

# Relating Automatic Bicycle Traffic Volume Counts with Detection of Cyclists Enrolled in Bicycling Reward Program

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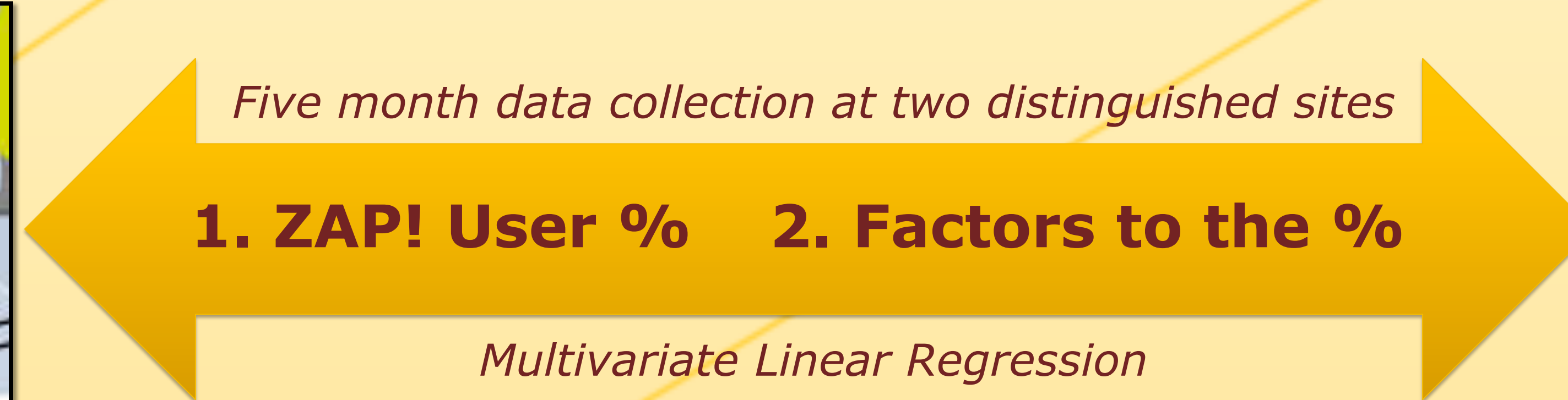
## Introduction

Cyclists enrolled in bicycling reward program, such as ZAP!, are recorded when they bike through a detection point. Setting up automatic bicycle counter, such as a pneumatic tube counter, at these detection points enables relating total bicycle traffic volume to the subset of enrolled cyclists.

This relationship is found to be affected by factors such as location, hour of day, day of week, academic semester, traffic volume, weather, etc.



Pneumatic Tube Bicycle Counters



ZAP! User Detectors

## Data Collection:

**Technologies:** RFID (ZAP!) and Pneumatic Tube Bicycle Counters (Eco-counter)

**City:** Minneapolis, MN

**Greenway Site:** Dinkytown Greenway near campus boundary

- away from campus center, dedicated bike trail connecting campus and downtown Minneapolis

**Harvard Site:** Harvard St. north of E River Rd.

- near campus center, mixed with vehicles

	Spring '15	Summer/Break '15	Fall '15
Greenway	NA	7/13 - 8/26	NA
Harvard	5/1 - 5/17	5/18 - 7/1, 7/27 - 9/7	9/8 - 10/22

\*partial day data or incorrect recordings are excluded

## Influential Factors to Hourly ZAP! User Percentage

Correlating Factors	LogWorth	P
HRLY VOLUME (TUBE)	77.712	0.00
HOUR	76.298	0.00
LOCATION	53.055	0.00
DAY OF WEEK	10.029	0.00
SUMMER/BREAK	3.913	0.00
DAILY AVG HUMIDITY	1.139	0.07
DAILY PRECIP	0.713	0.19
DAILY AVG WIND	0.500	0.32

## Sig. Factors (p<.05) Coef.

Intercept	0.60
DAY OF WEEK[Fri]	-0.13
HOUR[7]	0.11
HOUR[8]	-0.12
HOUR[9]	-0.18
HOUR[13]	0.08
HOUR[14]	0.15
HOUR[15]	0.07
HOUR[17]	-0.09
HOUR[18]	-0.08
SUMMER/BREAK	0.02
LOCATION[Greenway]	-0.12
HRLY VOLUME (TUBE)	-0.01

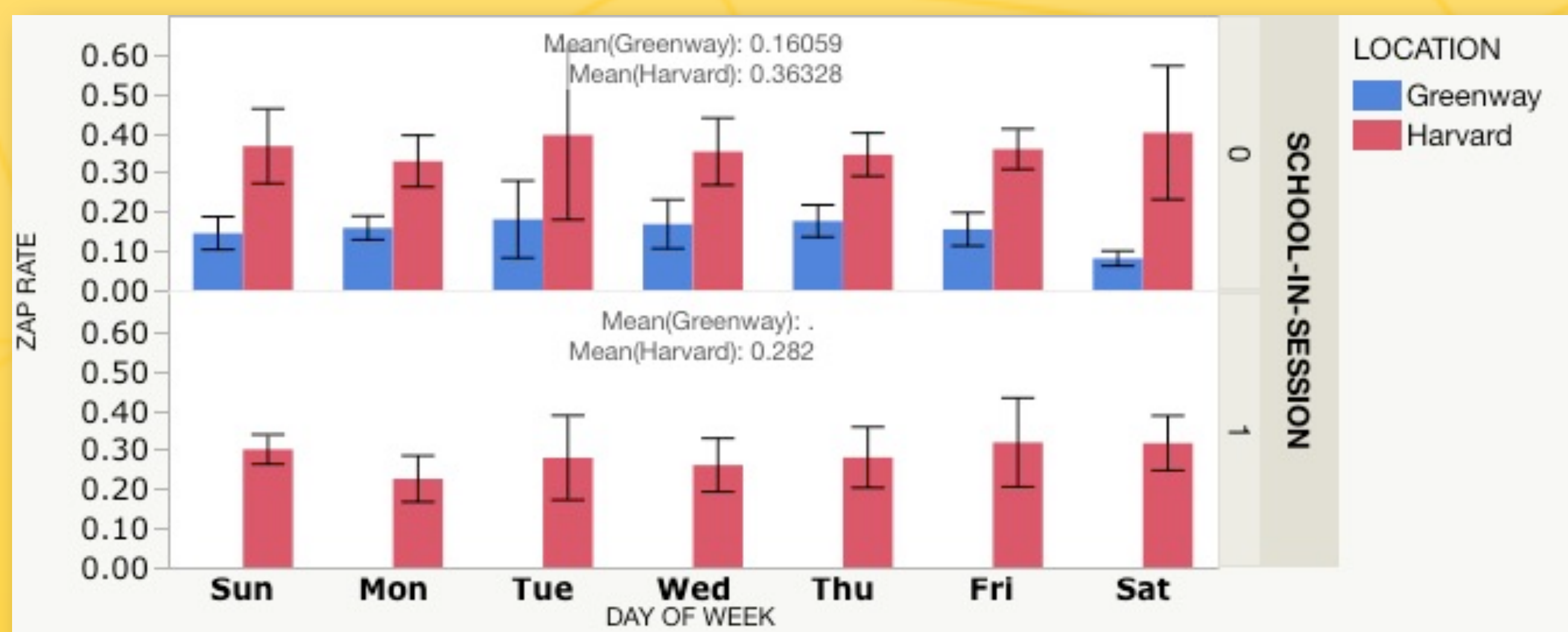
## Summary of Fit

RSquare	0.622
RSquare Adj	0.611
Root Mean Square Error	0.149
Mean of Response	0.342
Observations (or Sum Wgts)	908

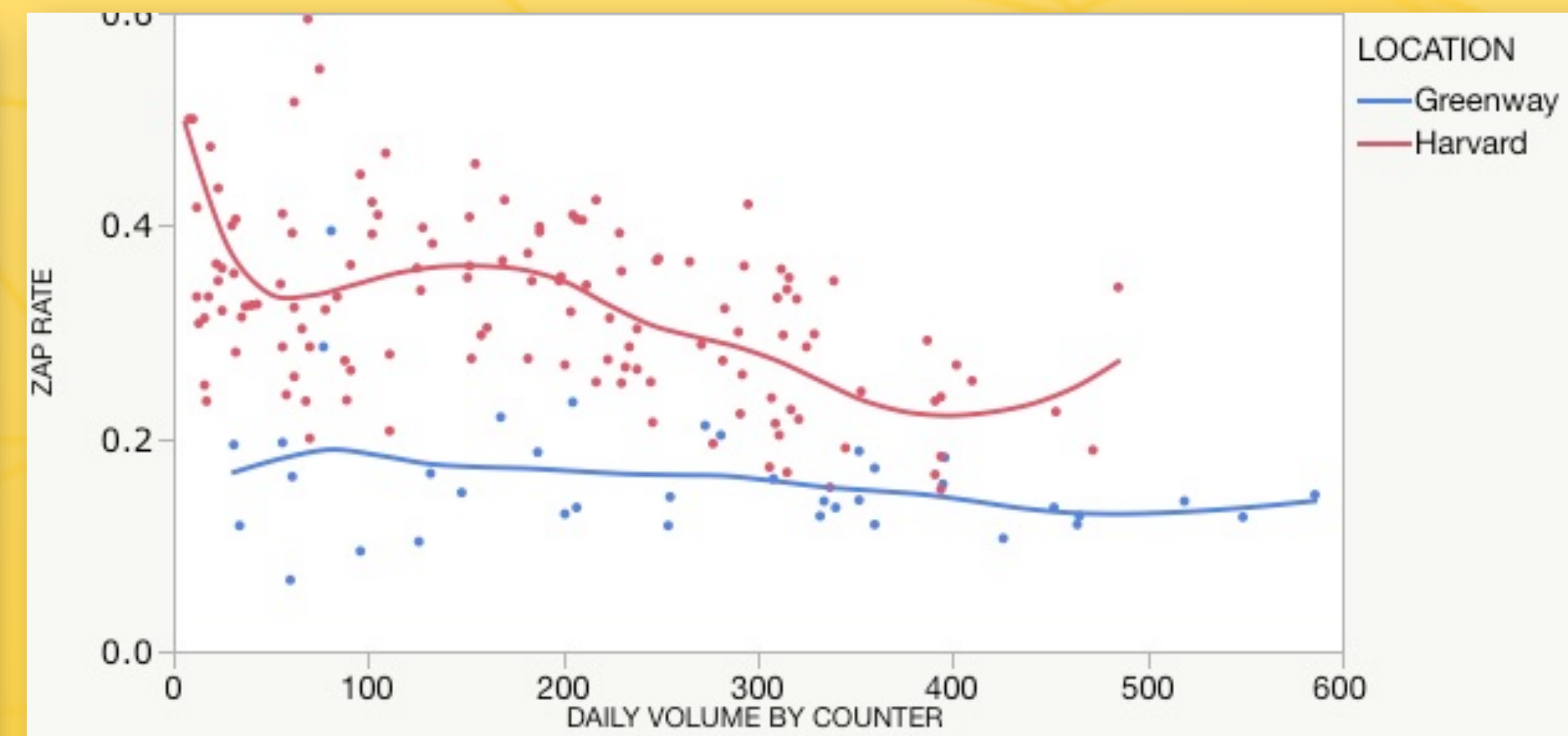
## Limitation:

- Higher error with low bicycle traffic volume;
- Difficulty in calibration of ZAP! detection range; range variation;
- Tube counter errors with large group of bikers;
- ZAP! does not record repetitive trips within 2-min;
- ZAP! devices may be carried by pedestrian and drivers

## Location, Semester, Day-of-week Effect



## Bicycle Volume Effect



## Conclusion

1. Averagely during the study period, 32.9% and 16.1% cyclists on Harvard St. and Greenway respectively, are ZAP! Users.
2. ZAP! user % decreases during AM/PM peak hours, on Friday, on dedicated bike trail off campus, and with higher daily volume;
3. ZAP! user % increases during non-peak hours, and during summer/break;

