From Visual Schematic to Tactile Schematic Maps

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Agenda

- Review of schematization concepts proposed for Small Display Visual Maps
- Similarities between Small Display Visual Maps and Tactile Environment Maps
- Investigation of the applicability of concepts from Small Display Visual Maps to the Tactile Environment Maps
Small Display Visual Maps and Schematization

- Navigation with GPS based computational wayfinding systems
- Presentation of visual maps on small (interactive) displays to support wayfinding tasks (i.e. route based)
- Small displays pose challenges to usage of maps
Geographic Information on Small Displays

Small Displays

Scaling

Panning
Small Display Visual Maps and Schematization

- Navigation with GPS based computational wayfinding systems
- Presentation of visual maps on small (interactive) displays
- Small displays pose challenges to presentation
- Need for systematic *schematization* of maps
- Schematic Maps
  - capture the abstraction of space that is pertinent in human spatial cognition
  - focus on relevant features for a task and leave out unneeded details
Schematization Example
Review: LineDrive (Agrawala & Stolte, 2001)

- Adapt the scale of route elements to the corresponding wayfinding activity
  - Segments with low activity are schematized/shortened
  - Segments with high activity are detailed
Review: Focus Map  
(Zipf & Richter, 2002)

- Adapt the visual prominence of map features depending on their proximity to the route
  - Close segments are shown
  - Segments far away are faded out
Review: Route Aware Map (Schmid, Richter, Peters, 2010)

- Show main route and alternative routes from an origin to a destination to support correction of routing errors
Review: YAH\textsuperscript{x} Map (Schmid et al., 2010)

- Adapt the map to prior knowledge by leaving out details in the regions visited before
- Use stable frame of reference with salient landmarks
Review: ZoneZoom (Robbins et al., 2004)

- Use a discrete recursive zoom functionality to access details on constant scales
### Summary of Schematizations in Small Display Visual Maps

<table>
<thead>
<tr>
<th>Name of Map</th>
<th>Concept (Überarbeiten: Argumentation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LineDrive</td>
<td>Shorten Segments – better: Activity Based</td>
</tr>
<tr>
<td>Focus Map</td>
<td>Adjust to Distance</td>
</tr>
<tr>
<td>Route Aware Map</td>
<td>Show Alternatives</td>
</tr>
<tr>
<td>YAHx Map</td>
<td>Consider Prior Knowledge</td>
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<tr>
<td></td>
<td>Show stable Frame of Reference</td>
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<tr>
<td>ZoneZoom</td>
<td>Provide Static Relations</td>
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<tr>
<td>Halo &amp; Wedges</td>
<td>Show Stable FoR</td>
</tr>
<tr>
<td>μMap</td>
<td>Consider Prior Knowledge</td>
</tr>
</tbody>
</table>
Tactile Environment Maps

- Map entities represented by tactually prominent entities
- Used for pre-trip survey knowledge acquisition
- Problem with tactile maps: Low resolution
- Solution: Schematization!?
The Relation of Small Display Visual Maps and Tactile Environment Maps

• Characteristics of problem space are similar
  – Low resolution: 20dpi & Display size: A4 or A3
  – High resolution: >72dpi & Display size: some inches²

• Usage is different:
  – Route vs. Survey
  – Path following vs. path finding
  – Predefined goal vs. dynamic goal assignment

• Transfer of solutions from Small Display Visual Maps to Tactile Environment Maps are considered
Considerations About the Applicability of Concepts in TEM

<table>
<thead>
<tr>
<th>Concept</th>
<th>Result of Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorten Segments</td>
<td>😊 Metric information often not needed</td>
</tr>
<tr>
<td>Adjust to Distance</td>
<td>😞 Fading out might be confusing</td>
</tr>
<tr>
<td>Show Alternatives</td>
<td>😞 Might confuse because of lacking survey</td>
</tr>
<tr>
<td>Consider Prior Knowledge</td>
<td>😊 Abstraction of known parts could free space for more details about unknown parts</td>
</tr>
<tr>
<td>Show Stable Frame of Reference</td>
<td>😊 Global landmarks could ensure between-map consistency and reference</td>
</tr>
<tr>
<td>Provide Static Relations</td>
<td>😊 Defined transitions between maps could add alignment support</td>
</tr>
</tbody>
</table>
Summary

- Review of concepts for schematization for Small Display Visual Maps
- Introspective consideration of transferring those concepts to Tactile Environmental Maps: 
  - Shorten Segments
  - Consider Prior Knowledge
  - Show Stable Frame of Reference
  - Provide Static Relations

- Further experimental investigations need to be done to ground the theoretical considerations
Thank you!
Questions?

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Bibliography


