

# GeoVisualization of Automobile Congestion

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AGILE: GeoVisualization of Dynamics, Movement, and Change

Girona, Spain

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AGILE workshop:  
GeoVisualization of Dynamics,  
Movement, and Change  
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The next 10 minutes...

- What is Traffic Visualization
  - Data collection and workflow
  - Pre-trip and en route uses
- Unfolding events
- New depictions of mobility in space
- Discussion Questions

## Motivation

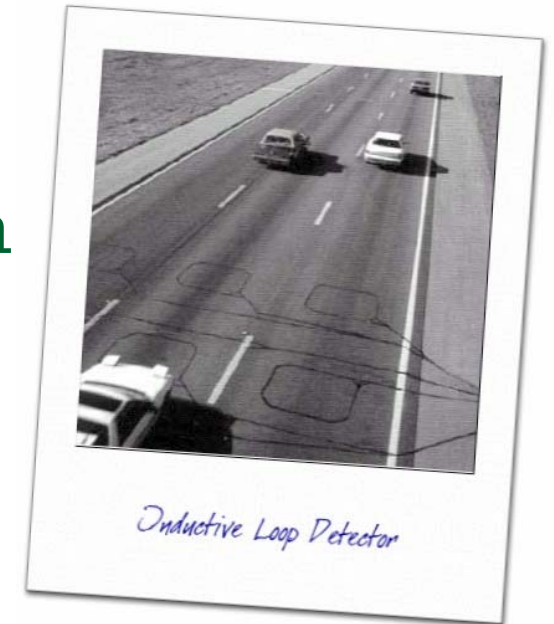
- Previous research indicates
  - Driver behavior and overall system performance benefit from real-time information provision to drivers
  - Design variables can influence interpretation and travel behavior
- How do we improve design and driver behavior?

# Traffic Visualization

- Real-time traffic maps
- Component of Advanced Traveler Information Systems
- Dynamic displays of network conditions
- Potentially among the most used visualizations in the world

## Traffic Data

- Data often comes from Inductive Loop Detectors (ILD)
- Aggregate data include:
  - Average velocity
  - Flow (# of vehicles / 5-minutes)
  - Occupancy



## Uses and users

- Traffic visualization uses:
  - Wayfinding, route selection, congestion assessment, congestion avoidance, departure selection timing, fleet management, evacuation assistance
- We focus on:
  - Individual drivers in pre-trip scenarios
  - Individual drivers in en route scenarios

## Individual Drivers

- Pre-trip: assess conditions along a single, or multiple prospective routes

## Individual Drivers

- Pre-trip: assess conditions along a single, or multiple prospective routes
- En route: evaluate conditions along current route, weigh potential diversion strategies

## 2 issues with traffic visualization

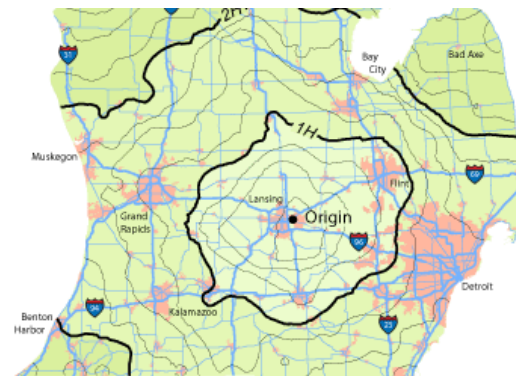
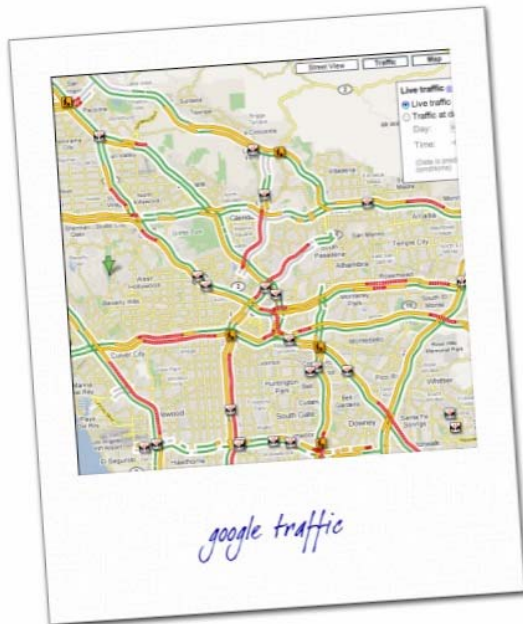
- Traffic events: definition and detection
- Relevance and traffic visualization
  - Limitations of stage-one snapshots
  - Isochrones and forecasting

## Traffic Events

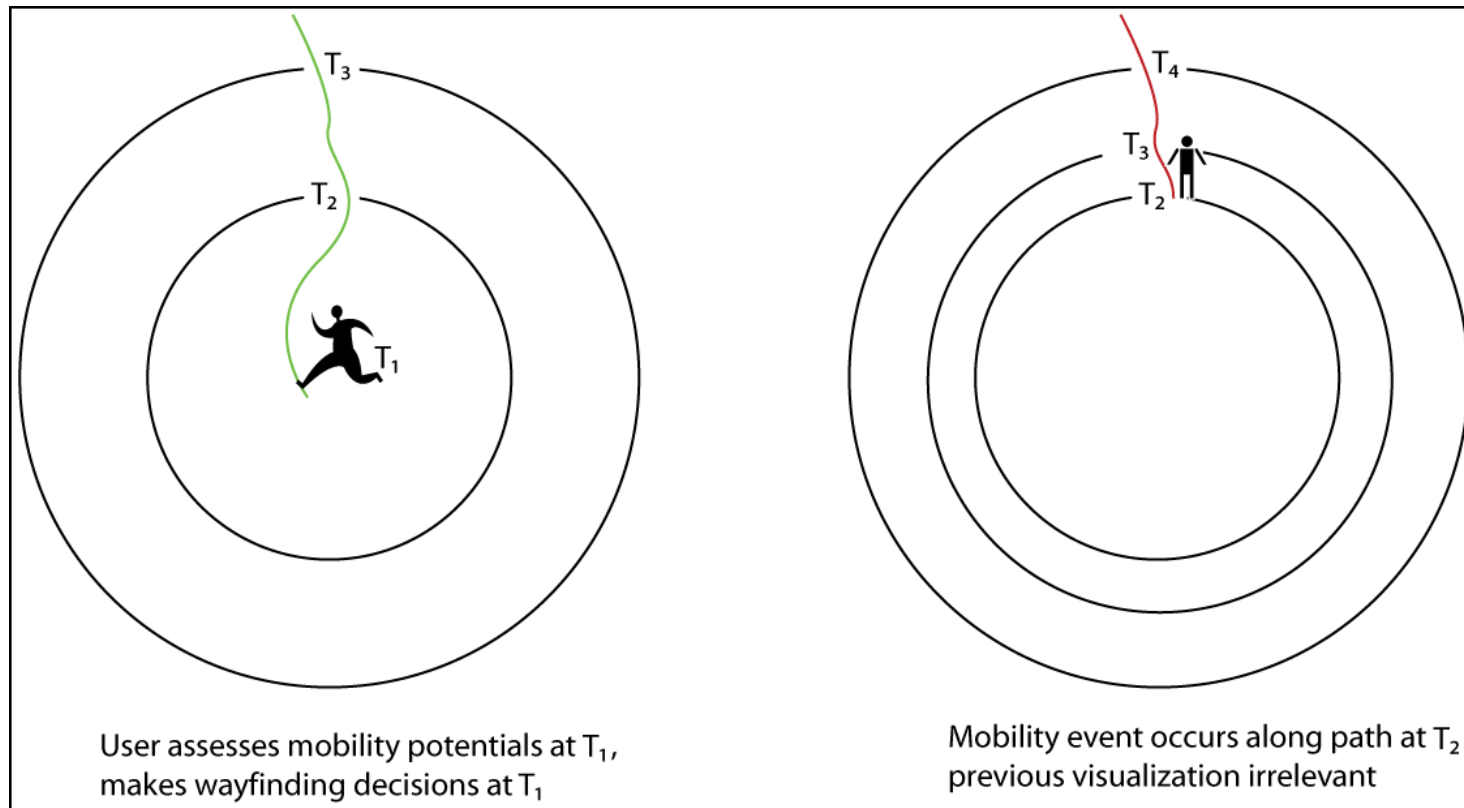
- What constitutes a traffic event? What is traffic?
- Pre-trip and en route users interested in “unfolding events”
- Events are conventionally detected at their end times (Galton 2002)
- Traffic-event-detection strategies only query at one time interval, disregarding measurements from previous atomic intervals, making it difficult to visualize trends, anomalies, or changes.

# Stage-one, relevance, movement, and mobility

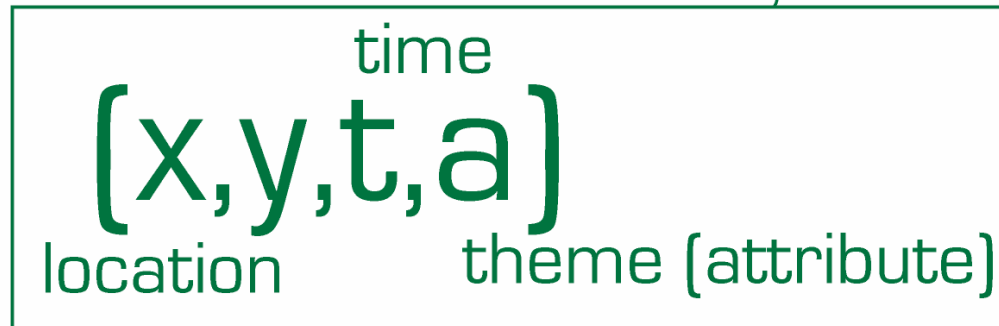
- Distance-decay and relevance
  - Dynamic attributes (Weather, traffic)
- Snapshots deliver irrelevant information



ISOCHRONE INTERVAL 15 MINUTES  
HEAVIER INDEX ISOCHRONES REPRESENT HOURS



Sinton 1978: The inherent structure of information  
as a constraint to analysis



Conventional approaches to location-based mapping neglect the influence of mobility on future geographic observation.



Mobility influences an individual's locational, temporal, and thematic experiences

# Traffic data as mobility potential

- Distance is “the cost of separation”
- Time-cost is important in 2008
- Traffic data, as a proxy for mobility potential, can help calculate time-cost
- The interaction of two distance surfaces:
  - Conventional distance (congruence)
  - Travel time distance

## Discussion Questions

1. What about mobility in GeoVisual Spatial Analytics? - “Real-time” can be antiquated, and inadequate

Spatially-aware displays that employ snapshot approaches are vulnerable to relevance decay.

Example: In-vehicle-navigation with “real-time” traffic.

2. How can we blend active databases, forecasting, spatial awareness and graphics technologies to create thematic isochronic displays?