

Issues in the Cognition and Representation of Internet Based Public Transport Maps

Peter Mooney and Adam Winstanley
Department of Computer Science
National University of Ireland Maynooth
Co. Kildare, Ireland
{pmooney,adamw}@cs.may.ie

Spatial content and maps are no longer unusual on the Internet. Public transport operators have realised that the Internet is currently the most powerful medium for the dissemination of up-to-date scheduling and timetabling information. Transportation information is now of vital interest in our daily lives. Journey planning systems are innovative uses of the WWW providing geospatial information about transportation with maps and schematic routing diagrams being used in these systems. Transportation maps are now amongst the most important and influential cartographic works in the world [Thrower]. A public transport journey planning system *ptInfo* [Mooney] has been developed to allow users to plan journeys on public transport systems. The system returns detailed journey itinerary specifications including interchange points. *ptInfo* uses digital maps as its principal means of journey specification and user interaction.

When travellers read transportation maps they often prefer to rotate the map so that the upward direction in the map corresponds to their own forward direction. “You are here” maps in transport centres are often incorrectly aligned causing people consulting these maps to take incorrect directions 25% of the time [Pinker]. People find it convenient rotate maps in order to restore simple spatial and directional relationships. The web browser environment provides no such rotational facilities. Users must perform additional cognitive operations to successfully interpret misaligned maps. Substantial benefits may be gained from the use of interactive mapping on web sites. The UCGIS research priority in the cognition of geographic information outlines that the inadequate

attention to cognitive issues of perceiving, comprehension and decision-making are major impediments to the effectiveness of geographic information techniques. Users need to be able to interact with GIS interfaces (public transport information systems) in ways reflecting their natural thought processes and cognitive abilities.

In identifying and categorising the cognitive issues in human use of transport maps, dynamic algorithms may be developed further to better model human navigational techniques in dynamic and unknown environments. Research indicates that heuristic search algorithms like A* [McDermott] are not accurate reflections of human map and route searching strategies. Incorrect cognitive maps are often developed accidentally during the first visit to a city, and are then very difficult to rectify [Ross]. Our system *ptInfo* is being extended to determine whether Internet cartographic presentations can influence route learning beyond that of conventional map displays. These presentation techniques include

- Map orientation normalised on journey direction
- Selection of suitable features for display

References

[Thrower] N.J.W Thrower. *Maps and Civilisation*, University of Chicago Press 1997.

[Pinker] Steven Pinker. *Visual Cognition*, MIT Press. 1985.

[Ross] Helen Ross. *Behaviour and Perception in Strange Environments*, Allen and Unwin Ltd. 1974

[McDermott] Drew McDermott *Introduction To Artificial Intelligence* Addison-Wesley 1995

[Mooney] Peter Mooney and Adam Winstanley. *A Map Based Public Transport Information System*. AGILE 2000 Conference, Helsinki, Finland May 25th - 27th 2000.