Automobile Alternatives

S. Handy
TTP282 Transportation Orientation Seminar
12/5/14
Federal Transportation Policy

1910

1960

1960

2010
LOS = f (volume/capacity)  ➔  How to increase LOS?
Result: Massive Intersections
OR
get people
to do
something
other than
drive
Why worry about them?
## U.S. Mode Split in 2001

<table>
<thead>
<tr>
<th></th>
<th>Share of Person Trips</th>
<th>Share of Person Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit</td>
<td>1.7%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Walking</td>
<td>8.7%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Biking</td>
<td>0.8%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Source: 2001 National Household Travel Survey (NHTS)
Percent of Trips by Public Transport, Bicycle, and Walking in Selected OECD Countries

Source: John Pucher

IMPORTANT NOTES: *Work trips only, **Walk and bike combined for Spain
Non-Motorized Modes
aka Active Travel
aka Walking and Bicycling
(and sometimes Transit)
Benefits of a Bicycle

- Puts a big fat smile on your face
- Shapes up that boodie
- Zero emissions
- Slows global warming
- Whizzes past traffic jams
- Gives you legs of steel
- It feels like flying
- It carries your goodies home
- Faster and easier than walking
- It's as quiet as a mouse
- No need to pay for gas, parking fees, or auto insurance...hurray!
- The Earth sends a lil extra luv to those on bicycles (this is scientifically documented)

www.cicle.org

http://www.diseaseproof.com/bicycle-benefits-image.jpg
What factors explain walking and bicycling as *modes of transportation*?

**Individual Factors:**
Age, gender, attitudes, experience, comfort?

**Social Environment Factors:**
Family, friends, neighbors, crime?

**Physical Environment Factors:**
Sidewalks, crosswalks, land-use mix, design?
## Influence of Built Environment on Walking for Transport

<table>
<thead>
<tr>
<th>Factor</th>
<th>Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>+</td>
</tr>
<tr>
<td>Land-use mix</td>
<td>+</td>
</tr>
<tr>
<td>Distance to destinations</td>
<td>-</td>
</tr>
<tr>
<td>Street connectivity</td>
<td>?</td>
</tr>
<tr>
<td>Pedestrian infrastructure</td>
<td>?</td>
</tr>
<tr>
<td>Traffic</td>
<td>?</td>
</tr>
<tr>
<td>Personal safety</td>
<td>?</td>
</tr>
<tr>
<td>Parks/open space</td>
<td>?</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>?</td>
</tr>
</tbody>
</table>

Saelens and Handy, 2008
The Caltrans Study

• Eight neighborhoods in Northern California, chosen based on design and location
• 2003 mail-out, mail-back survey with 1672 respondents (24.7%)
• Funding from Caltrans, UCTC, Active Living Research Program
Walking to Store vs. Distance

Handy, Cao, and Mokhtarian, 2006.
Walking to Store vs. Walk Preference

Handy, Cao, and Mokhtarian, 2006.
Davis Bicycle Studies

- Six small cities, chosen based on infrastructure and culture: Davis, Woodland, Chico, Turlock, Eugene, Boulder
- 2006 on-line survey, with 864 responses (12.3%)
- Funding from the Sustainable Transportation Center
Percent Biking Last Week by “Major streets have bike lanes”

Source: Xing, Buehler, and Handy, 2008
Percent Biking Last Week vs. Comfort Biking to Grocery Store

Source: Xing, Buehler, and Handy, 2008
Percent Biking Last Week vs. “I like riding a bike”

Source: Xing, Buehler, and Handy, 2008
Mode to Soccer Games in Davis

What share of kids bike or walk to their games?

- Drive: 76.8%
- Bike: 18.4%
- Walk: 4.8%

Source: Tal and Handy, 2008
How can we increase walking and bicycling?
### Walking vs. Biking Potential

<table>
<thead>
<tr>
<th></th>
<th>People Potential</th>
<th>Trip Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>No equipment needed</td>
<td>Only 2-5 mph so not many destinations within time available</td>
</tr>
<tr>
<td></td>
<td>Almost everyone does it some</td>
<td></td>
</tr>
<tr>
<td>Bicycling</td>
<td>Bicycle needed</td>
<td>Faster at 5-15 mph so more destinations within time available</td>
</tr>
<tr>
<td></td>
<td>Many people don’t have skills or confidence to do it</td>
<td></td>
</tr>
</tbody>
</table>
# Short Trips in the US

<table>
<thead>
<tr>
<th>Trip Length</th>
<th>Share of Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 mile</td>
<td>25%</td>
</tr>
<tr>
<td>&lt; 2 miles</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: John Pucher
Percent of Short Trips Made by Walking and Cycling in Germany (2002) and USA (2001)

Source: Ralph Buehler, "Travel Behavior in Germany and the USA"
Cycling Fatality Rates, 2002
(cyclist deaths per 100 million km cycled)

Source: John Pucher
<table>
<thead>
<tr>
<th></th>
<th><img src="image1" alt="Engineering" /></th>
<th><img src="image2" alt="Education" /></th>
<th><img src="image3" alt="Encouragement" /></th>
<th><img src="image4" alt="Enforcement" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encouragement</td>
<td></td>
<td></td>
<td><img src="image5" alt="Wheeling Walks" /></td>
<td></td>
</tr>
<tr>
<td>Enforcement</td>
<td></td>
<td></td>
<td></td>
<td><img src="image4" alt="Enforcement" /></td>
</tr>
</tbody>
</table>
## Bicyclist Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Facility Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners</td>
<td>Separated</td>
</tr>
<tr>
<td>Recreationalists/casual</td>
<td>Separated or on street</td>
</tr>
<tr>
<td>Commuters/confident</td>
<td>On street</td>
</tr>
</tbody>
</table>
Safe Routes to School

http://www.saferoutesinfo.org/
Percent Biking to Work in Smaller Cities

* has major university

Source: Handy, Heinen, and Krizek, forthcoming
Odense, Denmark
## Boom in Cycling to Work

<table>
<thead>
<tr>
<th>City</th>
<th>1990 (USA)</th>
<th>1996 (Canada)</th>
<th>2011 (USA and Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>0.3</td>
<td>0.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>0.6</td>
<td>0.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Chicago</td>
<td>0.3</td>
<td>0.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Boston</td>
<td>1.1</td>
<td>2.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Toronto</td>
<td>1.5</td>
<td>2.4</td>
<td>3.7</td>
</tr>
<tr>
<td>New Orleans</td>
<td>1.8</td>
<td>2.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Denver</td>
<td>0.9</td>
<td>0.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Washington</td>
<td>0.9</td>
<td>3.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>1.5</td>
<td>3.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Seattle</td>
<td>1.0</td>
<td>3.7</td>
<td>1.1</td>
</tr>
<tr>
<td>San Francisco</td>
<td>1.0</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Montreal</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancouver</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portland</td>
<td>1.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*2011 figures for Canadian cities are preliminary estimates.*

Cities rack up public artwork with bike racks
11/2/2008
“As bike lanes multiply around the city, cycling grows ever more popular and subcultures of riders coalesce around a style and a sensibility. A look at the two-wheeled traffic.”

By Alex Williams
October 9, 2008
Thursday Styles Section
Pg. E5

THE VINTAGE-BIKE FASHION GAL A Schwinn from the “Brady Bunch” era is the latest accessory downtown and in Brooklyn, especially for women. The bikes stand up to potholes and project a thrift-store chic. But prices are soaring.
“I’ve been riding a bicycle as my principal means of transportation in New York since the early 1980s.”
Riding away from a bar crawl

Rock, paper, scissors
In Sickness and in Health, Long After the Bike Is Due Back
“Getting Around: Little electric motors put the fun back in bicycling”
The Sacramento Bee, October 28, 2011
Where there’s a will there’s a way...

“I love my bike. It’s my car!”
Public Transit
The Role of Transit

• Public transit provides an essential alternative to driving for...
  – ... those who can’t drive = “captive riders”
  – ... those who prefer not to drive = “choice riders”
Transit Characteristics

• What do potential transit riders care about?
  – Cost
  – Speed
  – Frequency
  – Reliability
  – Comfort
  – Safety
Rail Options

- Light Rail Transit
- Rapid Transit
- Commuter Rail
- High Speed Rail
California High Speed Rail
Bus Rapid Transit

BRT System Elements

Vehicles

Bus Ways

Systems

Stations

Source: http://www.mta.info/mta/planning/brt/whatis.htm
Walking and Biking to Transit
It’s all about...

LAND USE
The Role of Community Design

By designing communities more like they used to be, we can reduce auto dependence

– Neighborhoods should be built around a commercial center

– Neighborhoods should be linked by a regional transit system
Interrelated ideas...

- New Urbanism
- Transit-oriented development
- Infill development
- Main Street programs
- Redevelopment
- Smart Growth
“New Urbanist developments create walkable neighborhoods, rather than large, single-use developments connected by streets hostile to pedestrians.”

- The Congress for the New Urbanism website
Transit-Oriented Development

“Transit-Oriented TOD’s focus of locating new construction and redevelopment in and around transit nodes is viewed by many as a promising tool for curbing sprawl and the automobile dependence it spawns.”

- TCRP Report 102
The Role of Information and Communications Technologies (ICT)

- Substitution?
- Inducement?
- Complimentarity?
Access without Ownership

Zipcar, Über, Lyft, Sidecar, RelayRides, etc.
Next Up