Round in Circles and Back Again Concentric Circles Maps Twelve Years On

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# **Plan of the Paper**

- Concentric circles maps
- London Concentric Circles Version 1, 2013
  - Design process and priorities
  - Evaluation and reception
  - Further explorations
- Effective design and concentric circles maps
  - Framework for effective design
  - Visual impact
  - Importance of topographical distortion

# **Plan of the Paper**

- Subsequent developments
  - User testing
  - Further explorations
  - Background events
- London Concentric Circles Version 2, 2024
  - New design priorities
  - Evaluation and reception
- Conclusions: Are circles the way forward?

• Long history of using regular shapes to attempt to improve comprehension of transit maps



#### Kennedy North/Thomas Cook, 1924

• Earliest o $\boxtimes$  cial use of a perfect circle, 1931?



Berlin S-Bahn map, 1931

• Problem: what about all the other lines



#### French National Lottery Paris Metro map, 1938

• Hybrid maps: straight lines and circular arcs do not necessarily integrate well



- Solution: concentric circles and spokes?
  - Circles and arcs, all centred on central point
  - Straight lines, all radiating from central point
- Every line-crossing is perpendicular

• Earliest known concentric circles map was an attempt to symbolise reunification of Berlin



#### Erik Spiekermann, 1989

• Earliest old cial use of concentric circles map, 2001?



Lisbon bus map, 2001

• Other concentric implementations possible: Modify design rules to match structure of the city



#### art/shop/eat Paris guidebook, 2004

## London Concentric Circles Version 1, 2013

- Completion of London Overground Loop, 2012
- Suggestions that a circle could publicise this



Jonathan Fisher, 2012

## London Concentric Circles Version 1, 2013

- Problems with Fisher map (and others)
  - Octolinear lines poorly integrate with circles
  - Topographical distortion and poor interchanges
  - Overground loop is not a perfect circle



## **Design Process and Priorities**

- Solve issues with concentric circles design?
- If Circle Line NOT perfect circle, must relax design rules



## **Design Process and Priorities**

- Perfect circular Overground loop prioritised
- Choose centre to enable balanced design



## **Design Process and Priorities**

- Tangents and parallel lines to simplify trajectories
- Start from centre and build outwards, keep compact



## London Concentric Circles Version 1, 2013



- Priorities achieved, possible to design a map in this way, but is it usable?
- A lot of topographical displacement necessary to satisfy Overground loop priority
- Massive positive internet and media response, numerous calls for adoption
- I designed this map as a cartographic joke, if I had known it was going to be taken seriously, I would have designed it differently!



## **Further Explorations**

• Berlin: my first design not to break the design rules



## **Further Explorations**

• Paris: unbalanced, distorted, city is not this shape



## **Further Explorations**

• New York City: strongly radial, no orbital line



## **Effective Design and Concentric Circles Maps**

- Are concentric circles maps the way forward?
- WRONG QUESTION
- Internet 'likes' are not usability data
- Need a basis from which to understand and evaluate usability



# Framework for Effective Design

- Five criteria: optimise maps for ALL of these
  - Simplicity of line trajectories
  - Coherence of line relatedness
  - Topographicity
  - Balance
  - Harmony
- Choose design rules that enable best optimisation
- Concentric circles/spokes may or may not enable this

# Framework for Effective Design

• Not all concentric circles maps are equal

Simplicity	Coherence	Topographicity	Balance	Harmony
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# Visual Impact

- Visual properties of these maps go beyond the framework, stronger than expected impact (+/-)
  - People tend to have preference for smooth curves
  - CC maps create strong artificial perspective



# Visual Impact

- Visual properties of these maps go beyond the framework, stronger than expected impact (+/-)
  - CC maps conceptually pleasing, look 'designed'



# Why Topographicity Matters

- Variable scale and topographical displacement are valid components of schematisation toolkit BUT
  - Configuration affects journey choice
  - Conflict with mental models should be avoided
  - Surface topography should not be compromised
  - Intuitive topography should be respected



## Subsequent Developments: User Testing

• User studies compared concentric circles versus octolinear maps: interesting properties



- Better simplicity
- Worse coherence

- Worse simplicity
- Better coherence

## **Subsequent Developments: User Testing**

- Roberts, Newton & Canals (2016)
  - Journey *planning* task plus questionnaire
    - Concentric circles map *slow* and *unpopular*
    - Simplicity should always take priority over coherence
- Roberts, Ng & Baruela (2016)
  - Journey choice task plus questionnaire
    - Concentric circles maps *unpopular* but not *confusing*
    - These maps can have issues with journey generation
- Match design rules to network structure to minimise adverse effects, *same for all design rules*

#### **Subsequent Developments: Further Explorations**

• Köln: concentric circles design rules are an excellent match to city shape





#### **Subsequent Developments: Further Explorations**

• Paris: modify design rules to be more compatible with city structure



#### **Subsequent Developments: Further Explorations**

• Moscow: three circle lines plus highly radial network



• Köln adopts my configuration



KVB tram map, 2021

• TfL borrows my ideas for advertisement campaign



#### TfL novelty Underground map, 2023

• TfL borrows my ideas for network publicity



#### TfL Superloop bus map, 2023

• TfL actual cartography standards decline horribly



TfL Underground map, 2024

## London Concentric Circles Version 2, 2024

- 2013 London Concentric Circles out of date and suffers from being my first design
- Recent TfL activities suggest an update is needed



## **New Design Priorities**

- New central point to emphasise new design
- *Topographicity* prioritised, minimise displacement, spatially informative positioning of nearby stations
  - BETTER THAN OFFICIAL OCTOLINEAR MAP
  - Overground loop not required to be perfect circle
- Circle Line shape preserved, horizontal deviations to spoke rule allowed but are better quarantined
- Coherence and harmony: all other straight lines on map are true spokes, no exceptions

## London Concentric Circles Version 1, 2013



## London Concentric Circles Version 2, 2024



- Priorities achieved, but simplicity of trajectories poor
- Even stronger response from internet and and media

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#### ⊖ TfL 💝 @TfL

#### Let's Circle the City! 😅

To celebrate the launch of @SamsungUK Galaxy S24 Ultra featuring Circle to Search with Google, we've redesigned the iconic Harry Beck Tube map to turn the Circle line into just that – a circle! 🔆

The special edition Tube map will be displayed in five stations on the Circle line until 14 February.

#### Let us know if you spot one ••







After eleven years, it's time to update my London Underground concentric-circles-and-spokes map. Completely redrawn from centre to edges, it's so much better than before, and more geographically accurate than the official map.



- Topographical distortion: hard to devise metrics, schematisation tools independent of each other
- Topographical displacement 'anecdotes' need scoring





- Topographical distortion: hard to devise metrics, schematisation tools independent of each other
- Fare zones are technically surface features, if topography is distorted untidily then zones likewise



## **Conclusions: Are Circles the Way Forward?**

- Concentric circles maps evoke strong positive responses, but usability data indicate caution needed
- Initial enthusiasm converts into scepticism once maps are experienced for journey planning
- Simplicity of line trajectories is crucial for usability, hence also matching design rules to city structure

## **Conclusions: Are Circles the Way Forward?**

- Concentric circles have their place in the right city
- Best candidates so far: Köln, Amsterdam, Moscow

