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Issues in the design of bus network maps

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Abstract:

Despite being extensively produced and used widely by the general public, overall there has been relatively little cartographic research on the design of public transport (PT) maps. A search of the literature on PT mapping shows that much of what has been published focuses on the design of 'metro' maps for urban rail systems, covering both approaches to creating schematised versions of the urban metro network and studies of their usability. There has been much less published about other types of transport network, such a railways, trams, or busses, or on multi-modal transport networks. Arguably many railway systems, either national, regional or suburban networks with their limited points of access (i.e. stations) and even tramway systems share many of the characteristics of metro rail systems, but bus networks tend to have quite different characteristics.

Individual bus routes tend to be more complex and varied than rail-based PT routes. While most bus routes are based on the existing road network and shared with other users (cars, motorbikes, etc.), there can also be dedicated bus only roads and bus lanes are quite common. It is not uncommon for bi-directional services to follow slightly different routes, especially in dense urban areas with one-way streets. In suburban areas busses may travers part of the route in one direction only, even if the overall trend of the service is bi-directional. Bus networks are also often more complex than rail based PT networks with routes converging and diverging in more complex ways. The access points to bus services are typically much less significant and obvious than rail/metro stations. Apart from major bus terminuses or bus interchanges, most bus stops are not significant landmarks and their naming is generally less obvious than rail/metro stations.

While better smart-phone apps address immediate PT route planning needs for many users, generally the small screen is not appropriate for giving an overall view of the PT network and may not highlight a feasible alternative if there is no direct route available, especially if the user is willing to walk a short distance. If a modal shift from cars to PT is to be encouraged, users need to have easy access to information about the whole network and what possibilities might be available to them. This is best served by a combination of full a network map, either showing all bus routes, or a multi-modal PT map including all types of PT available (as long as this does not become too complex) and a variety of sub-network maps.

In terms of classify bus maps either the general content or the style of mapping can be considered. Regarding bus route content, the full network map is the most comprehensive. Various forms of partial network map are possible, including those of selected sub-areas, those of selected associated services – either spatially in some way (such as those serving a certain district) or temporally (such as night services). A useful, but rarer type of partial network map is the stop specific map which shows all the forward services from a particular stop, or perhaps those heading in the same general direction from group of neighbouring stops (an interchange).

In terms of the style of mapping adopted, traditionally most bus maps were of a true geographical approach, often heavily based on a topographic or road map of the area. More recently, based on the familiarity of users with metro map design, many bus maps adopt a schematic approach, but there are arguments that this is less suitable for bus maps. An extreme example of schematisation is the 'thermometer' style, typically of a single or small number of related routes. Here only the sequence of stops can be determined, not their location. However, unlike metro maps where schematic versions reign supreme, because of bus routes following the road network, a more geographically correct is more appropriate, which has lead to the development of variations of 'semi-schematic' approaches which may have some local distortion of geography to simplify the map and aid clarity, but overall retain more-or-less correct geographical distances.

Beyond PT information, decisions are also required about additional topographic information to include. Typically such additional information is more critical in bus maps than rail/metro maps as the stops are more frequent, they are less significant features than stations, and the bus may pass a stop without stopping if there is no-one wishing to disembark or waiting at the stop, thus the user needs additional locational clues to decide when they are approaching their stop. Should the whole road network be shown, or only those routes with busses? Arguably showing roads crossing the bus

route allow the user to count crossings, but this would become tedious. Other landmarks, such as obvious buildings or monuments, are more useable, but may not always be available. If the map is schematic, it is difficult to include such additional information, giving advantage to the geographical or semi-schematic approaches.

Illustrated with a wide range of examples, the presentation discusses the issues of contemporary bus map design, examines the success, or otherwise, of various approaches. It goes on to suggest a range of research issues that remain to be resolved, such as:

- If schematisation is adopted, how is the amount of schematisation assessed?
- How is the appropriate level of schematisation determined for a particular location / network?
- How do schematic bus maps affect user perception of a location?
- Do users appreciate the effects of schematisation when choosing routes?

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