50,000 to \$74,999	16.5	31.4	19.6	16.5	10.6	3.1	2.2	545
\$75,000 to \$99,999	14.0	33.9	20.5	16.4	9.5	4.5	1.2	507
\$100,000 to \$124,999	15.3	26.7	18.2	17.5	13.7	6.6	2.1	424
\$125,000 or more	12.6	22.9	20.7	18.3	14.1	6.2	5.2	595
Total	17.6	29.7	18.8	15.8	10.7	4.9	2.5	2705

Data highlights (N = 2849)

Mode-specific means of mode perception items



Study[‘Sample’] = “Can your neighbor be in here?”

Ordered Probit

In terms of its value to you, how would you rate the time you spent on this recent commute?

Mostly wasted time

Mostly useful time

y_n : 0 1 2 3 4



μ_0

μ_1

μ_2

μ_3

Underlying latent continuous variable:

$$y_n^* = \beta' x_n + \varepsilon_n$$

Observed value of travel time:

Probabilities of falling into categories:

$y_n = \begin{cases} 0 & \text{if } -\infty < y_n^* \leq \mu_0 \\ 1 & \text{if } \mu_0 < y_n^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < y_n^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < y_n^* \leq \mu_3 \\ 4 & \text{if } \mu_3 < y_n^* < \infty \end{cases}$

$P_n(0) = \Phi(\mu_0 - \beta' x_n)$
 $P_n(j) = \Phi(\mu_{j+1} - \beta' x_n) - \Phi(\mu_j - \beta' x_n)$
 \vdots
 $P_n(D) = 1 - \Phi(\mu_D - \beta' x_n)$

Value of travel time (N=2031)

Model parameters

Summary statistics	Outcome frequencies		
$\mathcal{L}(\beta) = -2507.497$	$y \setminus n$	Count	Frequency
$\mathcal{L}(c) = -3063.566$	0	191	0.094
$\mathcal{L}(0) = -3268.768$	1	270	0.132
$d.f. = 30$	2	685	0.337
$-2[\mathcal{L}(0) - \mathcal{L}(\beta)] = 1522.543$	3	549	0.270
Regression OLS: $R^2 = 0.42$ <i>Adjusted R</i> $^2 = 0.41$	4	336	0.165

Model constant and thresholds

Variable	Coefficient (β_k)	p-value	Mean
Constant ($\mu \setminus 0$)	0.51	0.00	—
$\mu \setminus 1$	0.78	0.00	—
$\mu \setminus 2$	2.04	0.00	—
$\mu \setminus 3$	3.13	10	0.00

Value of travel time (N=2031)

Personal attitudes, preferences and behavior

Variable	Coefficient (β_k)	p-value	Mean
Pro-transit	0.05	0.08	0.07
Necessity of travel	-0.18	0.00	0.02
Commute advantage	0.24	0.00	-0.08
Satisfaction	0.04	0.10	0.08
Job for money	-0.04	0.12	0.01
Day off	-0.04	0.10	0.00
Organized	0.05	0.03	0.01
Monotasking behavior	0.04	0.10	-0.02
Multitasking preference	0.04	0.09	-0.01
Traditional leisure&social time use	0.07	0.00	-0.04
Work time use	-0.04	0.10	0.02

Value of travel time (N=2031)

Mode specifying variables

Variable	Coefficient (β_k)	p-value	Mean
Mode cost/benefit	0.18	0.00	0.03
Mode comfort	0.08	0.01	0.24
Mode MT/ productivity	0.14	0.00	0.32
Contented waiting	0.18	0.00	-0.05
Equipped waiting	0.06	0.01	-0.01
Drive alone	-0.19	0.03	0.44
Commuter rail	0.32	0.01	0.08

Travel attributes

Variable	Coefficient (β_k)	p-value	Mean
Commute duration (quadratic)	-0.00001	0.04	2793.67
MT conditions during commute	0.20	0.02	2.82

Value of travel time (N=2031)

Activities while traveling

Variable	Coefficient (β_k)	p-value	Mean
Daydreaming	-0.14	0.01	0.51
Conversing (leisure)	0.08	0.10	0.46
Hi-Tech (work)	0.16	0.01	0.32
Writing (work)	0.16	0.01	0.18
Reading (leisure)	0.09	0.06	0.41
Internet on laptop	0.20	0.02	0.12
Internet usage on the road	0.04	0.06	1.39

Socio-economic aspects

Variable	Coefficient (β_k)	p-value	Mean
Female	0.16	0.00	0.63
Age cohort	0.12	0.00	2.58
Vehicle availability	0.05	0.02	4.5

Results summary

- * Respondents who spend more time working, view their jobs as just a source of income
- * Commuters who view the travel as movement from point A to point B
- * Drivers
- * Respondents who have longer distance commute
- * Commuters who daydream
- * Commuters who are satisfied with their life and job and spend much time with their friends and family
- * Respondents who take advantage of commute time and organized
- * Commuter rail riders
- * Respondents who are contented and equipped to wait
- * Commuters who view their selected mode beneficial, comforting and productive
- * Respondents who use ICT
- * Females and people of older age cohorts

Future analyses

- * Develop a discrete choice model of primary commute mode
- * Estimate the impact of multitasking-related explanatory variables on the shares of each alternative
- * Examine time and cost tradeoffs with respect to multitasking behaviors
- * Identify groups of people with similar polychronicity profiles
- * Model choice to multitask
- * Explore population heterogeneity
- * Undertake international comparisons



Acknowledgements

Graduate students:

Amanda J. Neufeld

Visiting scholars:

Zhi Dong (Tongji
University)

Undergraduate students:

Cheng Zhuo

Aurina Lam

Eileen Coletto

Adam Stocker

Valerie Onuoha

Andre Tu

Kelly Caines



University of California
Transportation Center

University of California
Transportation Center

UCDAVIS

SUSTAINABLE TRANSPORTATION CENTER
of the Institute of Transportation Studies

UC Davis Sustainable
Transportation Center



Capitol Corridor Joint
Powers Authority

Thank you!