Mathematics For Visualization versus Visualization Of Mathematics

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The Mathematical Concepts Beneath Contemporary Visualization

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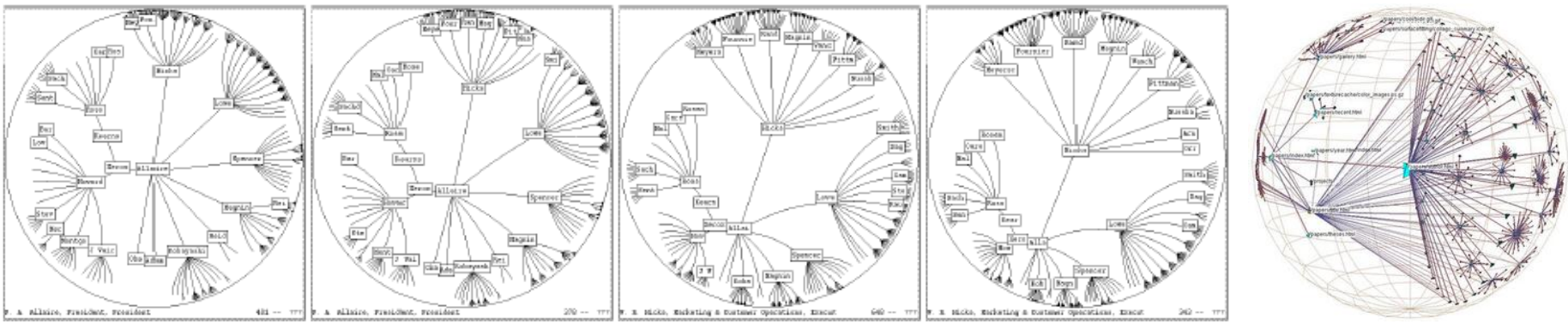
Math For Vis vs. MathVis

- math for vis
  - math as a tool in service of vis goals
- mathvis
  - vis as a tool to help understand math

Hyperbolic Geometry: Math For Vis

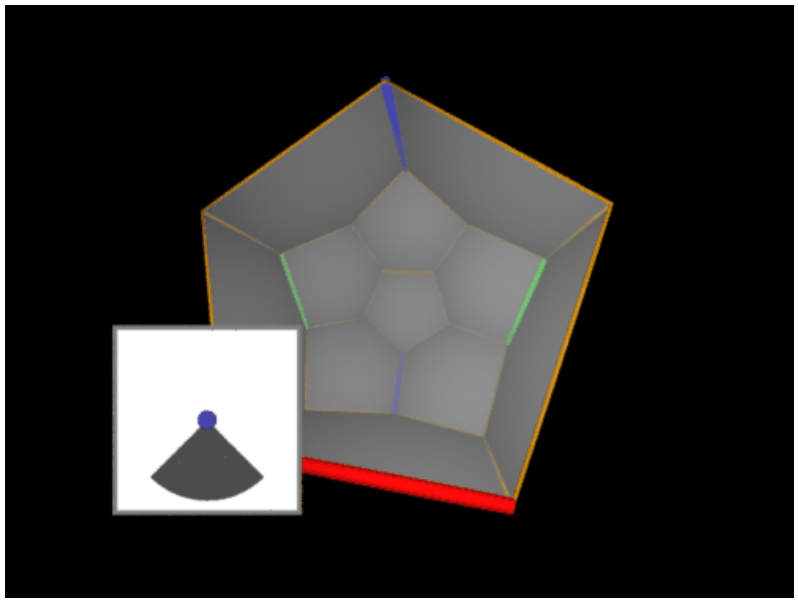
- elegant Focus+Context approach
  - exponential: leaves in tree, amount of room
- mathematical details hidden from end user
  - although discussed in paper for researchers

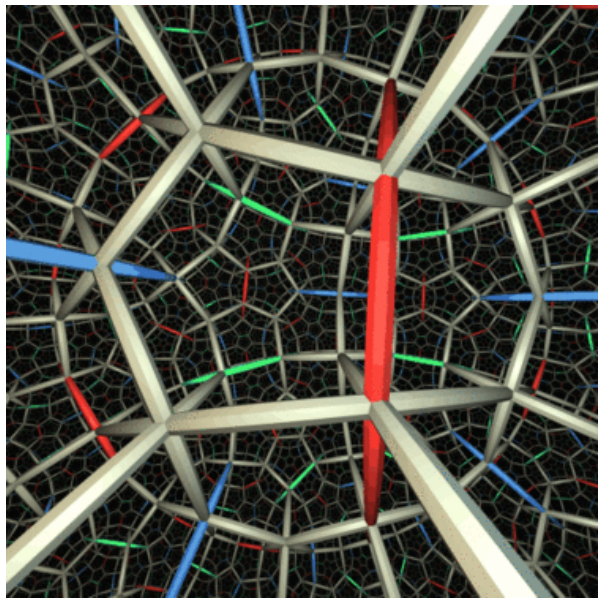


[The Hyperbolic Browser: A Focus + Context Technique for Visualizing Large Hierarchies. Lamping and Rao, Proc SIGCHI '95, p 401-408.]
[H3: Laying Out Large Directed Graphs in 3D Hyperbolic Space. Munzner, Proc InfoVis 97, p 2-10.]

Hyperbolic Geometry: MathVis

- show implications of concept
  - geometries where Euclid's parallel postulate does not hold
- emphasize unfamiliar and surprising effects
  - right-angle dodecahedra can tile space





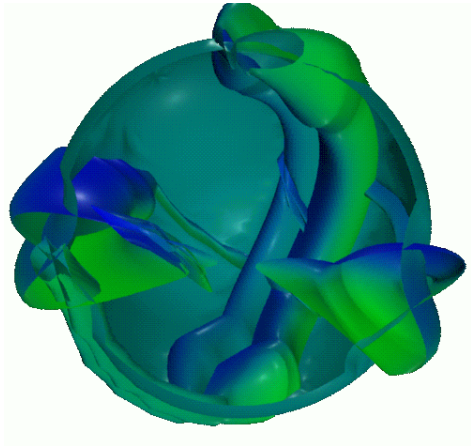
Not Knot (video). Gunn and Maxwell. Jones and Bartlett, Boston, 1991.

MathVis vs. InfoVis/SciVis

- scalability as core challenge in infovis/scivis
  - understand structure of particular dataset
  - inevitable urge to see larger real-world data

MathVis and Scalability

- mathvis model: scalability rarely a factor
- dataset itself often tiny
  - structure of particular mathematical object
    - intersections of knotted sphere in 4-space
  - characteristics of space
    - often inspect many individual datasets to illustrate



[Dennis Roseman, http://www.math.uiowa.edu/∼roseman/knottedSurfaces]