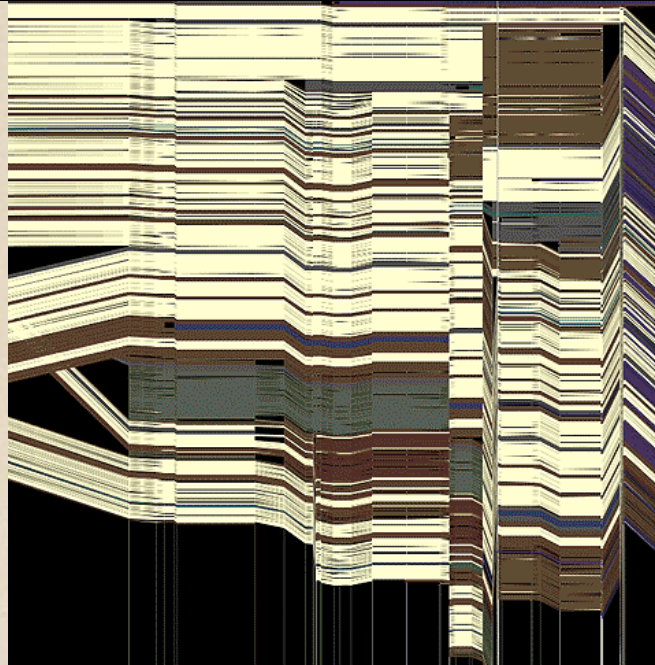
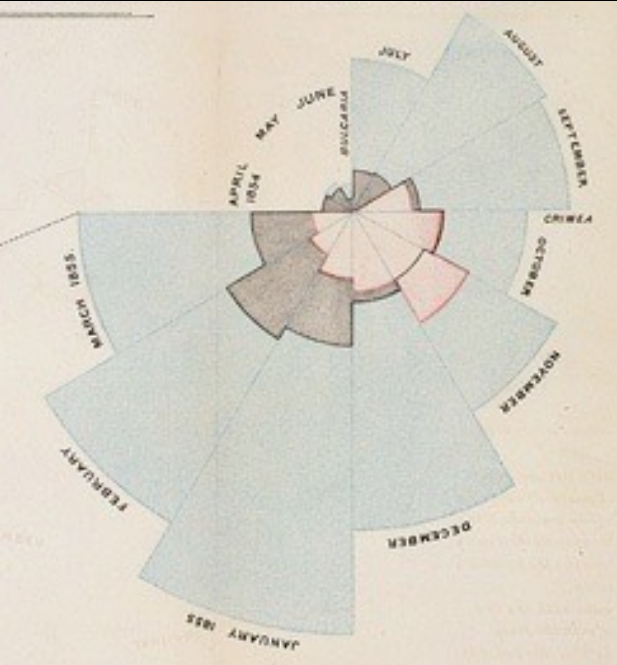


CSE 512 - Data Visualization

# Design Review & Critique



Jeffrey Heer University of Washington

# Final Project

# Final Project

**Design a new visualization system or technique.**

**Many options...**

New system for a chosen domain + data set

Novel visualization / interaction technique

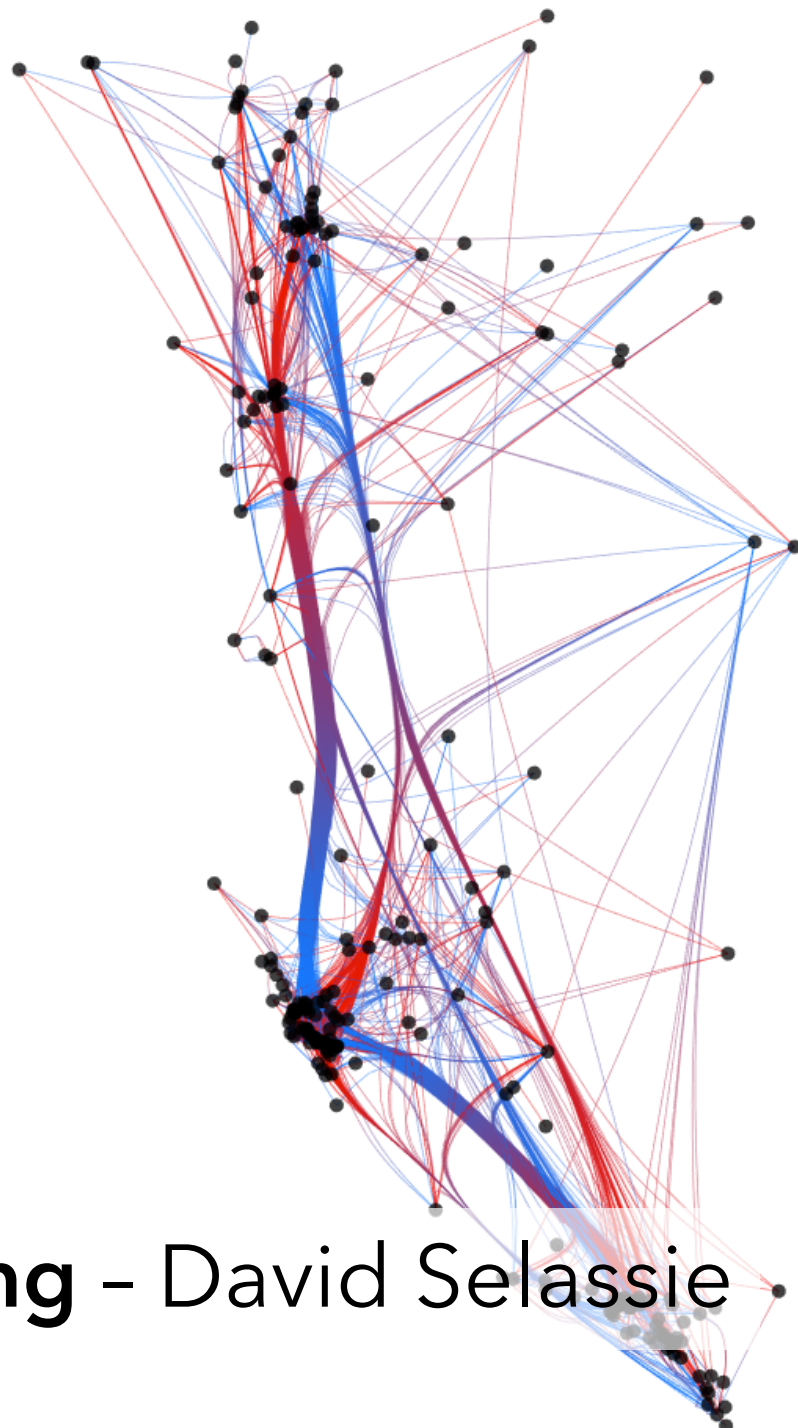
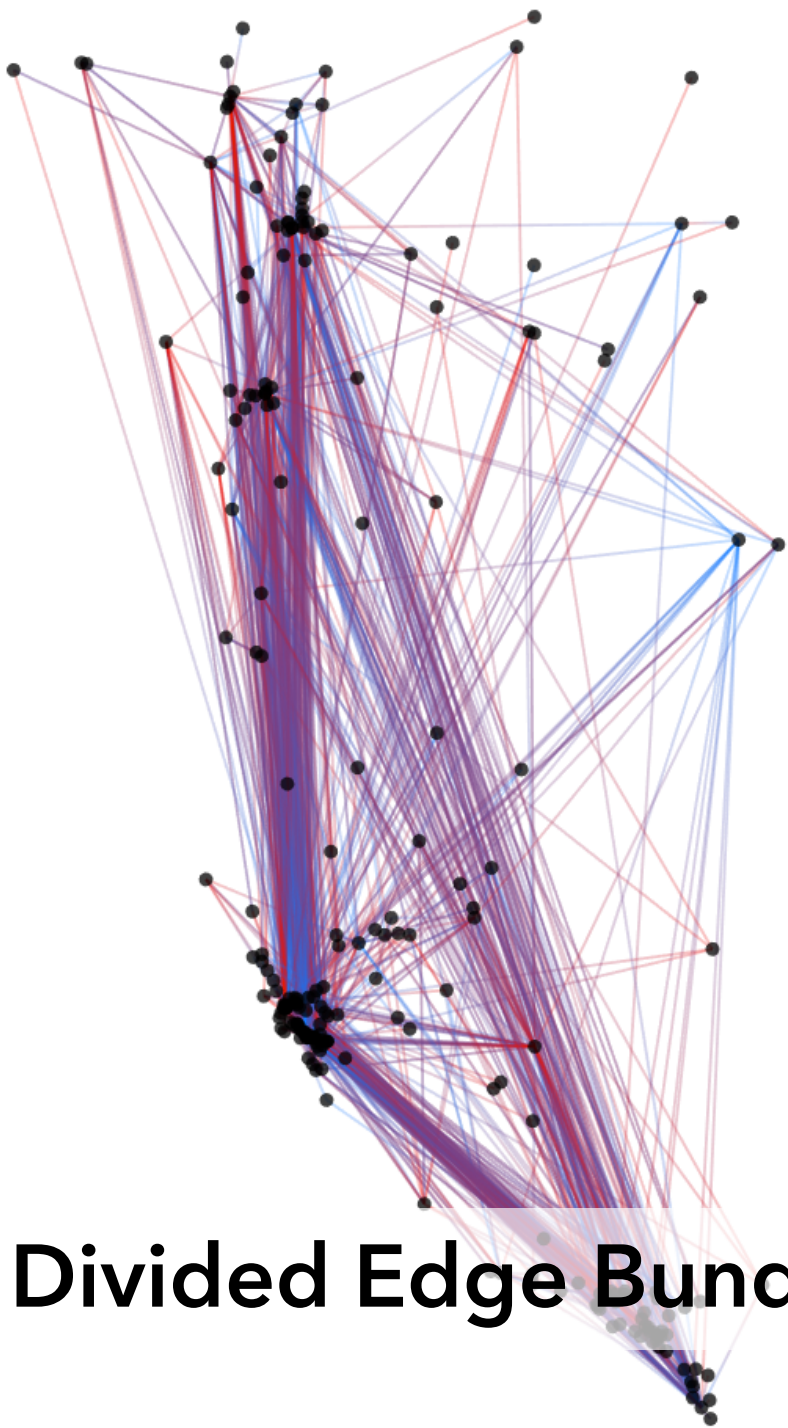
Design study or experiment

**Deliverables**

~4 page paper in conference paper format

Milestone and design review with staff

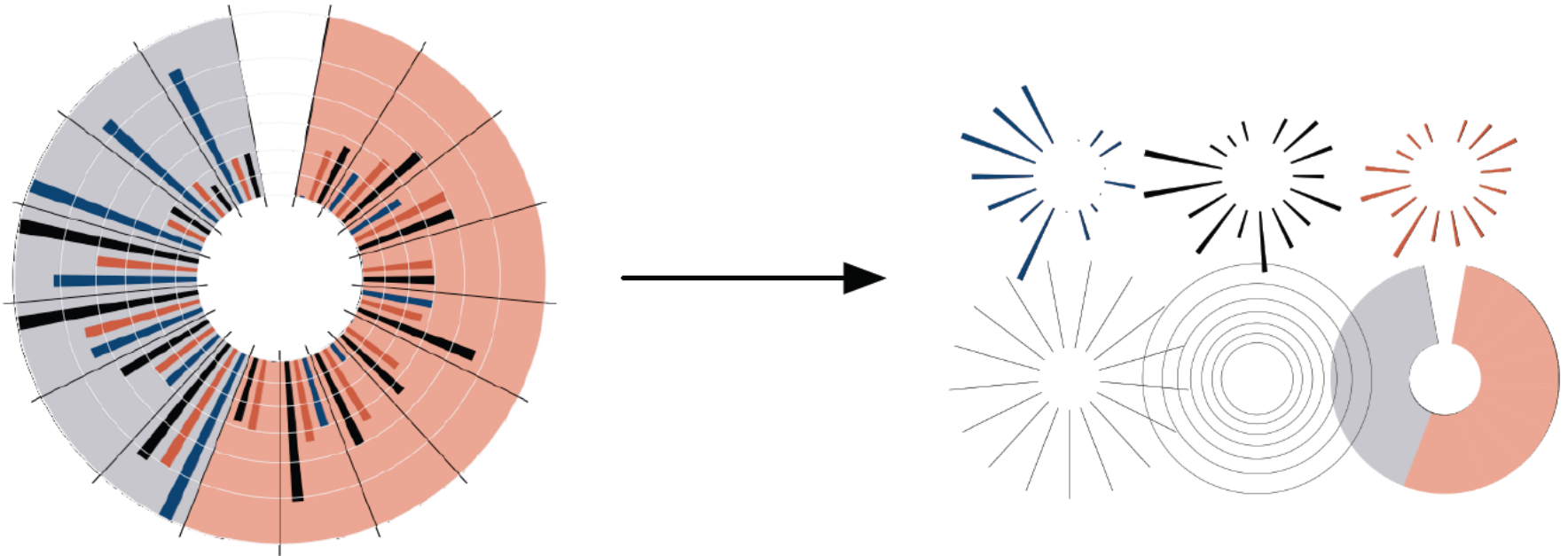
Final poster & demo session

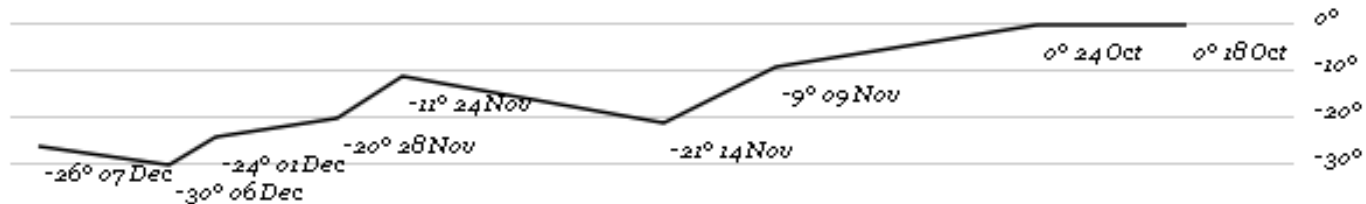
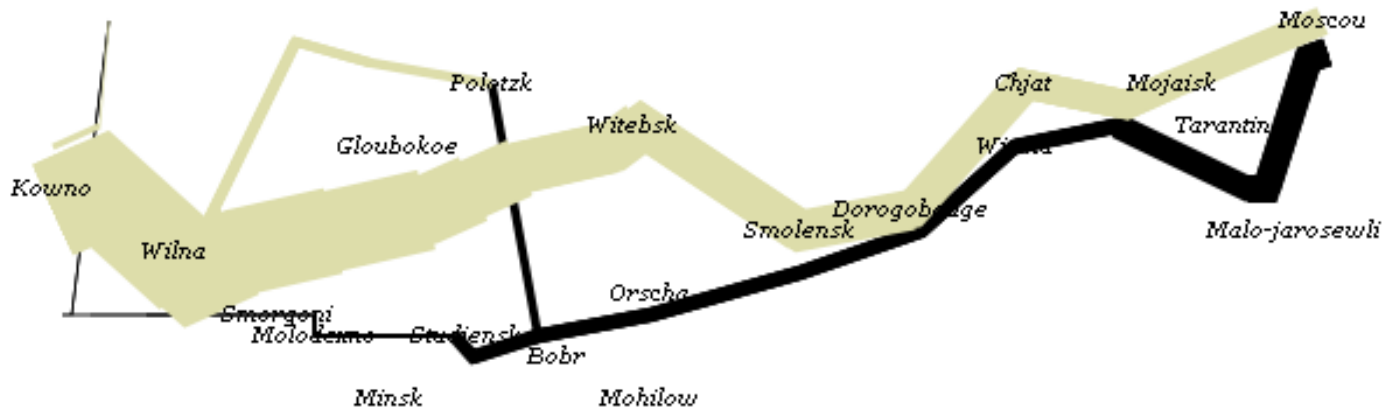


**Divided Edge Bundling** – David Selassie

# Protovis: A Graphical Toolkit for Visualization

**Mike Bostock**





```

var army = pd.nest(napoleon.army, "dir", "group");
var vis = new pv.Panel();

var lines = vis.add(pv.Panel).data(army);
lines.add(pv.Line)
  .data(function() army[this.idx])
  .left(lon).top(lat).size(function(d) d.size/8000)
  .strokeStyle(function() color[army[panelIndex][0].dir]);

```

```

vis.add(pv.Label).data(napoleon.cities)
  .left(lon).top(lat)
  .text(function(d) d.city).font("italic 10px Georgia")
  .textAlign("center").textBaseline("middle");

```

```

vis.add(pv.Rule).data([0,-10,-20,-30])
  .top(function(d) 300 - 2*d - 0.5).left(200).right(150)
  .lineWidth(1).strokeStyle("#ccc")
  .anchor("right").add(pv.Label)
  .font("italic 10px Georgia")
  .text(function(d) d+"°").textBaseline("center");

```

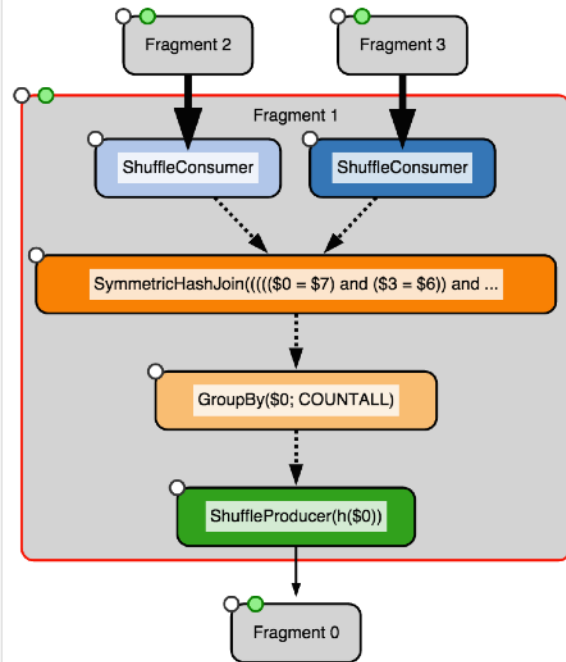
```

vis.add(pv.Line).data(napoleon.temp)
  .left(lon).top(tmp) .strokeStyle("#0")
  .add(pv.Label)
  .top(function(d) 5 + tmp(d))
  .text(function(d) d.temp+"° " +d.date.substr(0,6))

```

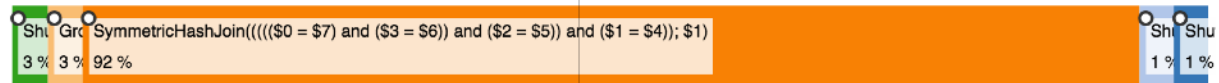
# Perfopticon Distributed Query Performance

Physical Query Plan:



Overview / Operators inside fragment 1

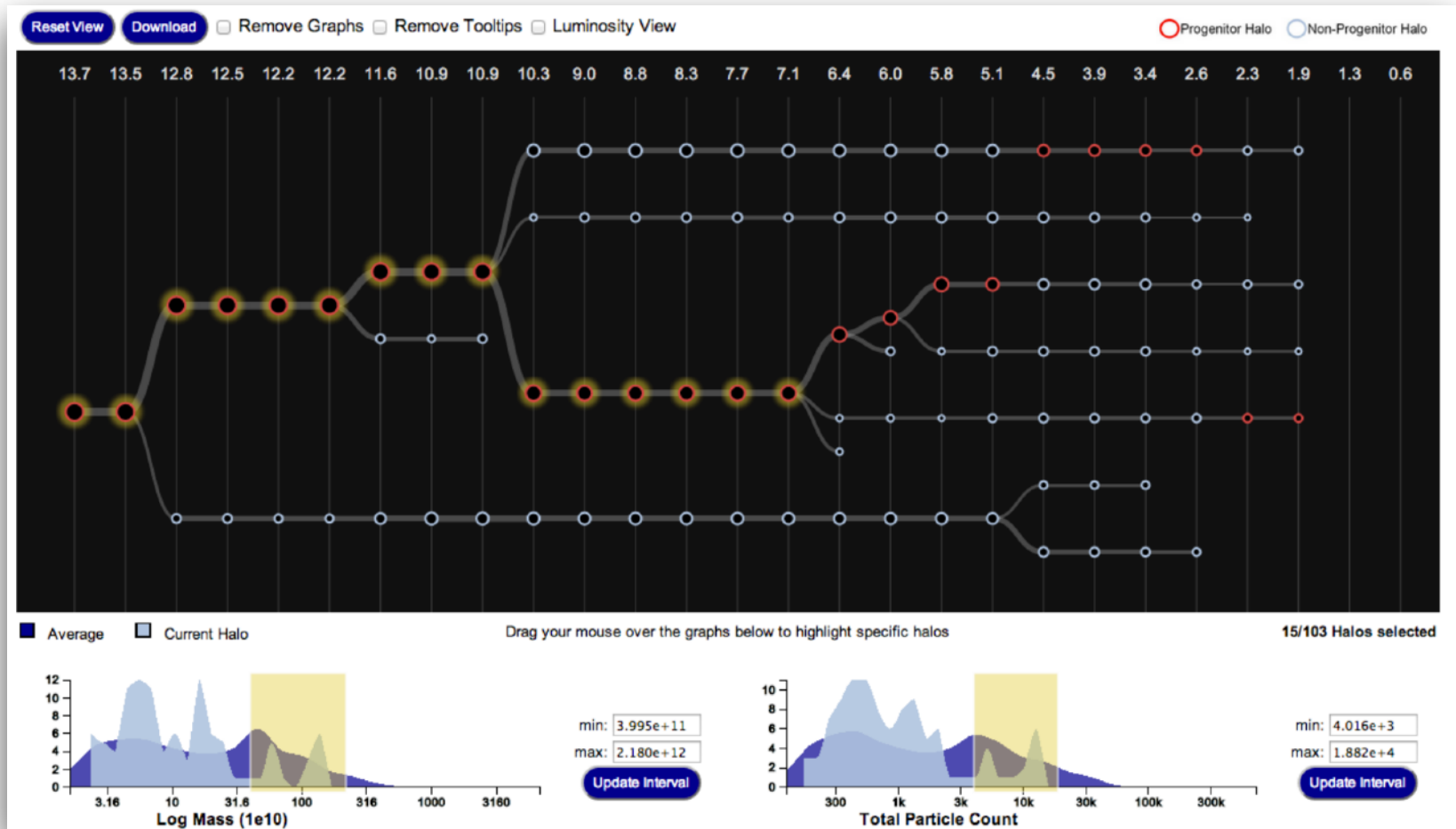
Query time contribution collapse/expand



Detailed execution



# Visualizing Galaxy Merger Trees



S. Loebman, J. Ortiz, L. Orr, M. Balazinska, T. Quinn et al. [SIGMOD '14]



# A browser-based tool for visualization and analysis of diffusion MRI data

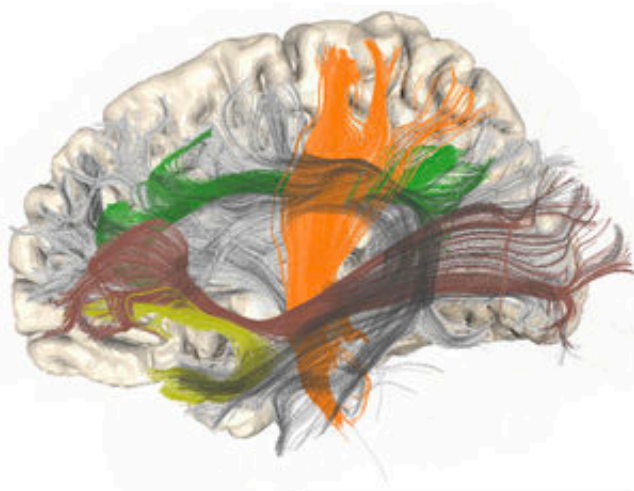
Jason D. Yeatman , Adam Richie-Halford, Josh K. Smith, Anisha Keshavan & Ariel Rokem 

AFQ-Browser | Yeatman, Richie-Halford, Smith, Keshavan & Rokem (2018) launch binder

### BUNDLES

- Left Corticospinal
- Right Corticospinal
- Left Cingulum Cingulate
- Right Cingulum Cingulate
- Left Cingulum
- Hippocampus
- Right Cingulum
- Hippocampus
- Callosum Forceps Major
- Callosum Forceps Minor
- Left IFOF
- Right IFOF
- Left ILF
- Right ILF
- Left SLF
- Right SLF
- Left Uncinate

### ANATOMY

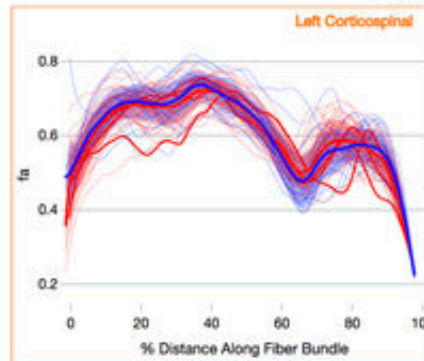


Open Controls

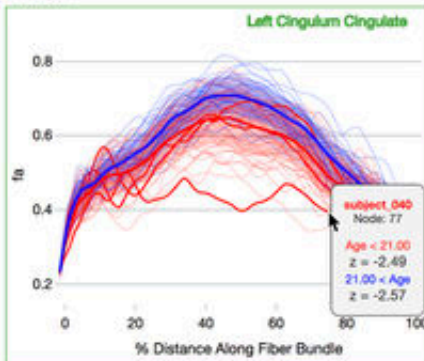
### BUNDLE DETAILS

AFQ tract profile outputs

Left Corticospinal

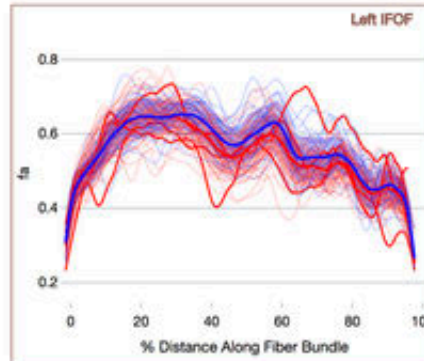


Left Cingulum Cingulate

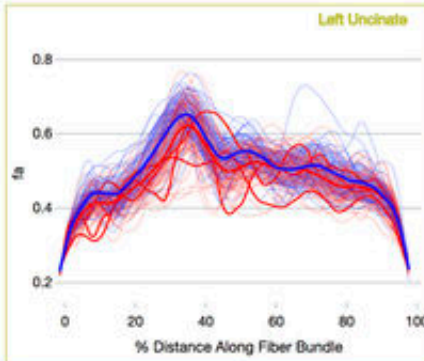


subject\_040  
Node: 77  
Age < 21.00  
z = -2.49  
21.00 < Age  
z = -2.57

Left IFOF



Left Uncinate



### SUBJECT METADATA

subjectID	Age	Gender	Handedness	IQ	IQ_Matrix	IQ_Vc
subject_046	8	Male	Right	92	41	30
subject_028	7	Male	Right	146	76	72
subject_040	7	Male	Right	127	63	67
subject_044	8	Female	Right	113	58	54
subject_038	8	Female	Right	129	63	62
subject_029	8	Female	Right	107	57	51
subject_035	8	Female	Right	130	61	72
subject_043	8	Male	Right	112	60	54
subject_054	8	Female	Right	0	0	0
subject_036	8	Female	Right	130	64	66
subject_025	8	Male	Right	125	67	61

Open Controls

Download data

Subject metadata Bundle properties

Metric:

Error Type:

Line Opacity:

Brushable Tracts:

Close Controls

# Visualizing the Republic of Letters

Daniel Chang, Yuankai Ge, Shiwei Song

## Republic of Letters

1700



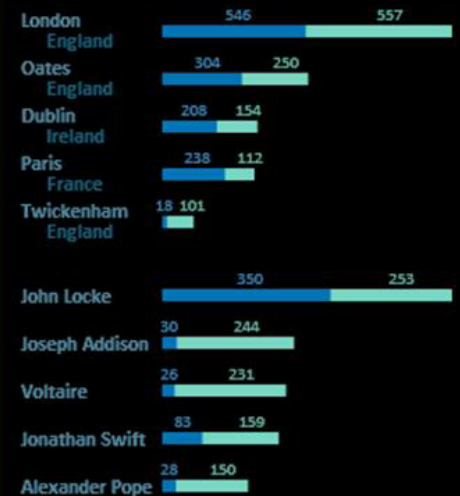
## FILTER BY AUTHOR

Clear All

Damien Desormes  
Daniel Cornabs  
Daniel de Pury  
Daniel Defoe  
Daniel Malthus  
Daniel Marc Antoine Chardon  
Daniel Muller

## TOP CITIES AND AUTHORS

Letters received (blue) Letters sent (green)



# Final Project Schedule

<i>Proposal</i>	Thur, May 10
<i>Milestone</i>	Mon, May 21 (reviews 5/22, 5/24)
<i>Final Paper</i>	Wed, May 30
<i>Poster &amp; Demo</i>	Thur, May 31 (11:45am-2pm)

## **Logistics**

Final project description posted online

Work in groups of up to 4 people

Start thinking about project topics!

# Possible Project Ideas

Team up with **local researchers!**

Advance your **existing research.**

Pick an **open problem** of interest.

Work in a domain with **real stakeholders.**

# Tips for a Successful Project

Focus on a compelling **real-world problem**.  
How will you gauge success?

Consider **multiple design alternatives**.

Prototype quickly (use Tableau, R, *etc...*).

**Seek feedback** (representative users, peers, ...).

Even informal usage can provide insights.

Choose **appropriate team roles**.

**Start early** (and read the suggested paper!)

# Prototype Peer Critiques

# Critique Questions

What is the purpose of the visualization?

Does it serve its purpose well?

Does it convey the data honestly?

Does it show the appropriate level of detail?

Are expressive & effective visual encodings used?

Do the interactions aid understanding of the data?

Is the design well-organized? Is it innovative?

What would like to change or refine?

How might things be done differently?

# I Like... / I Wish... / What If?

## **I LIKE...**

Praise for design ideas and/or well-executed implementation details. *Example: "I like the navigation through time via the slider; the patterns observed as one moves forward are compelling!"*

## **I WISH...**

Constructive statements on how the design might be improved or further refined. *Example: "I wish moving the slider caused the visualization to update immediately, rather than the current lag."*

## **WHAT IF?**

Suggest alternative design directions, or even wacky half-baked ideas. *Example: "What if we got rid of the slider and enabled direct manipulation navigation by dragging data points directly?"*





# I Like... / I Wish... / What If?

## **I LIKE...**

The goal of supporting developers to improve decoupling.

The "cut-line" interaction to isolate links of interest.

The use of gradients to show edge directionality.

## **I WISH...**

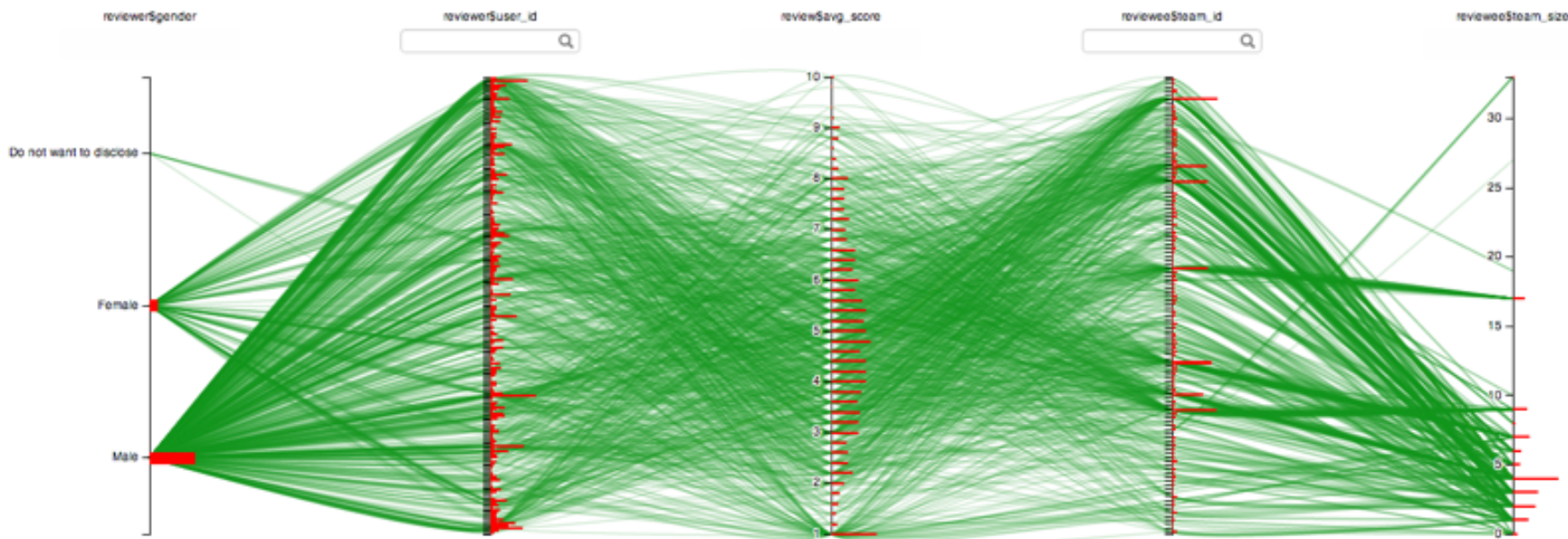
I could author multiple cut-lines for compound queries.

More details on demand were shown upon mouse-hover.

## **WHAT IF?**

You could incorporate information from applications that use this code? How often are different modules used?

- REVIEWER  gpa  academic\_major  age\_range  location  gender  signin\_count  user\_id
- REVIEW  avg\_score  score1  score2  score3  score4  score5
- REVIEWEE  team\_id  team\_size



reviewer\$gpa	reviewer\$acad...	reviewer\$age...	reviewer\$locat...	reviewer\$gender	reviewer\$signi...	reviewer\$user_id	review\$avg_s...	review\$score1	review\$score2	review\$score3	review\$score4	review\$score5	reviewee\$tea...	reviewee\$tea...
NULL	NULL	NULL	NULL	NULL	21	37212	4	4	5	6	4	1	5069	4
NULL	NULL	NULL	NULL	NULL	21	37212	7.4	8	7	7	6	9	5470	17
Does not ...	Science	26-30	Netherlands	Male	124	2230	6.8	7	7	8	7	5	5693	7
Does not ...	Science	26-30	Netherlands	Male	124	2230	2.2	2	1	3	4	1	5836	4
Do not w...	Business	31-35	Spain	Male	80	2848	4.4	4	1	7	9	1	5069	4
3-3.49	Other	21-25	Spain	Female	75	2826	5	5	5	5	5	5	5215	4
3-3.49	Engineering	over 50	United St...	Male	110	19502	3.6	5	5	2	3	3	5215	4
3.5-4.00	Science	36-40	Greece	Male	125	27386	3.6	3	6	5	3	1	5250	3
3-3.49	Engineering	over 50	United St...	Male	110	19502	7	9	5	9	6	6	5693	7

# I Like... / I Wish... / What If?

## **I LIKE...**

The 1D histograms on the parallel coordinates display.  
The use of brushing and linking between components.  
Attention to small details, such as white masks for axis labels.

## **I WISH...**

Data fields were configured to focus on the most relevant features.  
The interaction was faster (lower latency).  
A color-blind friendly color palette had been used.

## **WHAT IF?**

One tried to visualize the data using a technique other than parallel coordinates? What encodings work best for the intended audience?

# Critique Categories

## **Visualization Design**

Choice of visual encodings (expressive, effective?)  
Is the appropriate information visible by default?

## **Interaction Design**

Choice of interaction techniques  
Do they enhance understanding of the data?  
Usability, discoverability, performance

## **Overall Design Quality**

Organization, legibility, fitness for chosen goals