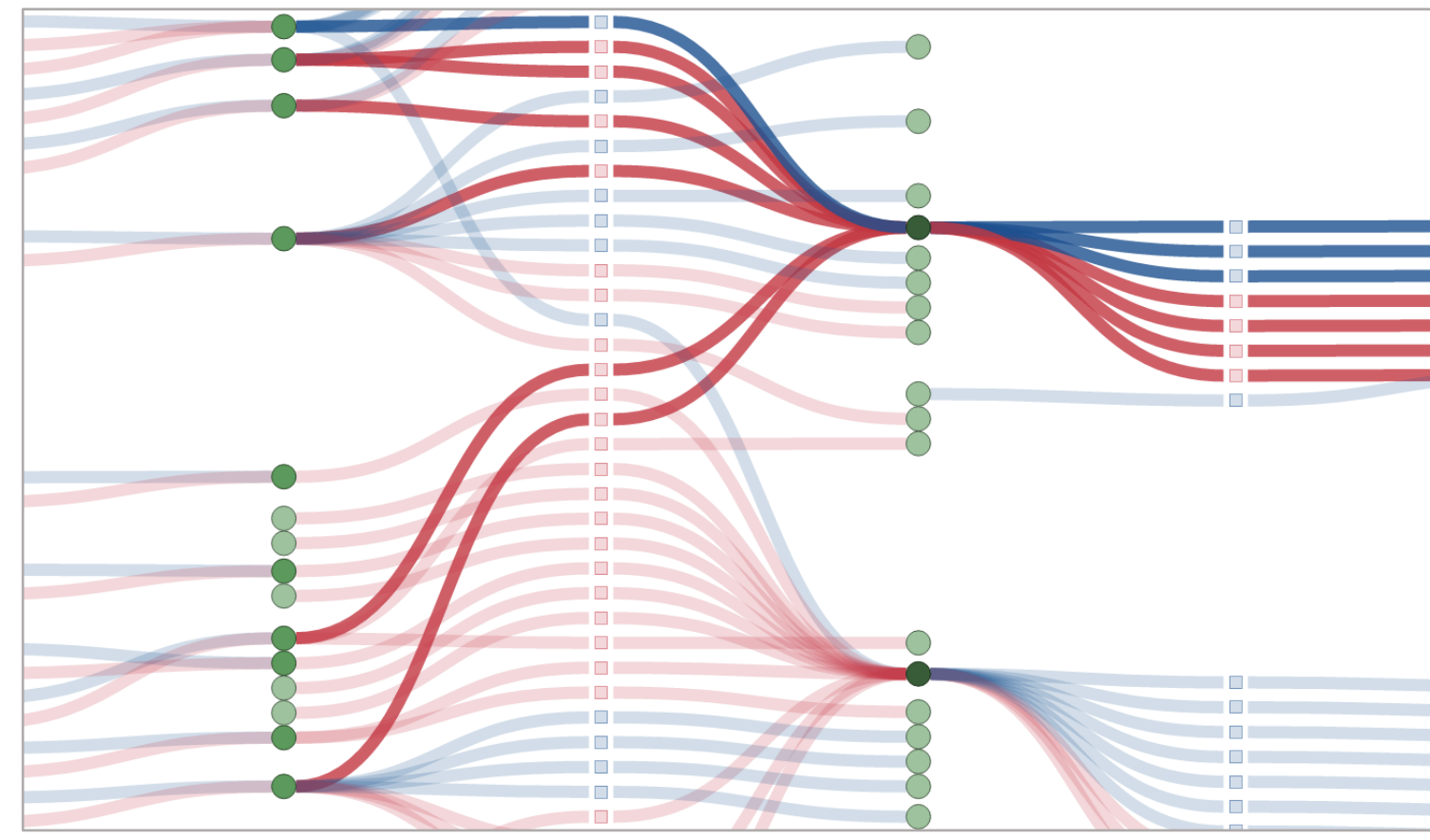


Visualizing Dynamics of Complex Familial Structures

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Visualizing Lineages

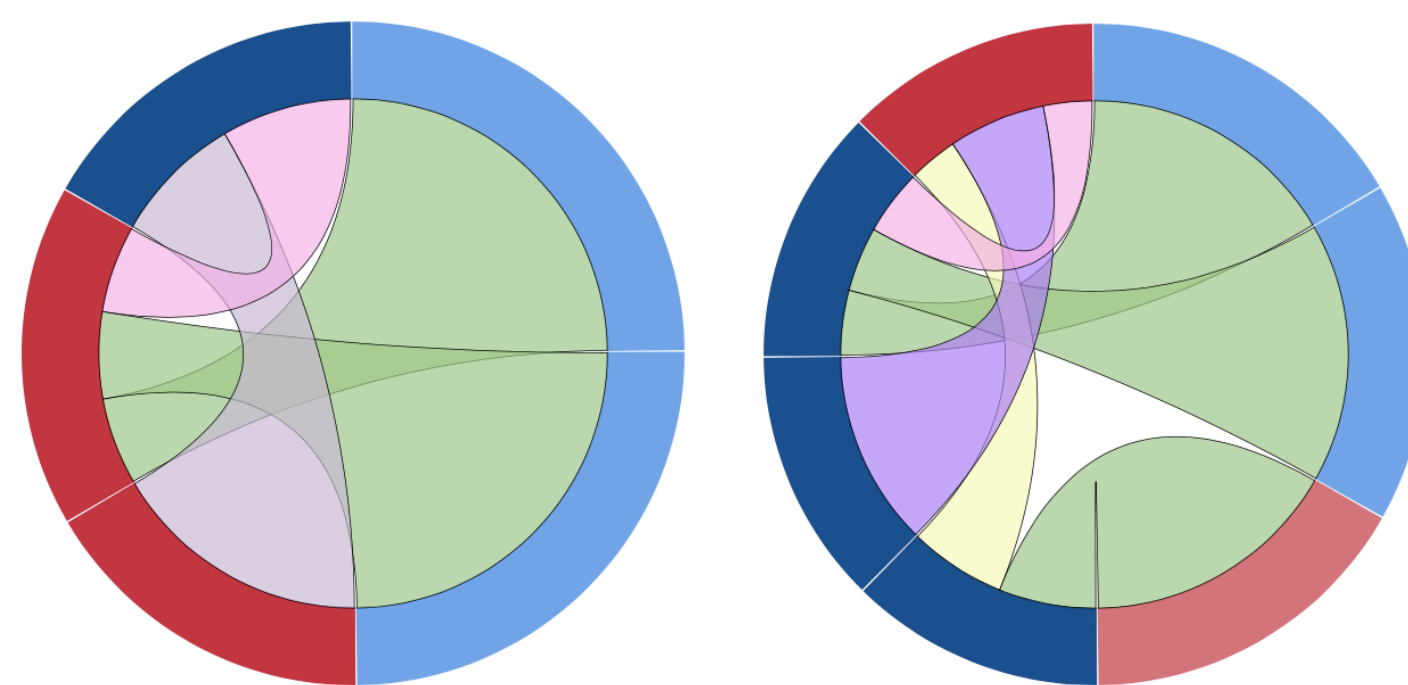
- Generation flow left-to-right organized around reference individuals (oldest generation on left)
- Family units are nodes (green disks)
 - Vertical alignment by generation from reference individuals
- Individuals are hyperedges from the family unit of their birth to their adult marriages (line with square at center)



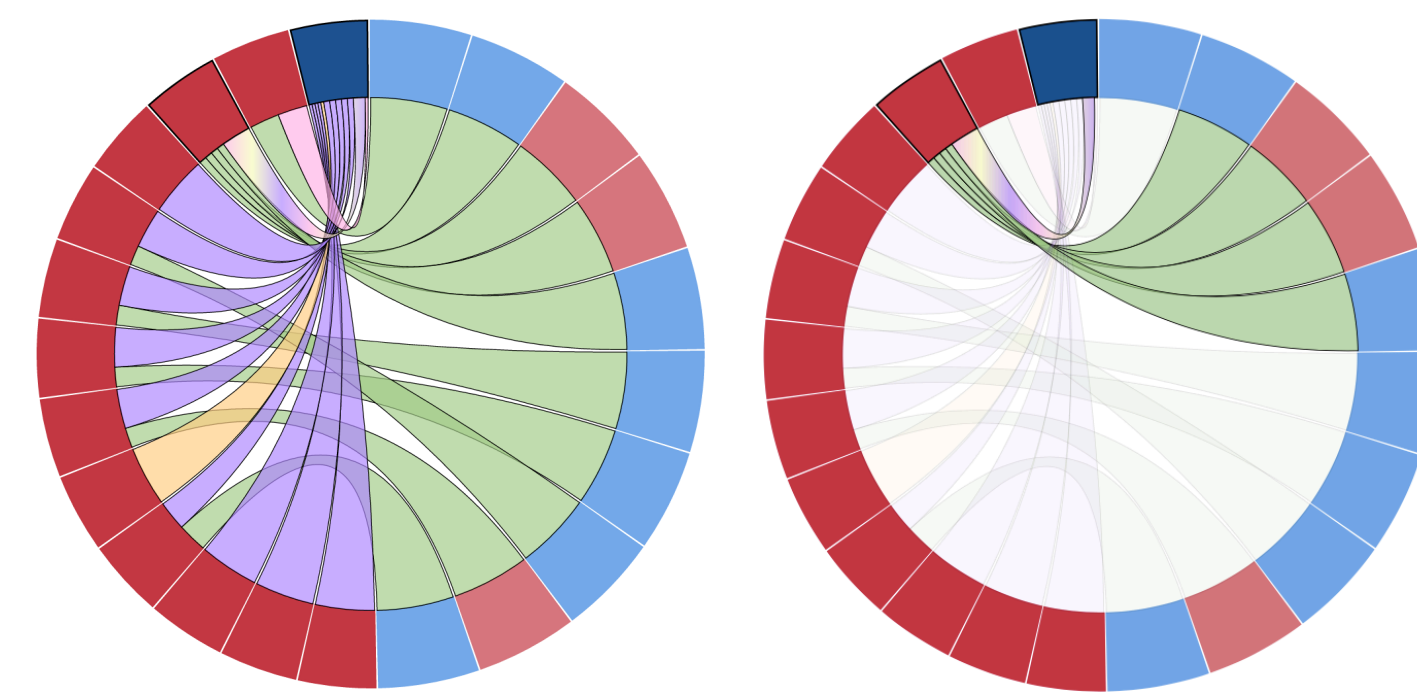
Lineage flow diagram for reference individuals Orson Pratt and Parley Pratt. Darkest nodes represent the reference individuals' family units. Nodes are lighter for each degree of separation away from the reference individuals. Participants in Orson Pratt's marriage are highlighted.

Visualizing Family Units

- Adapted chord diagrams to visually arrange complex familial structures
- Use the imposed lineage flow
 - Parents on left
 - Children on right
 - Chords connect intra-familial relations
- Distinguish relationships with color
 - Marital relationships: pink, purple, yellow
 - Parent/child relationships: green, gold



Patriarchal family unit visualization with 3 parents and 2 children for Henry Jacobs (left). Matriarchal family unit with 4 parents and 3 children for Zina Huntington (right).



Full Parley Pratt paternal marriage, depicting 12 wives and 10 children (left). Historians may interact with and feature parts of the visualization to highlight details of the family relations (right).

Future Work

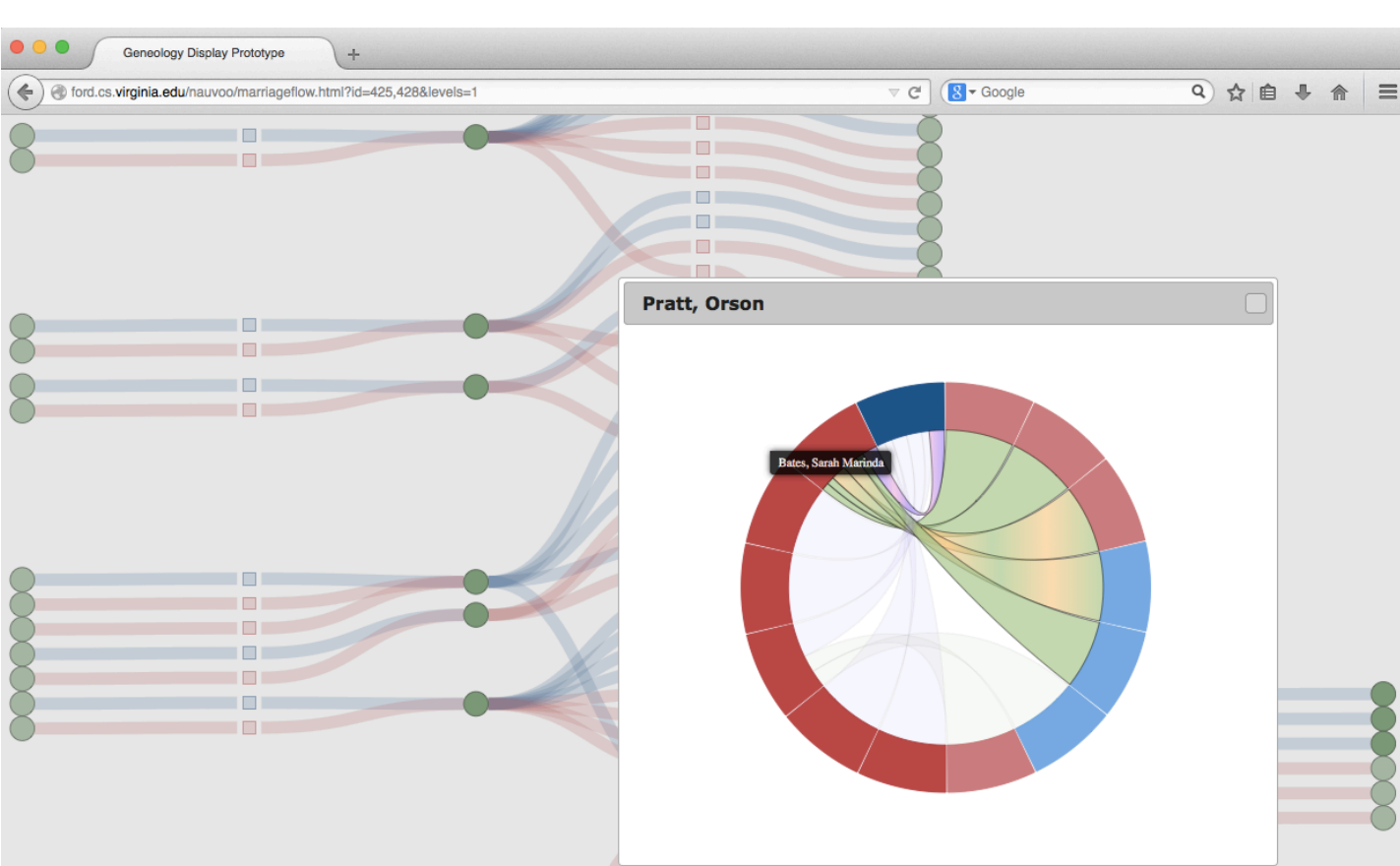
Visualization Refinement

- Lineage Flow
 - Allow cycles
 - Visualize adoptions
 - Show evolving lineage over time
- Familial Chord
 - Connect with lineage display

Network Analysis

- Analyze changing lineage networks over time
- Compare and contrast related matriarchal and patriarchal lineage networks
- Time-Varying Graph representation

Navigating the Interface



Mouse-overs and popups allow the user to focus on and zoom into an individual, inter-familial and intra-familial relationship

Implementation Details

Interactive Web Interface

- D3js
 - Adapted chord and Sankey diagram layout engines
- Time slider to update chord display

Database and storage

- PostgreSQL
- Custom PHP Rest API

Nauvoo Marriage Project

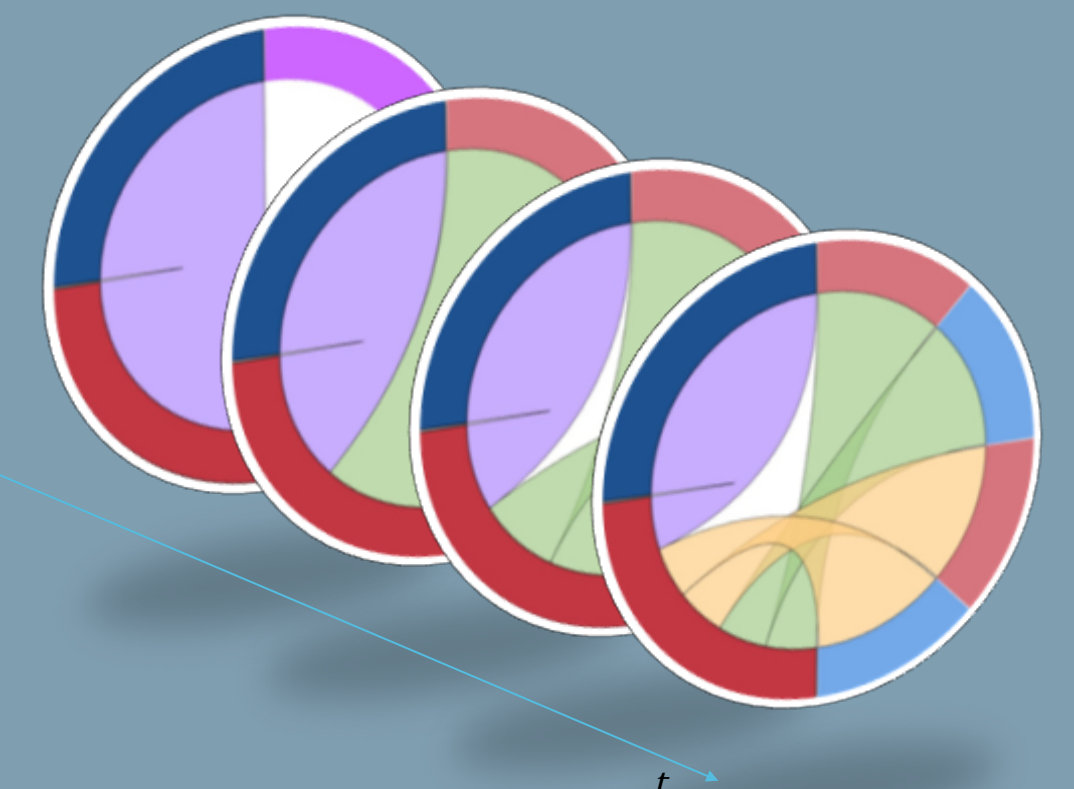
Goals and Description

- Investigate and understand the concept of "marriage" in the early Mormon church
- Mid-1800s Nauvoo, IL.
- Polyandrous and polygynous marriages

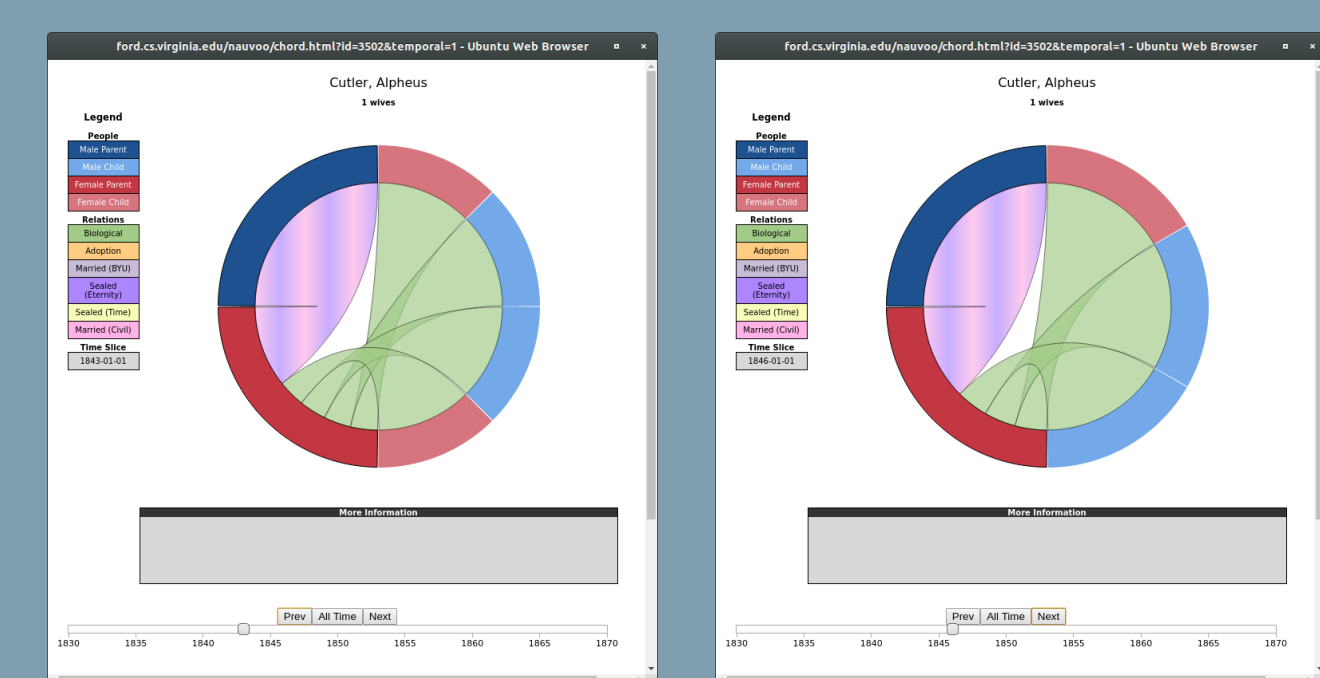
Dataset

- 50,000+ individuals and marriages
- 3 types of marriage relationships
- 2 types of parent/child relations

Depicting Change

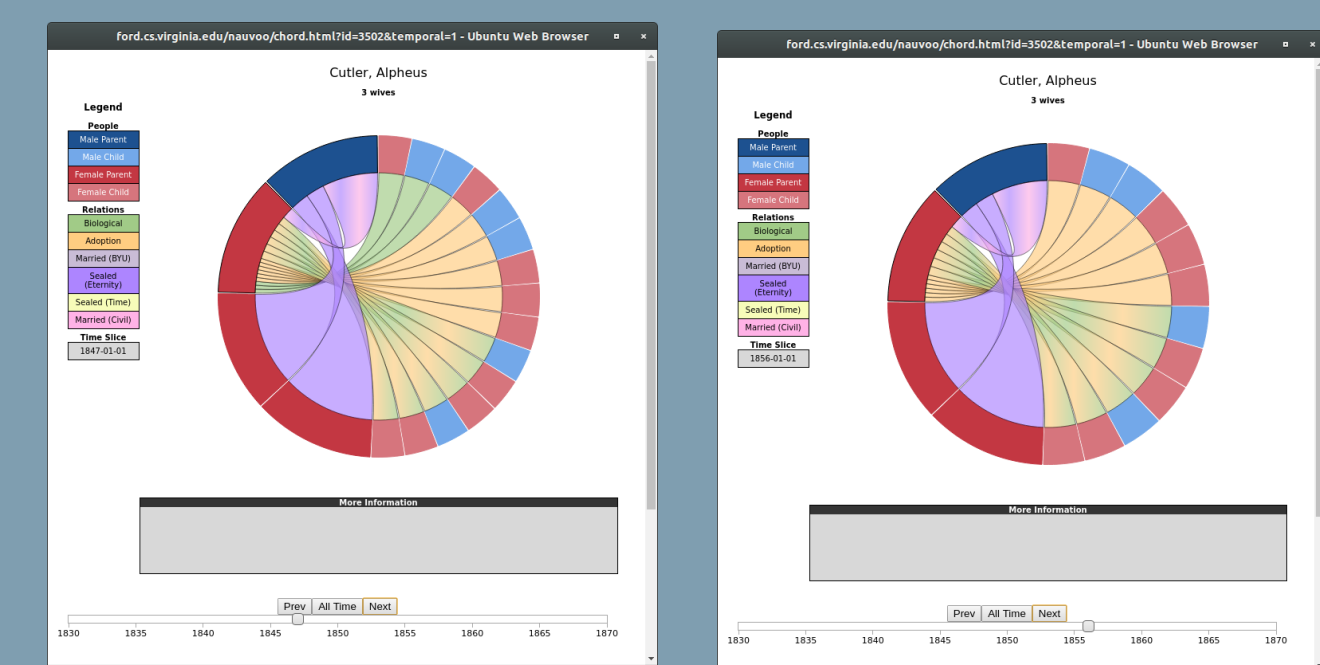


- Family unit visualizations display state of family at one point in time
- Stacking the slices conceptualizes a 3D temporal cylinder
- Step through time using a timeline slider



(a) 1843

(b) 1846



(c) 1847

(d) 1856

Alpheus Cutler's family unit displayed over 4 distinct time points between 1843-1856. Using the time slider, the visualization captures when family members die (b) and plural wives and adopted children are added (c).