A little history of urban transportation

TTP 220
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Recap of Key Concepts

• Travel as a derived demand
• Accessibility vs. mobility
• Travel time budgets
• Demand vs. volume
• Latent demand and induced travel
• Needs vs. desires

All of these help to explain history of urban transportation
Dr. Handy’s Tenet

• Land use and transportation are inextricably linked.

Accessibility – land with better access is more attractive for development

Derived demand – where activities are located determines where we go
Key Concept: Density Gradient

Assume a monocentric city...

Where is density (and value) highest?

What’s the trade-off people make?

What determines the slope?
Key Concept: Density Gradient

Assume a monocentric city...

So does lower transportation cost mean steeper or flatter curve?
Historic Rule 1

Transportation innovation → Higher travel speeds → Outward expansion
Lower densities
Greater separation

Travel time budget –
Given fixed amount of time available, people can travel farther if speeds are higher
Historic Rule 2

Transportation investment (road or rail) → Higher accessibility in those sites → Greater development potential in those sites

Accessibility – land with better access is more attractive for development
Historic Rule 3

Transportation innovation → Outward expansion

Outward expansion → Transportation innovation
The early 1800s

- What was going on in cities?
- What created the pressure for transportation innovations?
Transit Innovations

- Omnibus – 1820s
- Steam trains – 1830s
- Horse-car – 1830s
- Electric streetcar – 1890s
- Mass transit – 1900s in some places
- Motorbus – 1920s
- Rapid transit – 1950s
Omnibus

Paris 1828
New York 1831
Boston 1835

Source: http://bus38.free.fr/hist1854eng.html
Steam Trains

1830s - Linking cities to upper class suburbs
Horsecar

1830s – Horse-drawn but on tracks
Key points about transit so far

• Operated by private companies, with “franchise” given by city
• Because costly, tendency to serve only the best paid workers, not the masses
• Often operated in conjunction with land development, resulting in more continuous suburbanization 2-3 miles from city center
Concerns in the late 1800s

- Speeds still only 5-6 mph
- Need for grade separation – up or down
- Need for mechanical traction:
  - Problems with horse-drawn modes...
  - Problems with steam power...
Cable Cars

1873 – San Francisco
Electric Streetcar

1888 - Richmond, VA
1895 - 900 systems and 11,000 miles of track in the U.S.

http://americanhistory.si.edu/onthemove/exhibition/exhibition_4_6.html
Streetcar System Impacts

• Affordable for working class, who could now live away from factories
  – 5 cent fare to anywhere
  – 3-5 times as fast as horse-cars

• Led to more outward expansion, e.g. Boston:
  – 1850: 2-3 mile radius, mixed land uses
  – 1900: 10 mile radius, industrial and commercial core surrounded by residential

• Growth in mobility, e.g. avg. trip length:
  – 1890: 7 miles – city area = $\pi \times 7^2 = 153.9$ square miles
  – 1900: 10.5 miles – city area = $\pi \times 10.5^2 = 346.4$ square miles
Changing views of streetcar systems at the turn of the century

Pre-1900

Post-1900
The Fall of Transit

“Few industries have risen so rapidly or declined so quickly, and no industry of its size has had a worse financial record”

– J. Vance
Streetcar Problems

- Misguided public policy
  - Multiple companies within each city
  - Insistence on 5 cent fare

- Poor financial management
  - Systems heavily over-built and over-expanded
  - 5 cent flat fare didn’t cover cost of expansion
  - Costs of upkeep put off
Interesting Implications

- Private industry but in effect a subsidy from investors to general public
- Poor management led to dramatic and lasting change in form of cities
Urban Situation 1900 to 1920

- Massive urban growth
- Fringe growing faster than center
- Increasing criticisms of streetcars

Film of Market Street in 1905...

Fig. 10. Downtown traffic, Post Office Square, May 23, 1904
Mass Transit

New York, Boston, Chicago

NY’s last cable car – 1905
NY’s last horse-car line – 1917

Options for Streetcar Companies following cost rises during WWI

• Raise fare...
  – cities wouldn’t let them
• Increase ridership, e.g. through land speculation...
  – riders didn’t come.
• Get public subsidy...
  – voters rejected it.
• Result: Streetcars reached peak in 1923
Bay Area Streetcars

After 100 Years, Muni Has Gotten Slower

The Bay Citizen, March 31, 2012

The San Francisco Muni is turning 100 this year. And in that century of great technological progress, in which an aircraft broke the sound barrier in 1947 and a supersonic car did the same in 1997, Muni has actually become slower.

“Streetcars ruled the road, and there wasn’t much getting in the way — no car traffic — and we didn’t have all the traffic lights and stop signs,” said Peter Straus, a retired Muni service planner.

“I wouldn’t be surprised if a horse-drawn carriage got there faster than Muni,” Angie Murphy, a regular Muni commuter.

LA’s Red Car System
Motorbus

Success beginning in 1922

Source: http://www.baycrossings.com/Archives/2003/03_April/paving_the_way_for_buses_the_great_gm_streetcar_conspiracy.htm
Motor-bus with sloping windshield and standee windows brought out in 1940.
Situation in 1930s

- Depression meant slowdown in urban growth, layoffs of urban workers
- Public criticisms of large investments in subways
- Merchants in outlying areas opposed investments
- Planners opposed elevateds and subways
  - Thought it would make congestion worse
  - Thought it would increase centralization
- Public subsidies for highways, education, housing, other programs, but not for transit
- Increase in busses – “trackless trolleys”
Plate 8. Although the Major Traffic Street Plan improved traffic for a few years, congestion emerged again during the latter part of the twenties. This photograph shows heavy vehicular and streetcar traffic in the downtown area during the late twenties or early thirties. (Courtesy of Seaver Center for Western Research/Natural History Museum of Los Angeles County)
On a congested thoroughfare one lane of street-cars carries more than six times as many passengers as two lanes of automobiles.
Motor-buses in 1935 replaced the street-cars which had been operating for more than a hundred years on Madison Avenue, New York City.
WAR TRAFFIC MUST COME FIRST

DON'T WASTE TRANSPORTATION

ASSOCIATION OF AMERICAN RAILROADS IN COOPERATION WITH THE OFFICE OF DEFENSE TRANSPORTATION

Millions of troops are on the move...

Is YOUR trip necessary?

OFFICE OF DEFENSE TRANSPORTATION
1950s Situation

• Role of General Motors:
  – Bought up bankrupt streetcar systems in 1920s, replaced with busses
  – Found guilty of criminal conspiracy in 1950s

• Role of Public Sector:
  – Cities bought up streetcar and bus operations beginning in depression
  – Nearly all systems converted to public by end of 1950s
  – Talk of federal funding for transit but no action
Rapid Transit

http://www.bart.gov

© 2006 BART
The Rise of the Automobile

- Recreational car era (1920-1945)
- Freeway era (1945 – now)
Recreational car era (1920-1945)

Source: http://www.autolife.umd.umich.edu/Environment/E_Overview/E_Overview6.htm#scenic
By the 1920s

• Ford Model T
  – $600 in 1913
  – $393 in 1923

• Auto ownership
  – 1 car for every 13 Americans in 1920
  – 1 car for every 5 Americans in 1929

• Cheaper to own a house in the suburbs with a car than own house in city
Growth in Auto Ownership

millions

1900  1910  1920  1930
WWII Drive-Less Campaign

When you ride ALONE you ride with Hitler!
Join a Car-Sharing Club TODAY!

They've got more important places to go than you!...
Save Rubber CHECK YOUR TIRES NOW
Freeway era (1945 – now)

- After WWII, increased demand for cars:
  - Pent-up demand and rising incomes
  - Increasing suburbanization
Growth in Auto Ownership

Source: Highway Statistics, Bureau of Transportation Statistics
Public Sector Support for Cars from the Start

• Cars seen as way to decentralize, to get people away from ills of the city
• Public investment seen as needed to improve roads and reduce congestion

More next time!
“Taken for a Ride”

• What was the state of the streetcar systems by the 1950s?
• What were the options for the streetcar systems at that time?
• What role did GM play in determining their future?
• Who were the other players and what roles did they play?
• What did people really want at that time?
• What about the role of government?
• What points especially strike you or surprise you from the movie?
Figure 1: Transit Ridership Is At Highest Level in Five Decades
Figure 2: Since 2004 Transit Use Has Grown More Than Population or Highway Travel
Bike sharing
45 operations in the U.S. as of Jan 2015

Solving the first-mile, last-mile problem?
Ride-Sharing
Transportation Network Companies

Solving the first-mile, last-mile problem?
Micro-transit on demand

e.g Bridj, Chariot, Leap

Competing with public transit?
Getting people out of their cars?

http://www.bizjournals.com/sanfrancisco/blog/2015/03/leap-transit-commuter-bus-san-francisco-loup.html
Check out this video:

Future Transportation Technology Will Blow Your Mind
Next up:
History of Federal Transportation Policy