

How MIT Got a Handle on Parking:

The Hidden Power of Commuter Benefits

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UTTRI Friday Seminar



The MIT Urban Mobility Lab



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The MIT Urban Mobility Lab

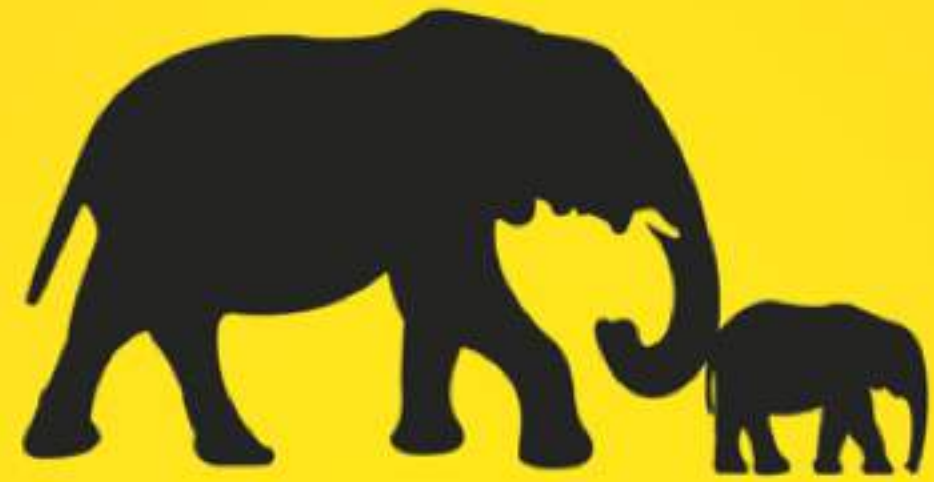
“The JTL Urban Mobility Lab at MIT brings behavioral science and transportation technology together to **shape travel behavior, design mobility systems, and improve transportation policies...**”

Behaviour

Policy

Technology

Behaviour



Nudge

Improving Decisions About
Health, Wealth, and Happiness

Richard H. Thaler and Cass R. Sunstein

Revised and Expanded Edition

"One of the few books I've read recently that fundamentally changes the way
I think about the world." —Steven D. Levitt, coauthor of *Freakonomics*

THINKING, FAST AND SLOW



DANIEL

KAHNEMAN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

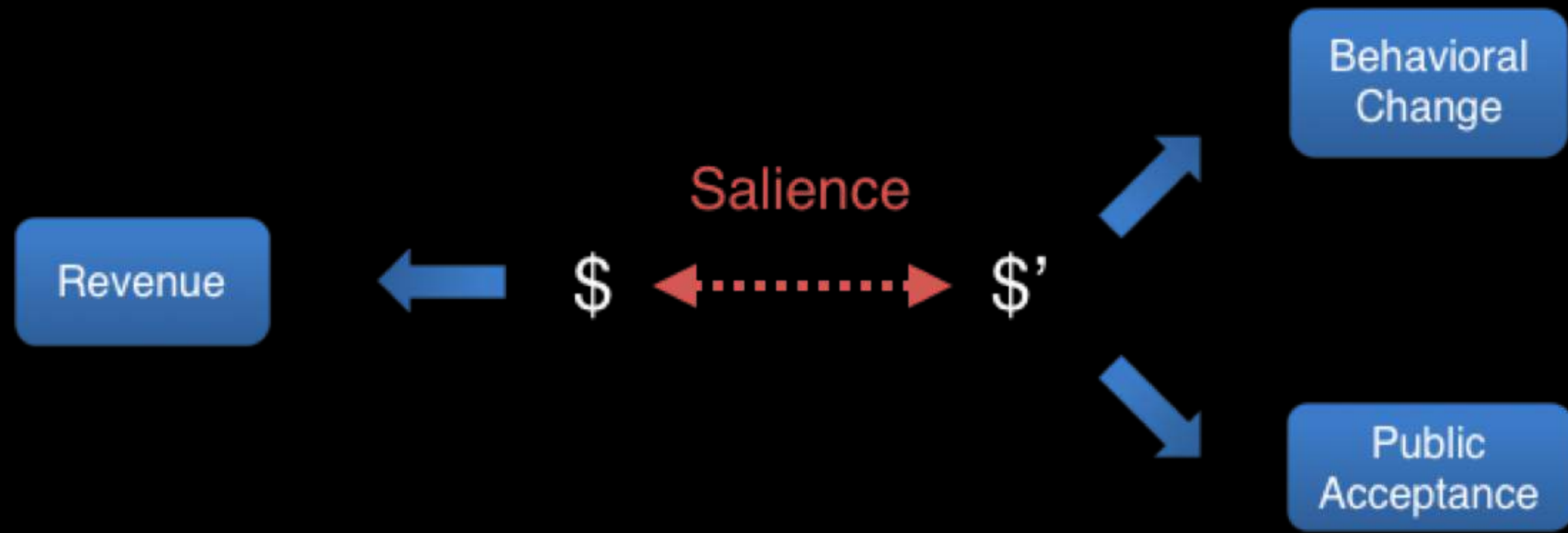
REVISED AND EXPANDED EDITION

NEW YORK
TIMES
BESTSELLER

PREDICTABLY IRRATIONAL

The Hidden Forces That Shape Our Decisions

DAN ARIELY



- Policy Instruments
- Ownership fee
 - Congestion charge
 - Gas tax
 - Parking charge
 - Carbon tax

Policy

407 **ETR**
Express Toll Route



401 WEST
London



MTA Bridges and Tunnels

Welcome to the **Bronx Whitestone Bridge**
Drive Safely



CASH 

CASH

CASH

9

7

1

3



CARS

CARS

STATE

30

Three Models

- Shanghai's Auction
 - Bidding to Drive; Public Acceptance
- Beijing's Lottery
 - Superficial Fairness; Efficiency-Equity Tradeoff
- Guangzhou's Hybrid
 - Behavioral Economics; Policy transfer

Technology

How will the
connected and autonomous vehicle
reshape our cities?

AV: Behavior, System and Policy

Behavior: AV Preference & Demand

- Preference Formation
- Time Use
- Ownership/Access
- Car Pride / Emotions
- Social Mobility Sharing
- Risk preference
- Information impact

System: AV and Transit Integration

- Operation
- Pricing and Ticketing
- Information
- Business Model
- MaaS
- Sparse Demand
- Network re-design
- Land use / Sorting

Policy: AV Regulatory Framework

- Congestion Impact
- Land Use + Parking + Street
- Pricing
- Mobility Equity
- Open Data/API
- Insurance
- Certification



Credit Bricky Cement / Flickr/CC



my thesis

How can workplaces encourage more sustainable commuting?

- Employee commuter benefits
- Parking pricing and availability
- Nudging and gamification

stakeholders

the commuter

- Seeking an easy/flexible/painless commute
- Cost-sensitive
- Concerned with quality of life

the employer

- Seeking to maximize profit, output, etc.
- Wants to attract & retain employees

the transit agency

- Aims to grow ridership and revenue
- Tasked with providing equitable accessibility to urban residents and workers

society at large

- Wants to minimize negative externalities of mobility: congestion, pollution
- Seeks improvements in social welfare and economic growth

research objectives

evaluate

Analyze the impact of novel travel demand management (TDM) strategies at two major employers in the Boston Area: MIT & Partners HealthCare

design

Develop and test a series of experimental interventions to inform the design of future TDM programs

recommend

Put forth lessons learned for policy-makers, transit agencies and employers to reduce car commuting using demand-side strategies informed by behavioral science

TDM: a primer

origins in the 1970s

- Motivated by:
 - Gas shortages associated with 1973 oil crisis + 1979 energy crisis
 - 1970 expansion of Clean Air Act
- Initial focus on Traffic Control Measures (e.g., clearing bottlenecks) and carpool incentives

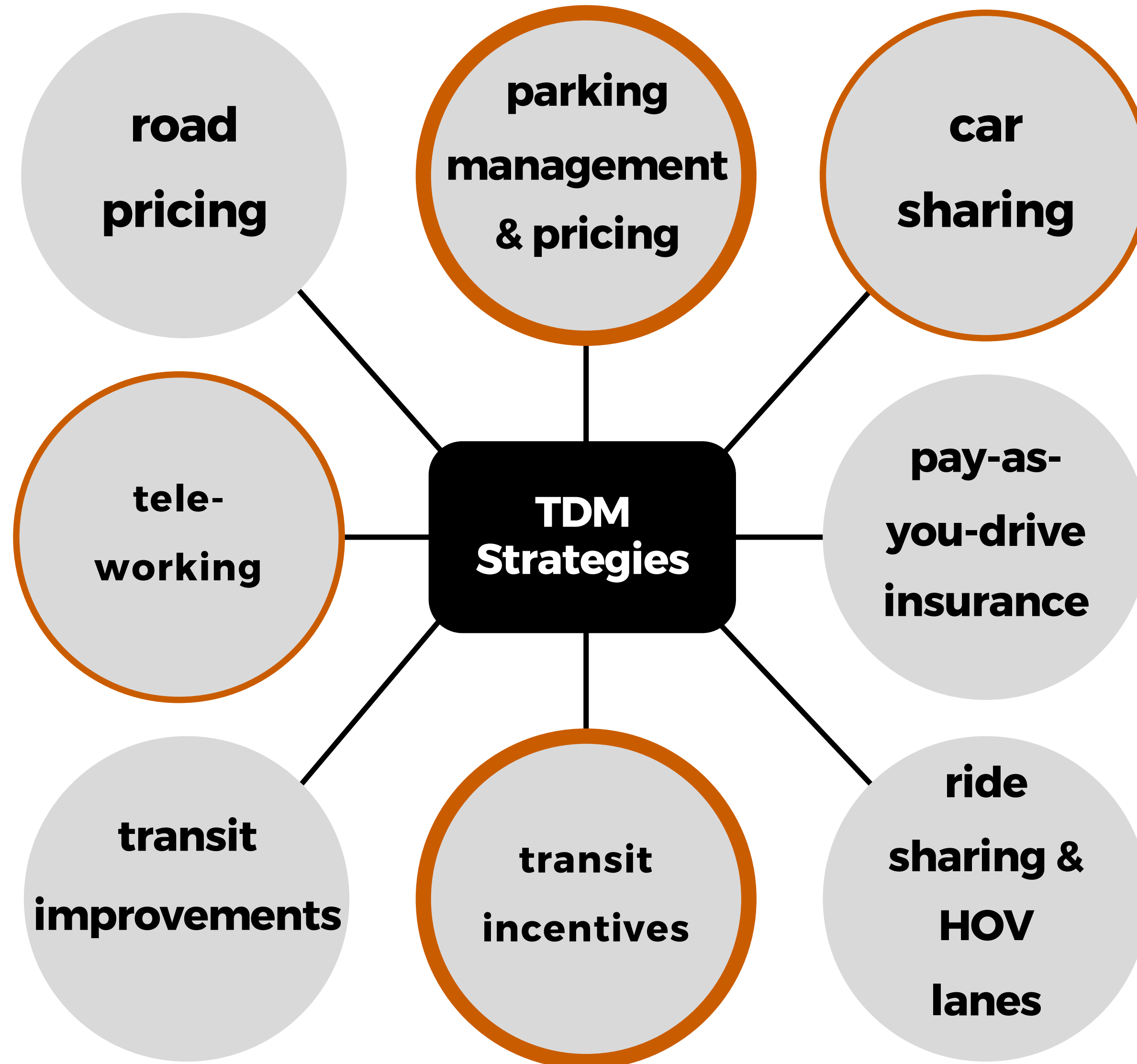
growing in scope through '80s, '90s

- 1990 amendments to Clean Air Act expanded federal powers on TDM (e.g., mandatory employer trip reduction programs)
- Focus broadened towards transit incentives, telecommuting, and other behavioral interventions

modern approaches

- Technology-enabled suite of options
- Evolving traveler preferences

employer focus



what employers can do

price and manage parking

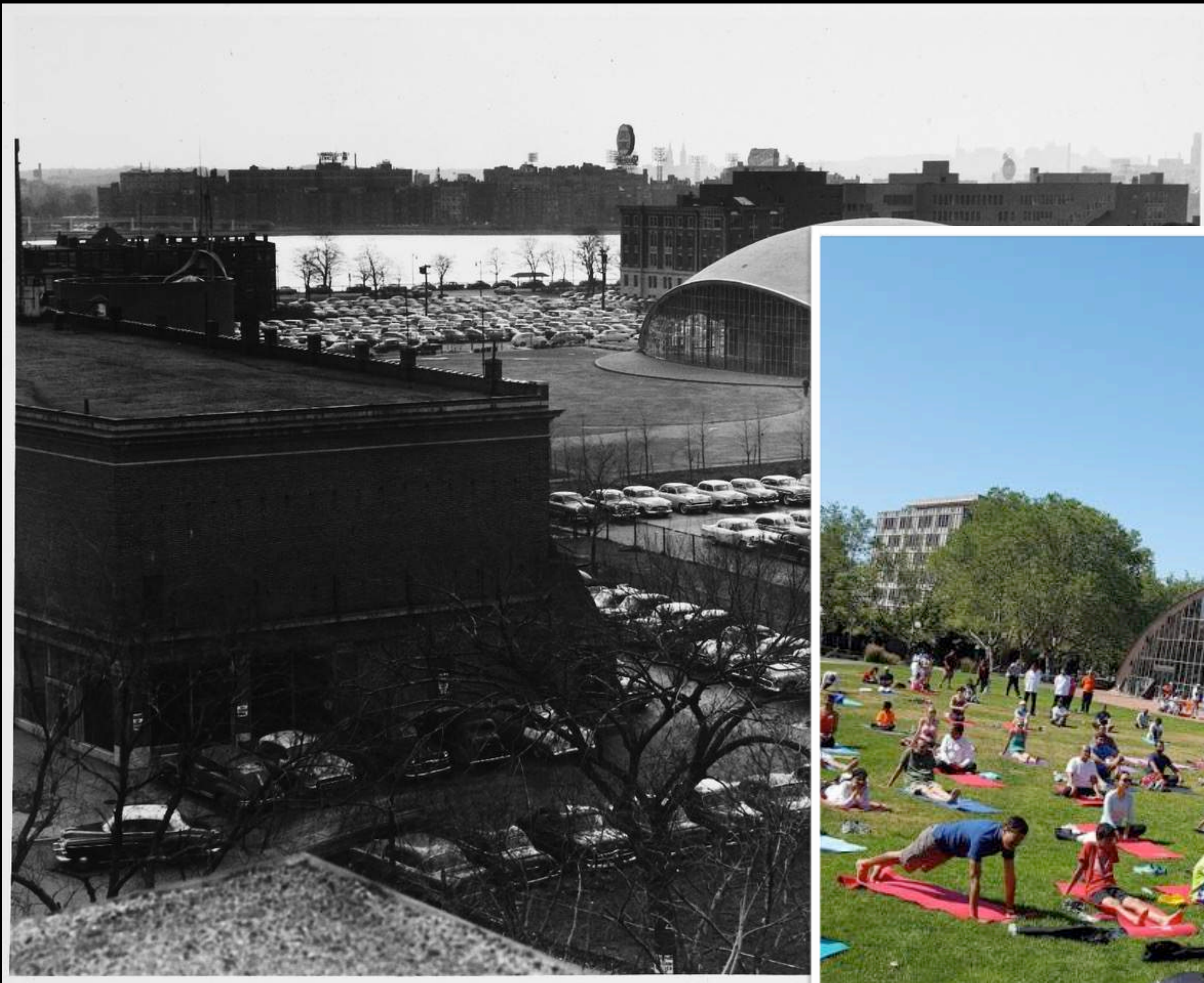
- 80% of variation in drive-alone rates can be attributed to parking pricing and availability (Dowling et al., 1991)
- 95% of commuters have free parking at work (Shoup, 1995)

offer competitive transit benefits

- commuter tax benefits are only available if pass is purchased through employer (with or without subsidy)
- can negotiate with transit agency for universal pay-per-use pass programs

don't give up on carpooling

- the “holy grail of transportation planning”
- online/app-based tools can match carpool riders & split parking costs automatically







MIT parking & transportation at a glance

~11,000

staff

~4000

parking spaces (73% gated, 20% non-gated & 7% leased)

38%

the parking subsidy last year (\$1,100 per permit)

\$100,000 - \$200,000

the estimated cost to build a parking space in underground garages on campus

accessMIT

A broader vision that seeks to provide MIT with affordable, flexible, and low-carbon mobility choices.

Features of AccessMIT



Shift to **daily** parking pricing



Free universal bus & subway transit pass



Increased **commuter rail** monthly pass subsidy



New parking subsidy at **transit stations**



Online commuter **dashboard**

evaluation strategy

biennial transportation survey

- Questions added on perceptions of AccessMIT & associated behavior changes

passive data collection & analysis

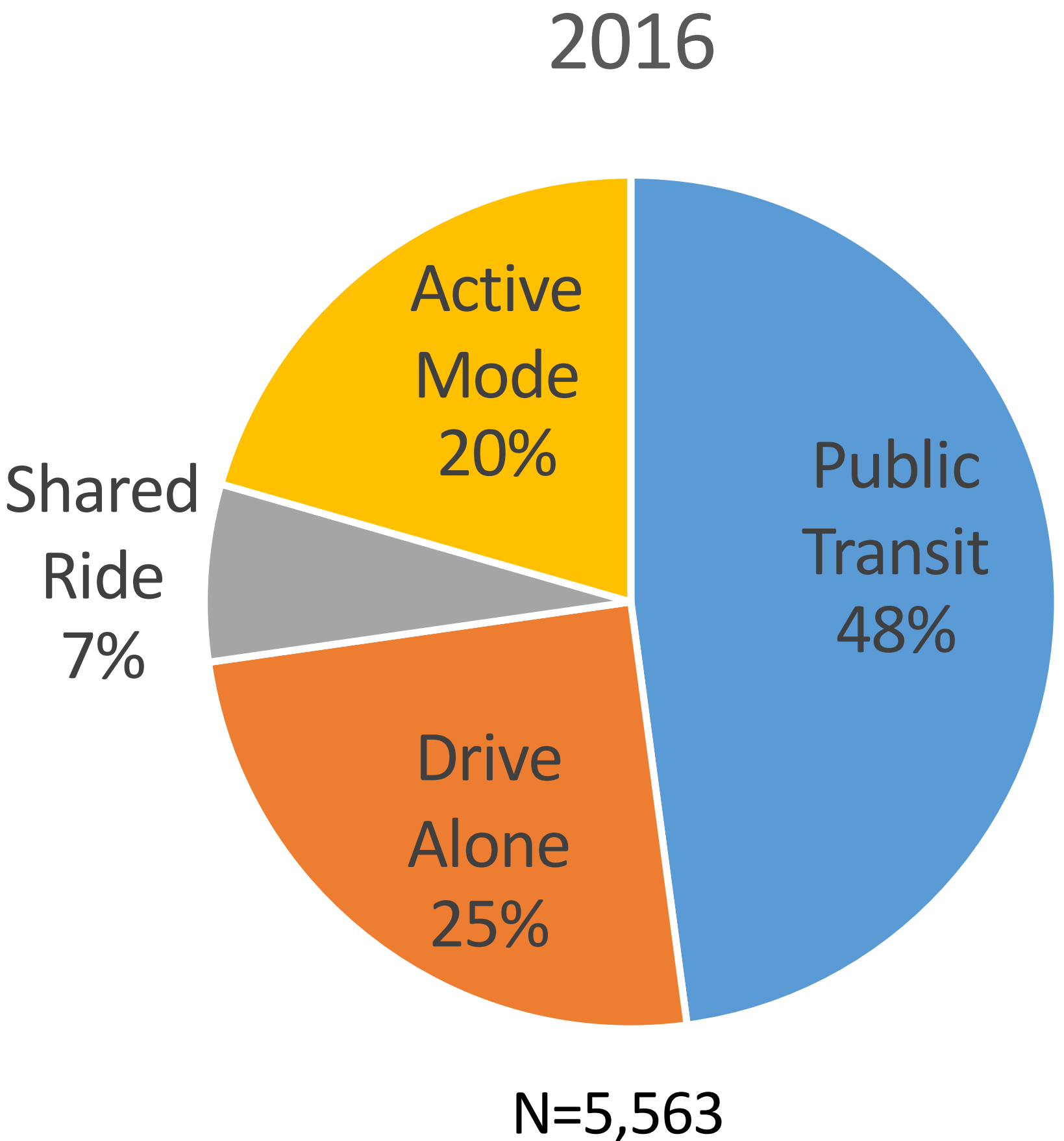
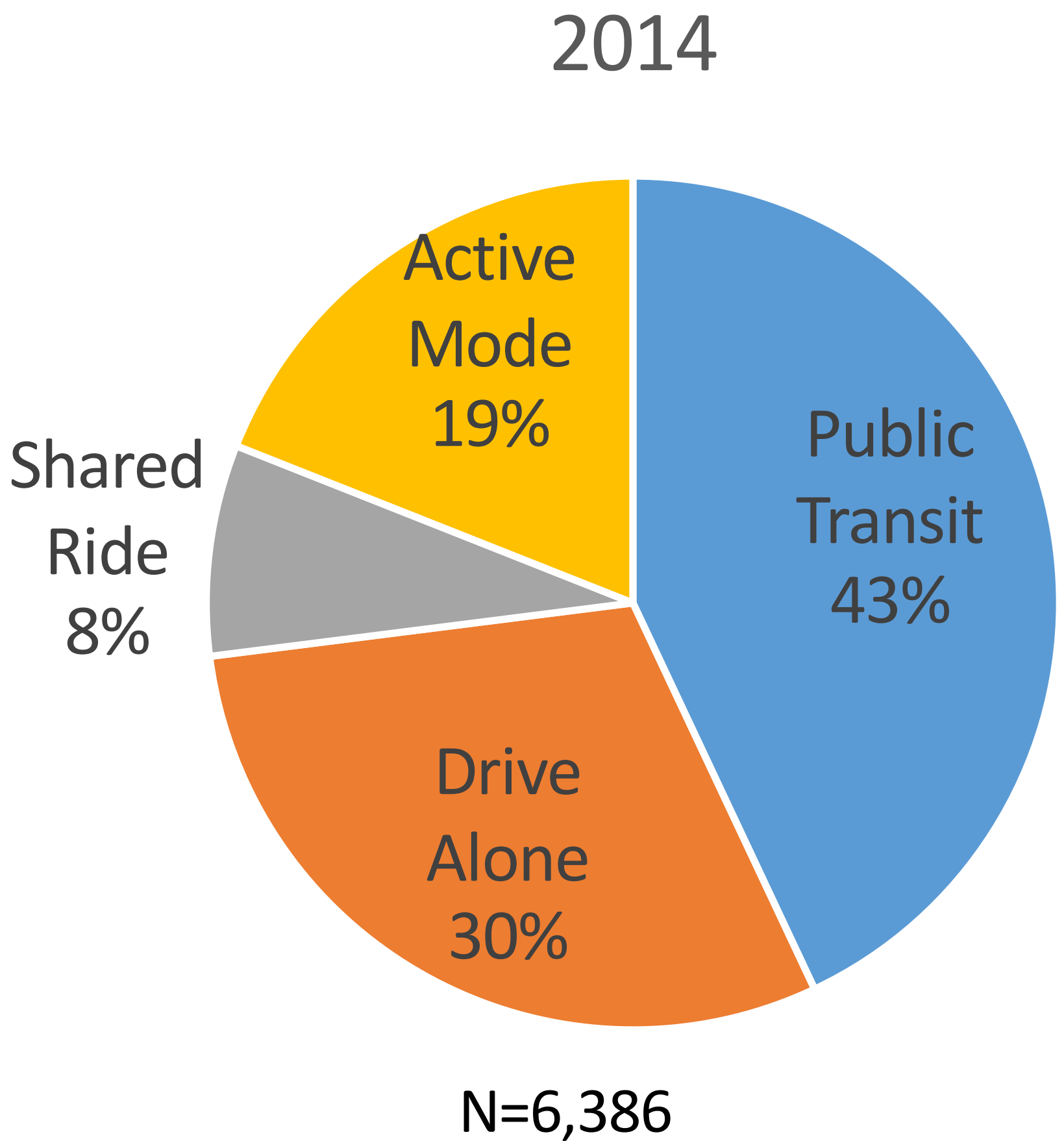
- Parking lot in/out data
- Employee CharlieCard usage

engagement with key stakeholders

- Informal interviews with staff in P&T Office, Office of Sustainability, Campus Planning
- Membership on MIT Institute Committee on Parking & Transportation

results: mode choice

shift from solo car commuting to transit



results: parking & transit

reduction in parking

- 8% drop in parking transactions

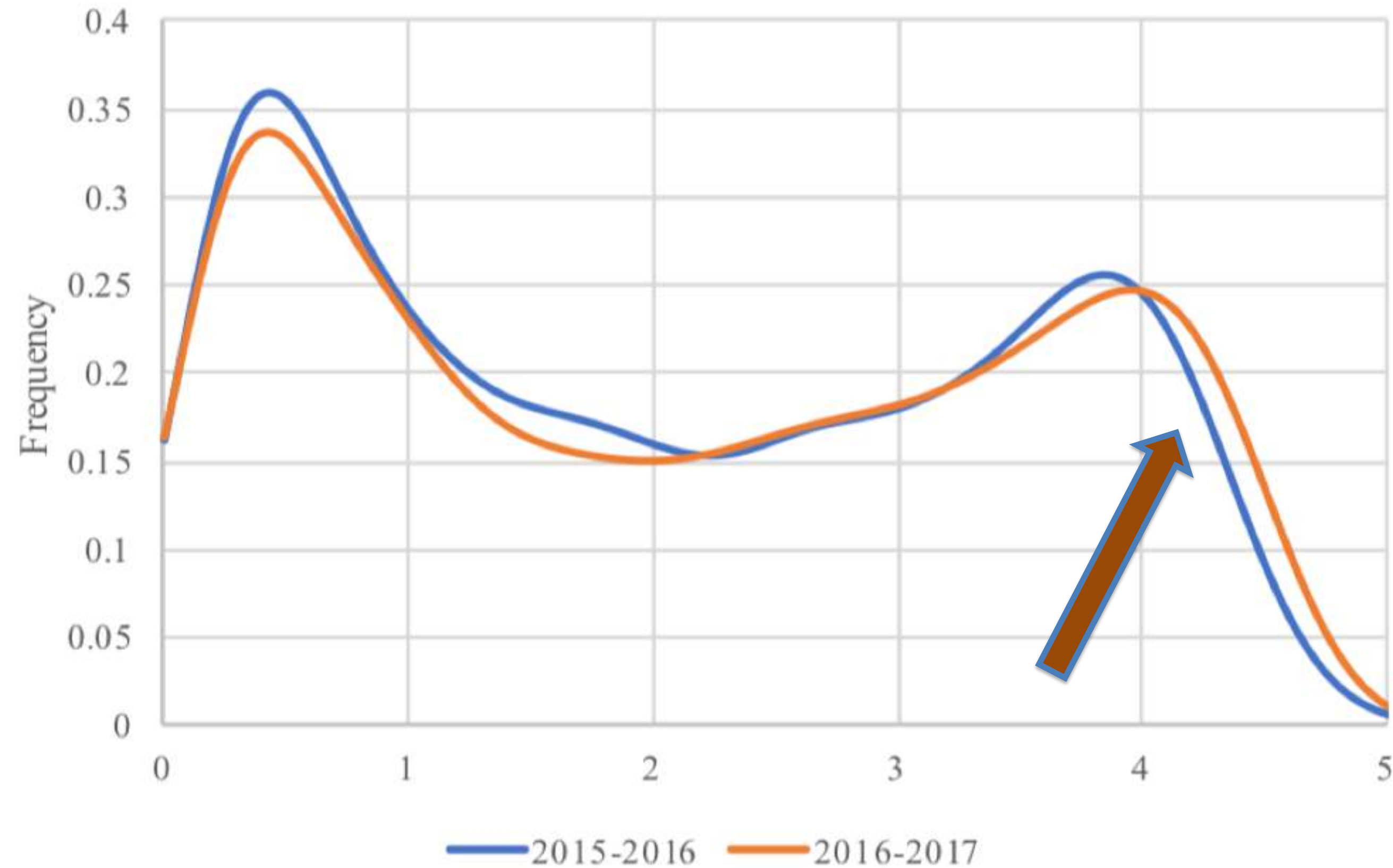
growth in transit ridership

- 24% increase in staff using MBTA on a regular basis

who shifted behavior?

polarization of parkers

- Those who park a lot, parked more

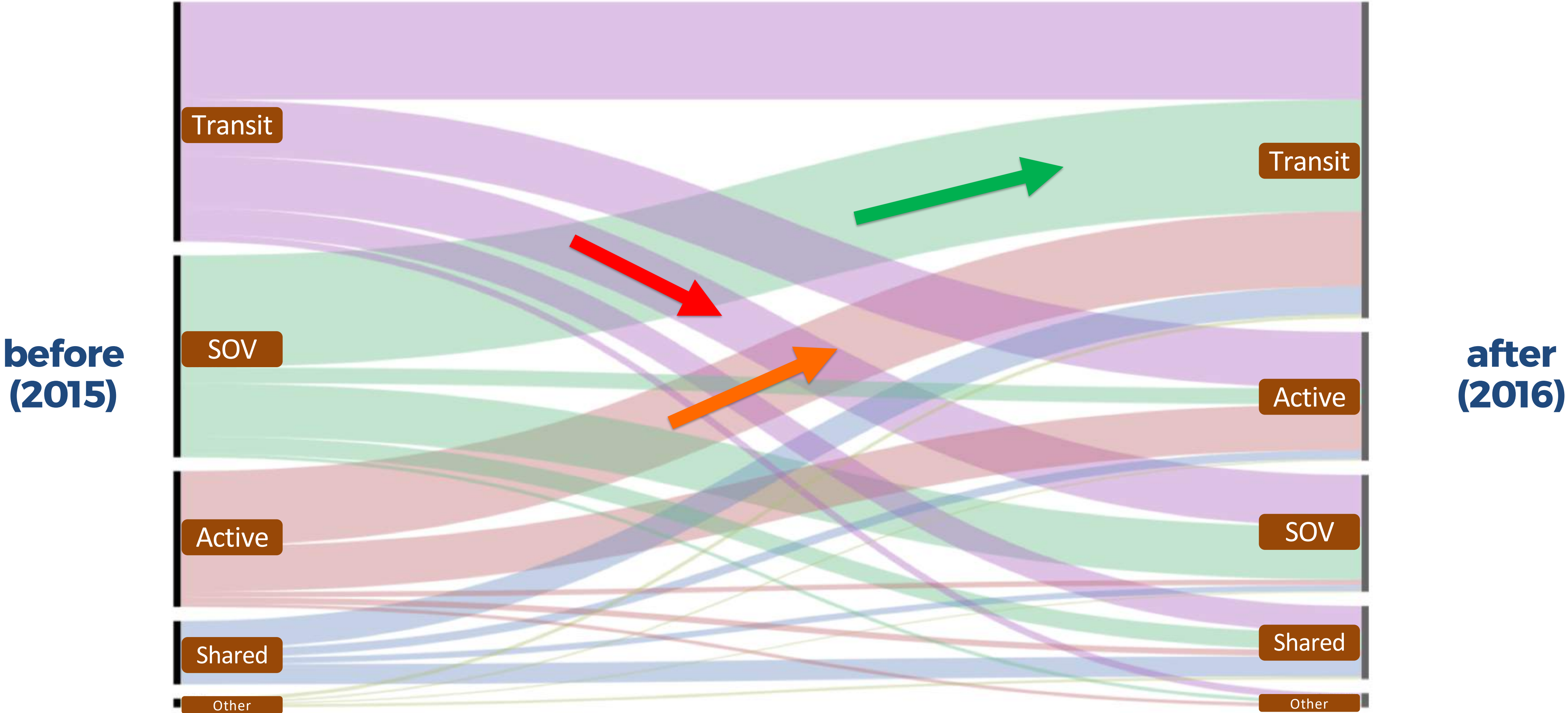


who shifted behavior?

polarization of parkers

- ...but many occasional parkers **stopped renewing their parking permits** altogether
 - ~13% drop in permit sales over first two years

mode shifts



who shifted behavior?

polarization of parkers

- ...but many occasional parkers **stopped renewing their parking permits** altogether
 - ~13% drop in permit sales over first two years

west garage closure

one in six WG parkers stopped purchasing a permit

- Every parker was offered space in a different parking area
- 4% of regular parkers did not renew their permit

parking frequency dropped 16% among former WG permit holders

- Significant decrease in overall parking transactions

small disruptions to habit can have big impacts

- Additional walk time of 2-5 minutes led to significant reductions in parking
- Parkers discovered shuttles

financial impact

MIT is estimated to save a net of \$1.4 million annually, accounting for:

- \$3.5 million in annualized savings due to reduced parking infrastructure provision
- Less \$2.1 million in additional transit subsidy expenditures

MBTA (transit agency) revenue increased as well:

- Estimated to grow 5% from combined employer and employee fare contributions

a [qualified] success

Sustainable Commuting @ MIT: **A Randomized Controlled Trial**

RCT concept

use 'nudging' to further leverage existing policy package

- Pilot a low-budget, scalable incentive program

test whether targeted information provision + monetary rewards can encourage mode shift

- Many past experiments have failed to show significant impacts, or relied on self-reported results

explore differential impacts in behavior change

- Who will shift behavior? Who will complain? Will it work?

Overview of Sample & Treatments

Population: 2000 most frequent staff parkers
(>1 day/week)

E1. Info Digests

[N=500]

E2. Cash
Rewards

[N=500]

E3. Info Digests +
Cash Rewards

[N=500]

Control

[N=500]

Week 1 Email Digest

“MIT Commuting Myths & Facts”

1) **Myth:** Commuters typically use the same method of travel every day.

Fact: Most MIT commuters use a variety of modes to get to campus.



70%

of MIT parkers use another travel mode at least once per week



1.7

The number of days parked per week by the average MIT parker

2) **Myth:** The *AccessMIT* program doesn't provide any new benefits to drivers.

Fact: *AccessMIT* benefits* are designed to offer flexible travel options, especially for those who drive from time to time.



1 in 2

drivers reported the *AccessMIT* benefits influenced their commute. Employee satisfaction increased by 10%.



50%

The MIT subsidy for parking at MBTA stations. This benefit, along with the free subway+bus pass, was reported as most beneficial by drivers.

3) **Myth:** Daily parking pricing is more expensive.

Fact: Most permit holders will save money by unlocking the sunk cost of annual permits.‡



2 in 3

parkers will likely spend less than the \$1,760 annual cap

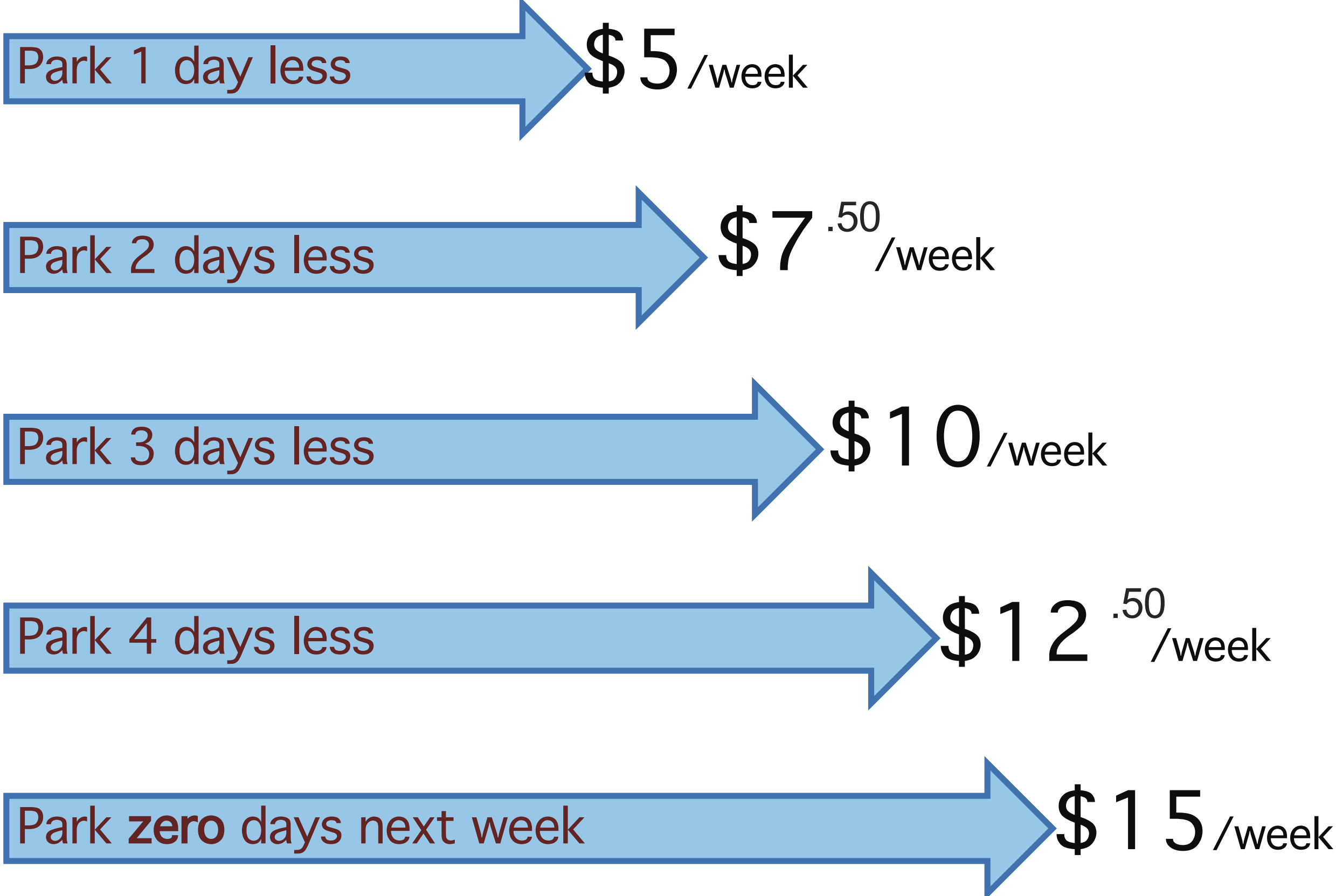


\$500

Estimated average annual savings with daily pricing

Financial Rewards

- Provide personalized incentives based on *reduction* in parking frequency compared to before contest



RCT findings

nudging is hard...

- No statistically significant difference between each treatment group and control

...but can have a positive impact

- Significant increase in awareness of TDM policies
- Top performing participants tended to be in the 'combined' info + rewards treatment group

caution: surveys paint a rosier picture than passive data

- significantly fewer parkers anticipated reaching annual cap than data suggests
- overstated shift to transit

Takeaways

it's about classical economics...

- Case study showed that getting the pricing right on parking & transit is key to shifting behavior

...but behavioral economics plays a role too

- importance of cost salience cannot be overemphasized, both for commuter and for employer
 - pay-as-you-park pricing relies on this
 - nudging the nudgers

motivating the stakeholders

the traveler

- overcome tragedy of the commons
- internalize externalities

the employer

- show that:
 - (a) economics are favorable, and
 - (b) employees want it

the transit agency

- hedge against risk
- build corporate relationships (e.g. 55% of MBTA pass sales are through employers; 1/3 of revenue)

the government

- create incentives to align interests (e.g. tax credits)
- regulatory tools (e.g. PTDM ordinance)

Toronto school board needs a lesson on the high cost of free parking



ALEX BOZIKOVIC > ARCHITECTURE CRITIC

PUBLISHED 23 HOURS AGO

47 COMMENTS



The Toronto District School Boards offices in Toronto on April 20, 2018.

DEBORAH BAIC/THE GLOBE AND MAIL



Thank You!

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