

Modern Metrics

2020 2021 2022

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Modern Metrics

(2020)

What's new in Web Performance?

Core Web Vitals

- Largest Contentful Paint (LCP)
- Cumulative Layout Shift (CLS)
- First Input Delay (FID)

Modern Metrics

(2021)

COVID

What's new in Web Performance?

Core Web Vitals affecting SEO

Modern Metrics

... 2022

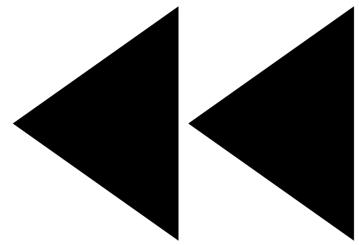
What's new in Web Performance?

- A survey of "modern" metrics
- Evaluating metrics
- Bias
- What's the latest and why should you care?
- Taking a look yourself!

"Modern" Metrics (2022)

What is a "modern" metric?





REWIND!

"Modern" Metrics (2020)

CWV

FID

LCP

CLS



"Modern" Metrics (2018)

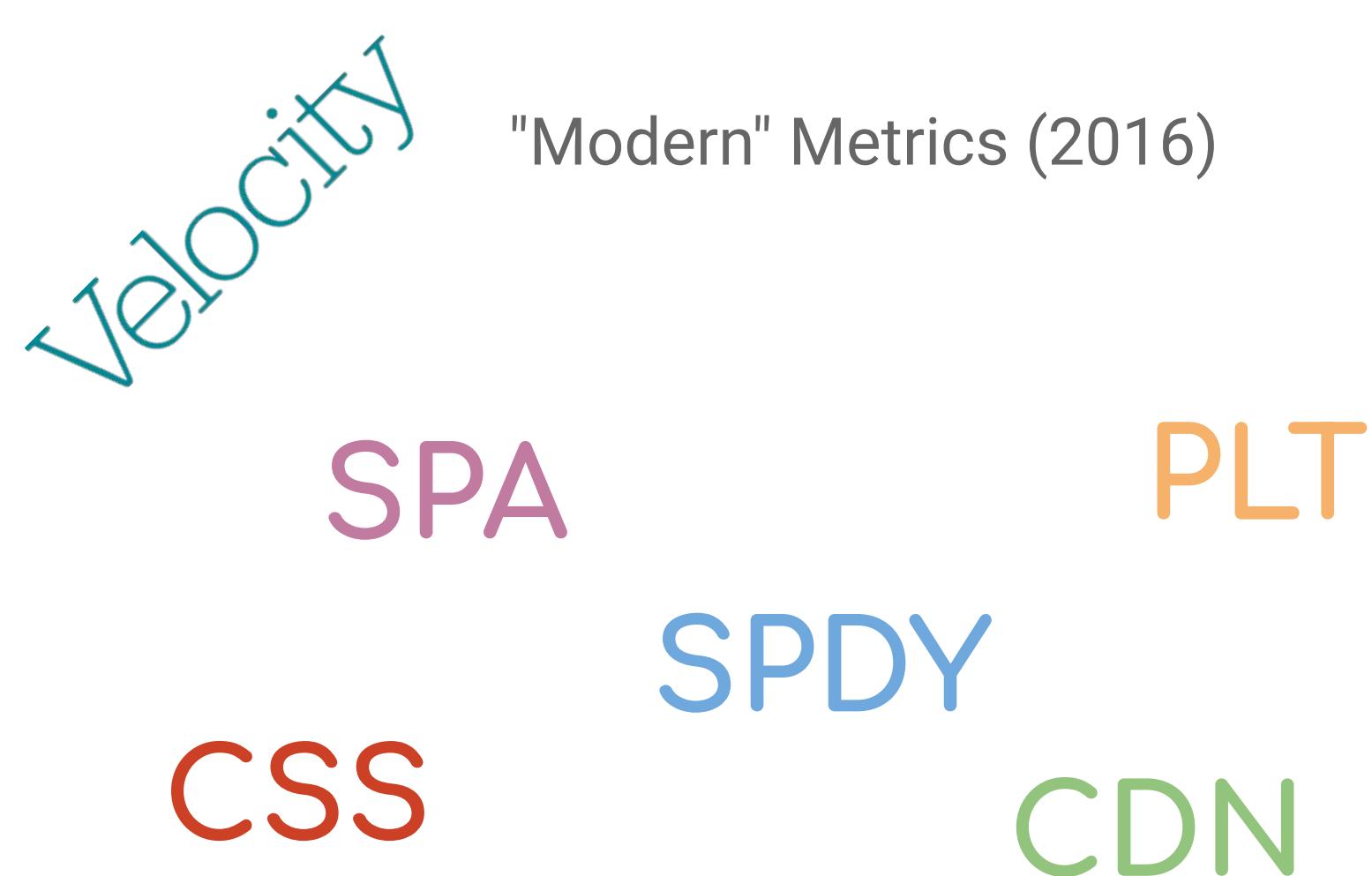
TTFI

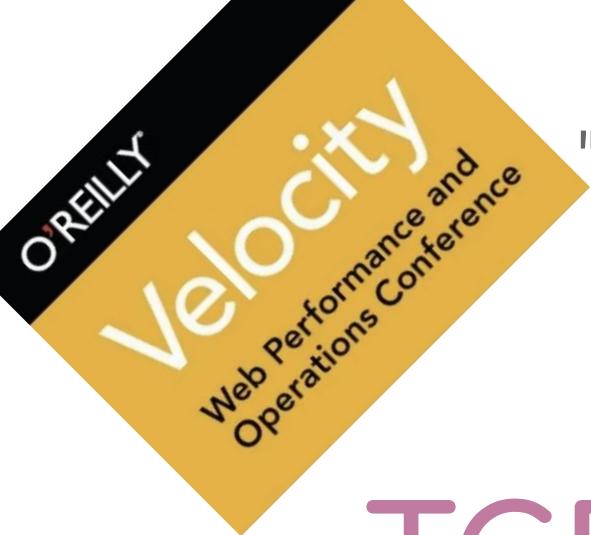
LT

FCP

TTI

FMP

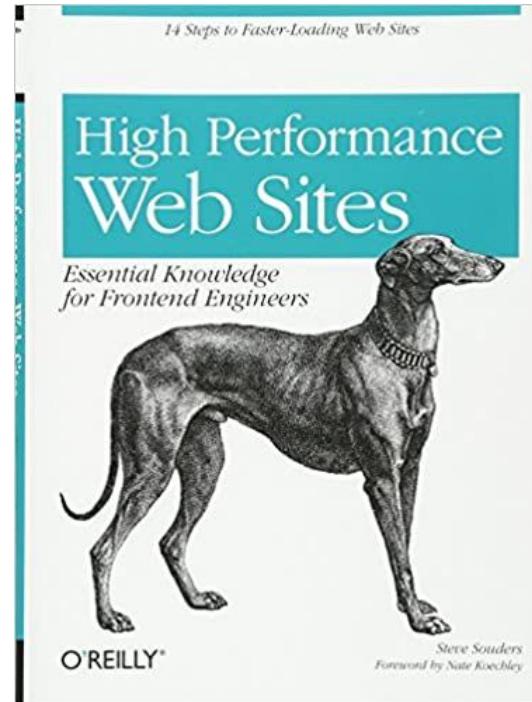




"Modern" Metrics (2008)

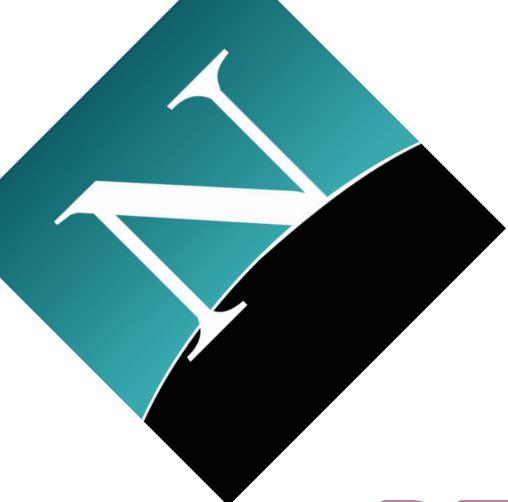
TCP

DNS



RUM

XHR

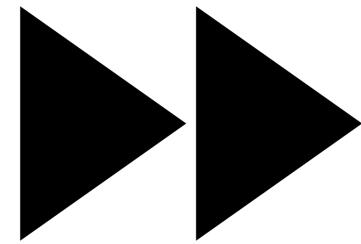
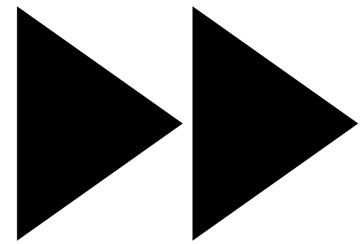
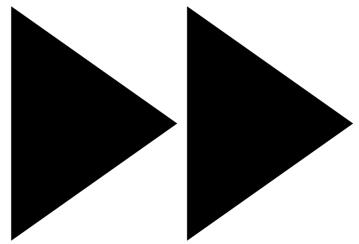


"Modern" Metrics (2000s)

RTT

KB

PING



BACK TO THE FUTURE!

How to mint a "Modern" Metric

Every year the MMC (Metric Minting Committee) gets together to create a new metric.

Their process:

- Step 1: Pick a cool sounding TLA
- Step 2: ???
- Step 3: Profit!



"Modern" Metrics (2030)



TLA

TLA

TLA

"Modern" Metrics (2022)



- Network Focused
 - DNS, TCP, SSL, RTT, TTFB
- Browser Focused
 - PLT, TBT
- Visual
 - FP, FCP, FMP, LCP, TTVR, SI
- User Experience
 - TTFI, TTI, CLS, FID, INP, Rage Clicks

"Modern" Metrics (2022)



- Why do we have so many?
- Which of those matter?
- Who's in charge of minting these new metrics?
- Why should I care?

"Modern" Metrics (2022)

- Lean in! Here's the secret

[redacted from slides, only available to live audience]



"Modern" Metrics (2022)

- Seriously, lean in!

[redacted from slides, only available to live audience]



"Modern" Metrics (2022)



- Measure the things that sound right to you, and see how they compare to the other metrics you care most about

Is that?

- Website traffic
- Business Metrics
- Conversion metrics
- Retention metrics
- Ads Served

"Modern" Metrics (2022)



- What's the latest shiny thing?
- The world evolves
- Metrics evolve
- We should too!
- Let's evaluate how metrics behave in the Real World(tm)

Core. Web. Vitals.

Core? Web? Vitals?

There are many ways to interpret and present data that may affect how people react to it.

How can data have **bias**? In our industry:

- RUM vs. Synthetic
- Measurement techniques
- Dimensions
- MPA vs. SPA
- Time
- Human interpretation

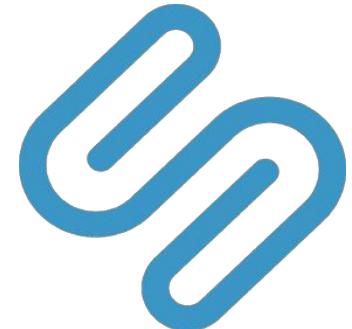


Bias: RUM vs. Synthetic

- Synthetic
 - Stable environment
 - Access to more + raw data
- **RUM**
 - Reflection of the real world
 - Only access to what browsers allow
 - Beacon time matters

Bias: Measurement Technique

- Library
 - web-vitals.js
 - **boomerang.js**
 - lux.js
 - perfume.js
 - ga
- Time of the beacon
 - Load
 - Unload / Hidden
 - (multiple)



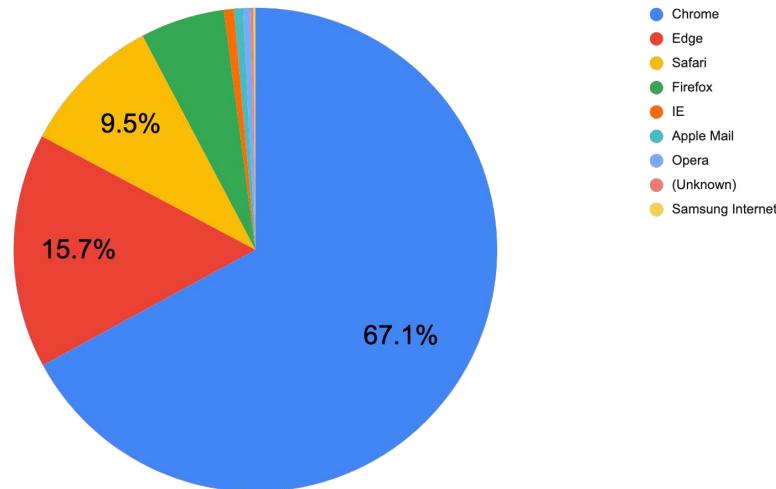
Bias: Dimensions

- Device Type (Desktop vs. Mobile)
- Browser
 - Marketshare
 - Browser supported APIs
- Geolocation
- The actual websites being measured
- etc

Bias: Dimensions: Browser

- Marketshare
- Browser supported APIs

Desktop Browser Marketshare (mPulse 2022-09)



LargestContentfulPaint API

Current aligned Usage relative Date relative Filtered All ⚙

Chrome	Edge	Safari	Firefox	Opera
103				
104	104		104	
105	105	15.6	105	90
106	106	16.0	106	91
107		16.1	107	
108		TP	108	
109				

PerformanceEventTiming API

Current aligned Usage relative Date relative Filtered All ⚙

Chrome	Edge	Safari	Firefox	Opera
103				
104	104		104	
105	105	15.6	105	90
106	106	16.0	106	91
107		16.1	107	
108		TP	108	
109				

LayoutShift API

Current aligned Usage relative Date relative Filtered All ⚙

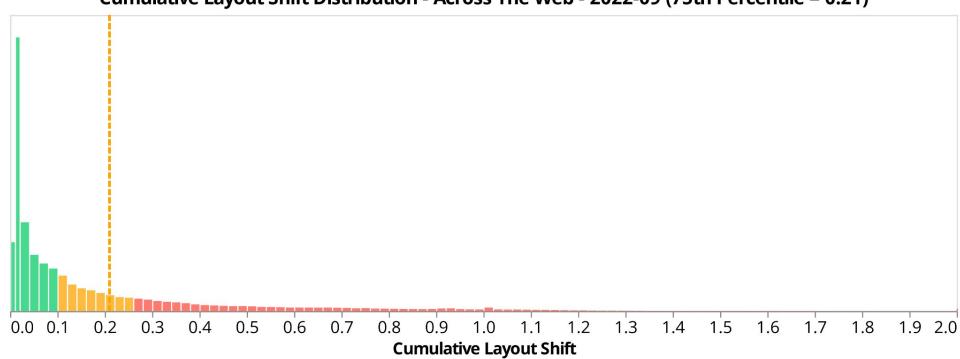
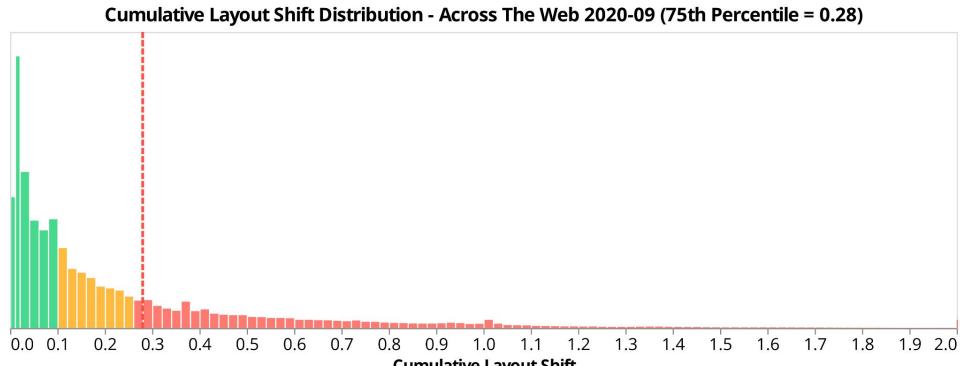
Chrome	Edge	Safari	Firefox	Opera
103				
104	104		104	
105	105	15.6	105	90
106	106	16.0	106	91
107		16.1	107	
108		TP	108	
109				

Bias: MPA vs. SPA

- Synthetic
 - Often biased towards MPAs (or the Hard navigation of a SPA)
 - Tools are being updated to support Soft navigations
- RUM
 - Can "split" measurements by soft navigation

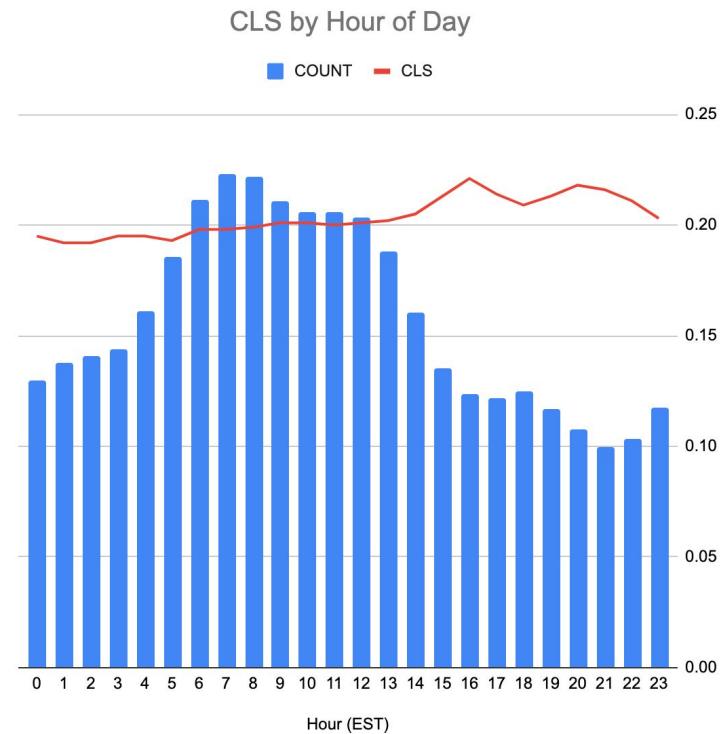
Bias: Time

- Time changes all things
- Time of Day
- Day of Week



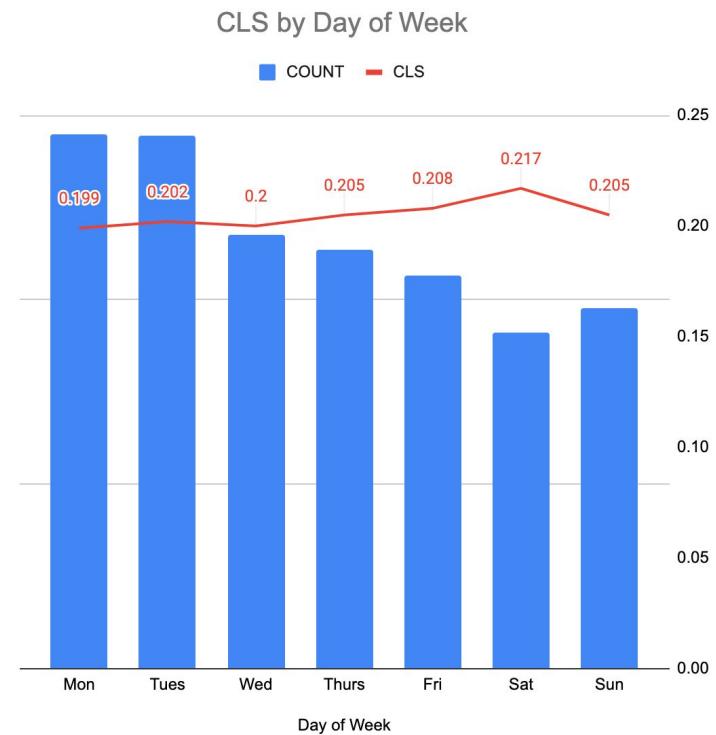
Bias: Time

- Time changes all things
- **Time of Day**
- Day of Week



Bias: Time

- Time changes all things
- Time of Day
- Day of Week



Bias: Human Interpretation

- Data is in the eye of the beholder
(presenter)
- Who is this Nic guy anyway?
 - BSE, CompSci
 - !Data Scientist



Core! Web! Vitals!

WARNING

chart-intensive slides ahead

WARNING

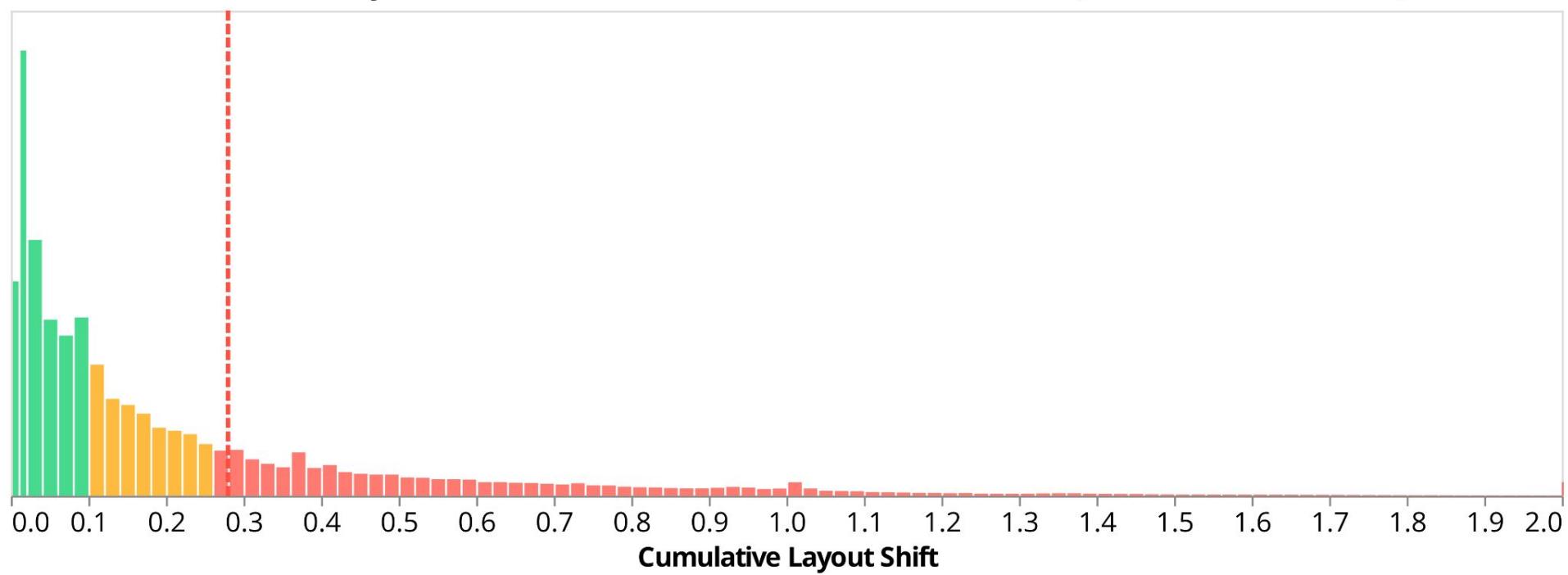
i don't know what I'm saying

CLS

Cumulative Layout Shift



Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)

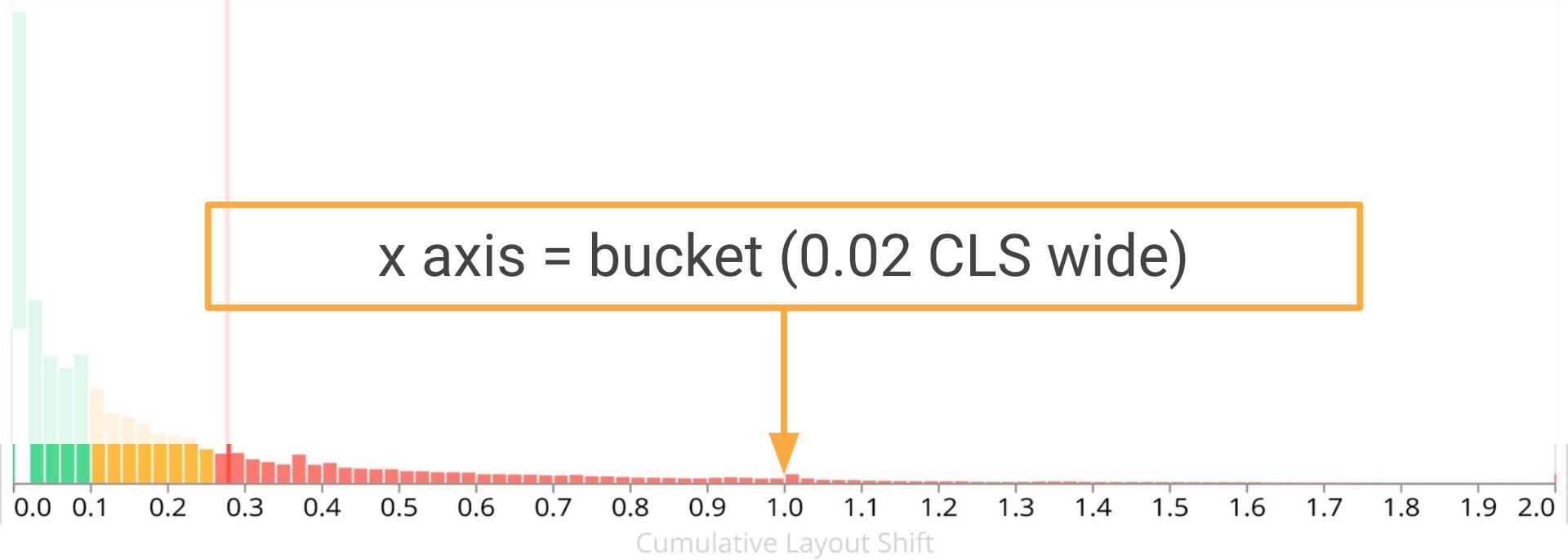


* RUM, mPulse, boomerang.js (MPA+SPA), 2020-09 1w, all browsers that support CLS, 0.02 bucket, n = ~2b, n,nnn sites, Nic

Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)

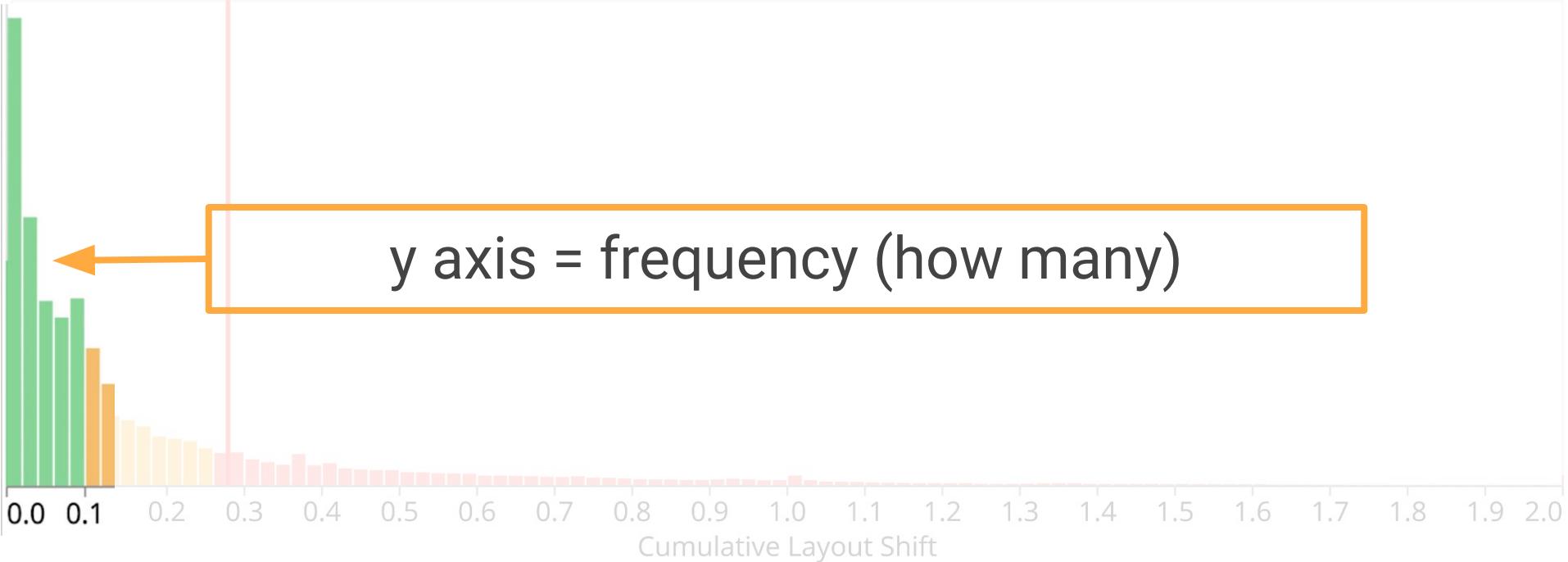


Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)



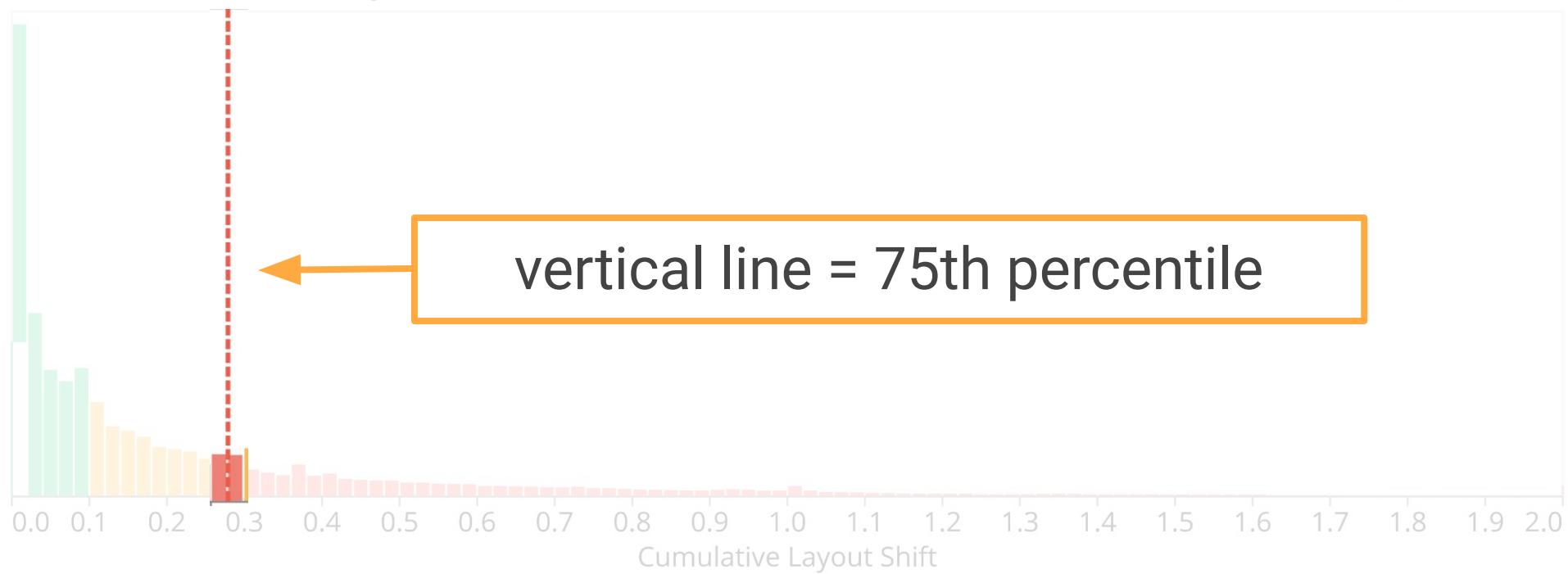
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Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)



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Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)

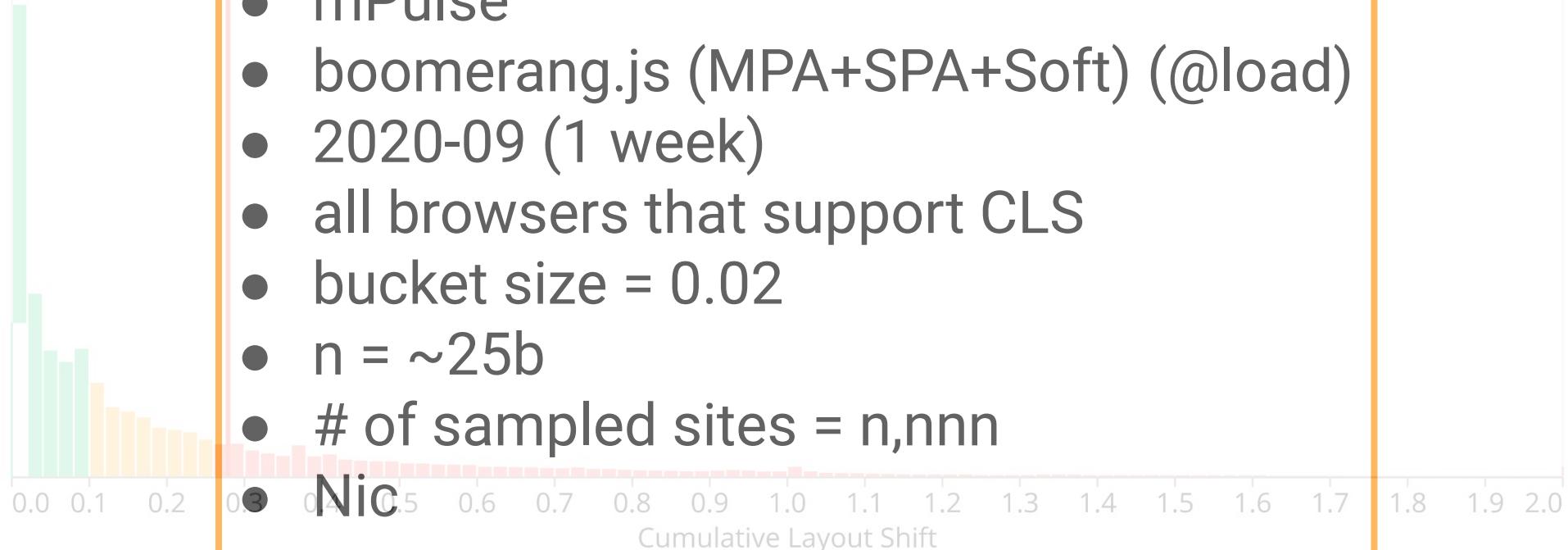


* RUM, mPulse, boomerang.js (MPA+SPA), 2020-09 1w, all browsers that support CLS, 0.02 bucket, n = ~2b, n,nnn sites, Nic

the fine print:

- RUM
- mPulse
- boomerang.js (MPA+SPA+Soft) (@load)
- 2020-09 (1 week)
- all browsers that support CLS
- bucket size = 0.02
- $n = \sim 25b$
- # of sampled sites = n,nnn

Nic

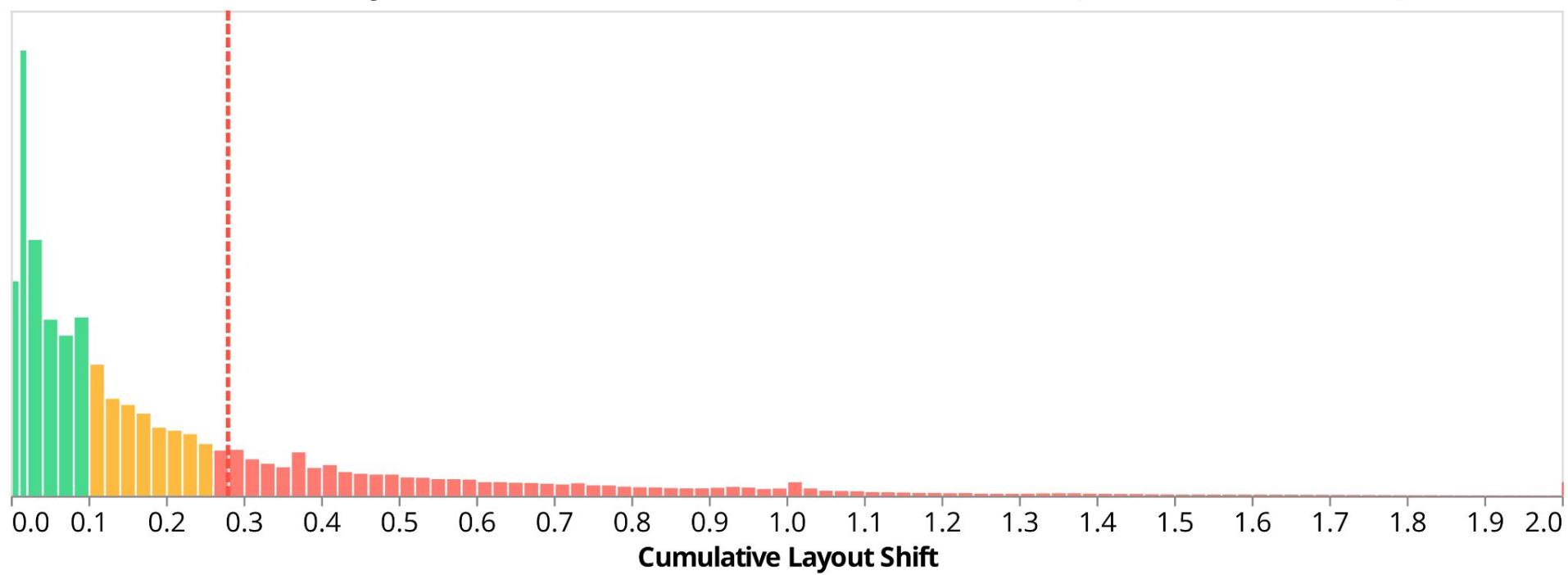


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Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)

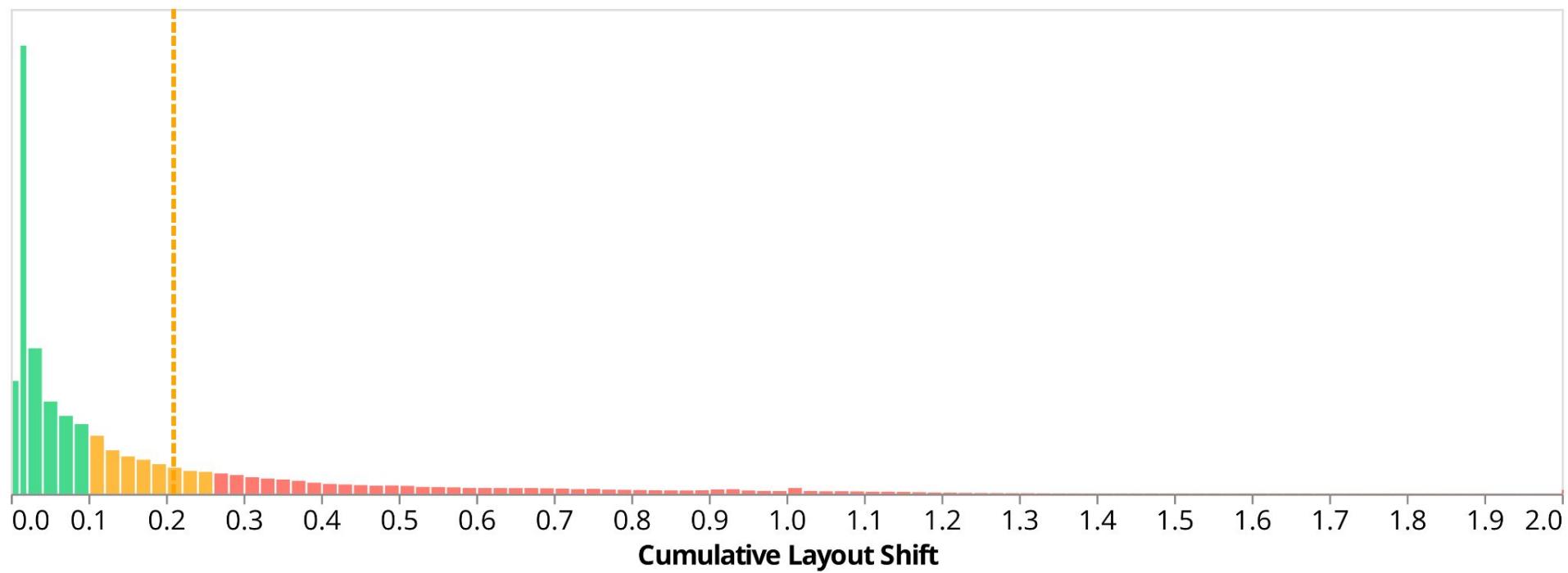


Cumulative Layout Shift Distribution - Across The Web 2020-09 (75th Percentile = 0.28)



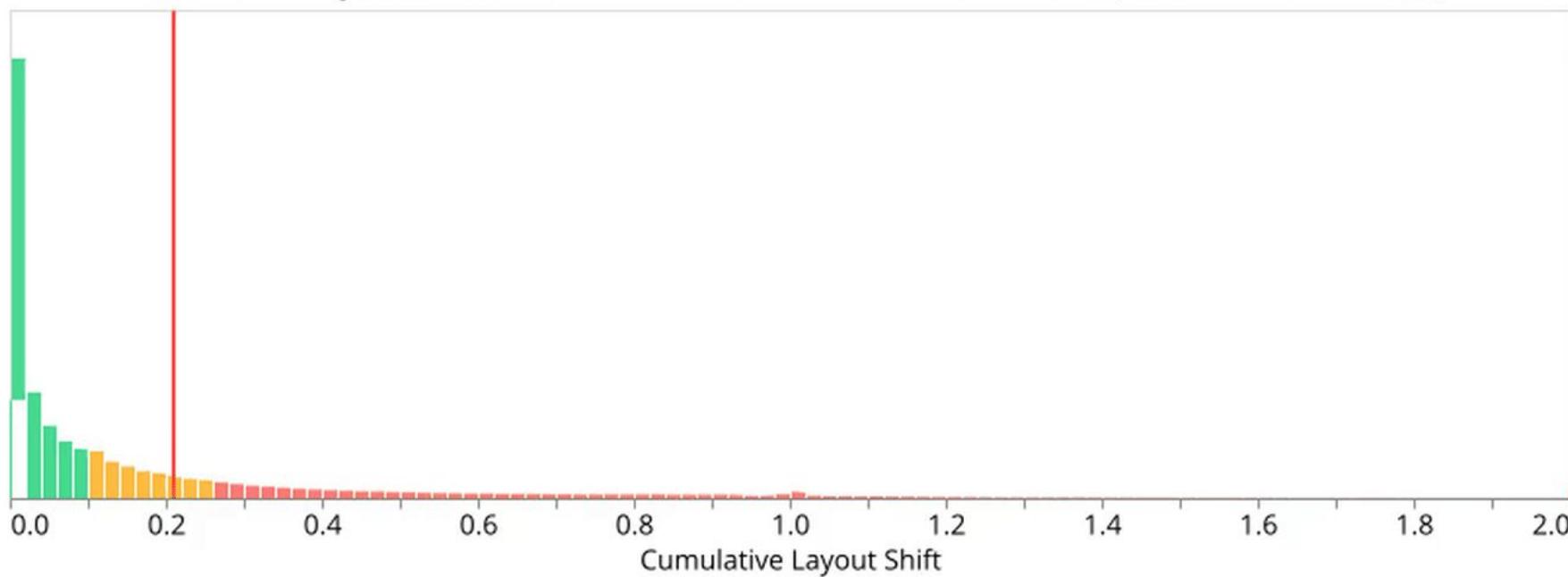
* RUM, mPulse, boomerang.js (MPA+SPA), 2020-09 1w, all browsers that support CLS, 0.02 bucket, n = ~2b, n,nnn sites, Nic

Cumulative Layout Shift Distribution - Across The Web - 2022-09 (75th Percentile = 0.21)



* RUM, mPulse, boomerang.js (MPA+SPA), 2022-09 1w, all browsers that support CLS, 0.02 bucket, n = ~2b, n,nnn sites, Nic

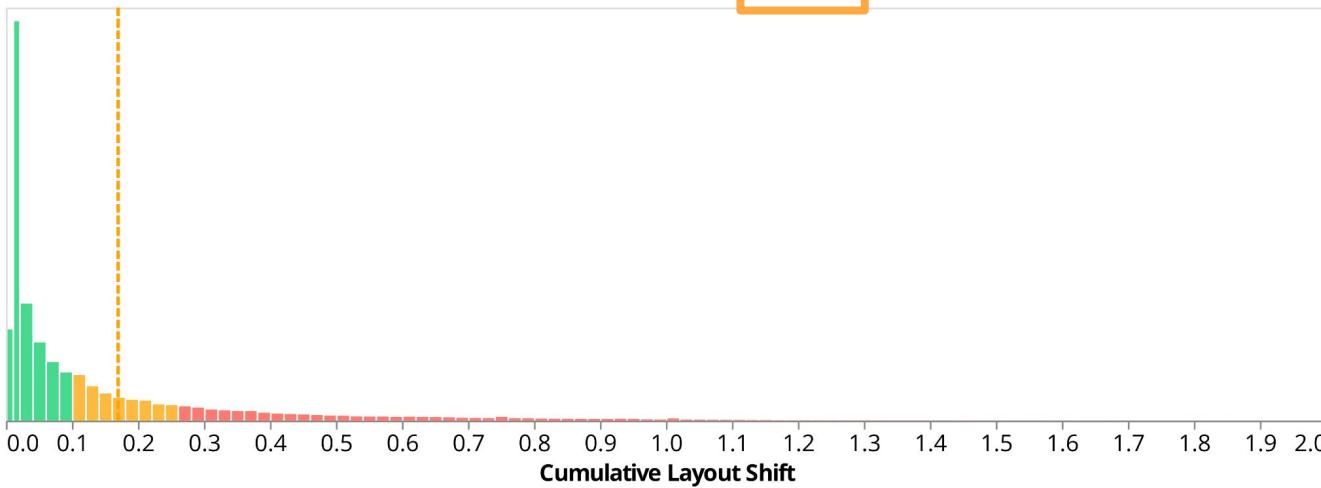
Cumulative Layout Shift Distribution - Across The Web - 2021-08-07 (75th Percentile = 0.21)



Cumulative Layout Shift Distribution - Across The Web

Desktop

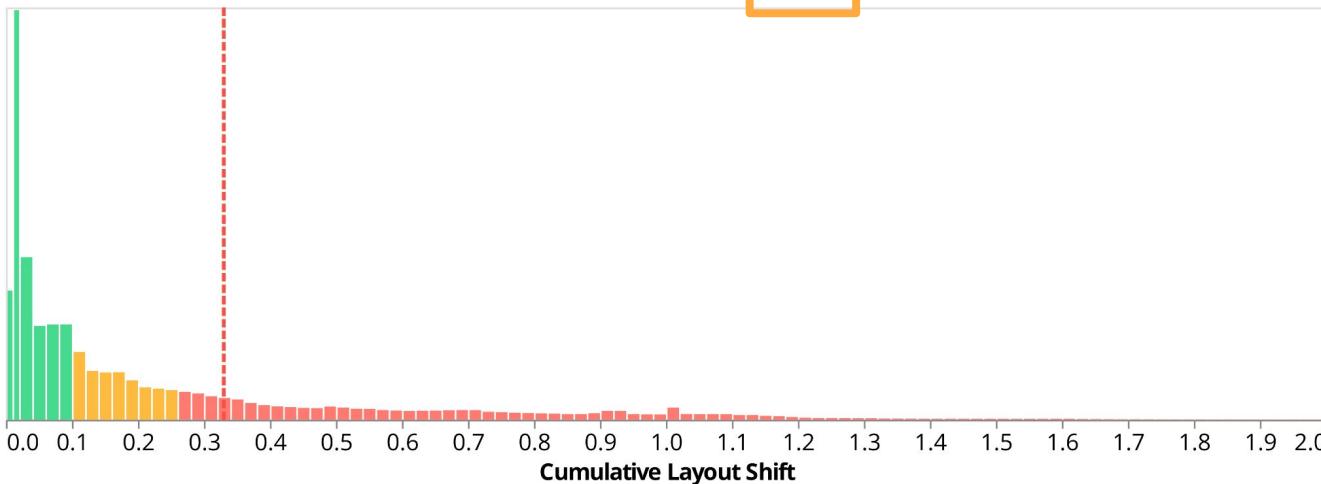
2022-09 (75th Percentile = 0.17)



Cumulative Layout Shift Distribution - Across The Web

Mobile

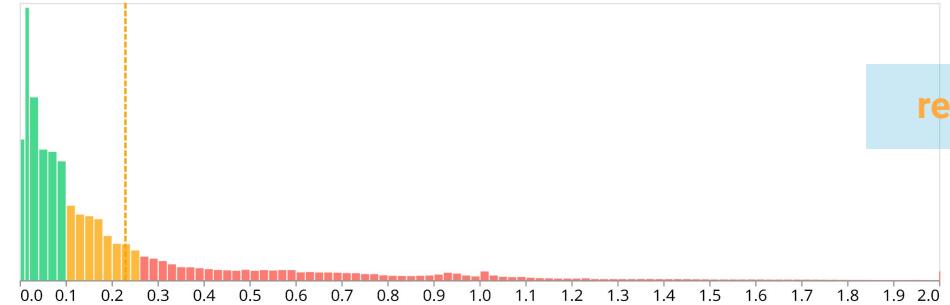
2022-09 (75th Percentile = 0.33)



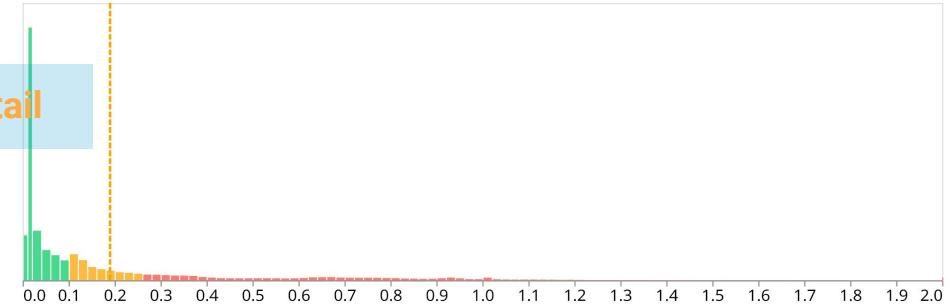
2020-09

2022-09

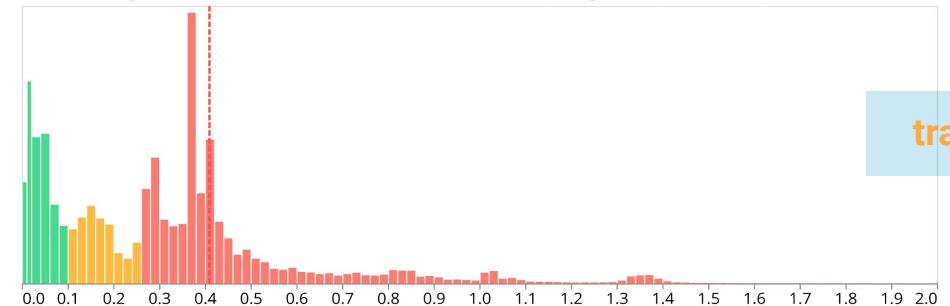
Cumulative Layout Shift Distribution - Across The Web - Retail (multiple sites) - 2020-09 (75th Percentile = 0.23)



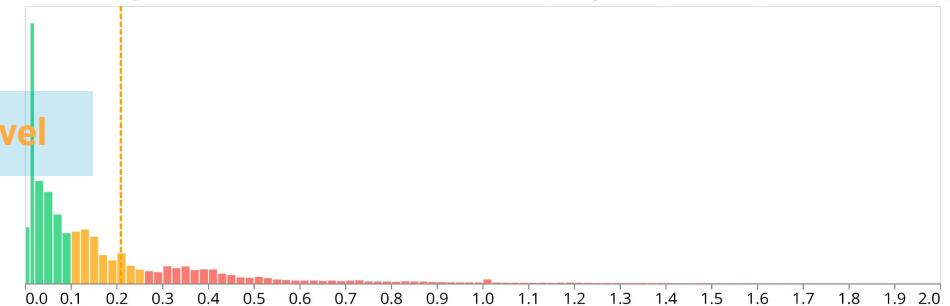
Cumulative Layout Shift Distribution - Across The Web - Retail (multiple sites) - 2022-09 (75th Percentile = 0.19)



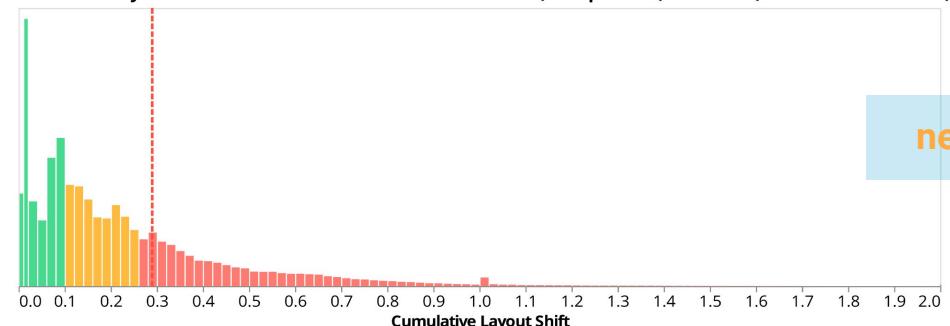
Cumulative Layout Shift Distribution - Across The Web - Travel (multiple sites) - 2020-09 (75th Percentile = 0.41)



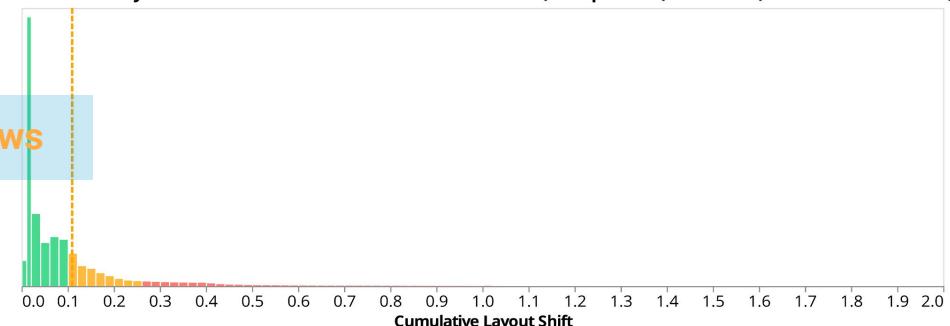
Cumulative Layout Shift Distribution - Across The Web - Travel (multiple sites) - 2022-09 (75th Percentile = 0.21)



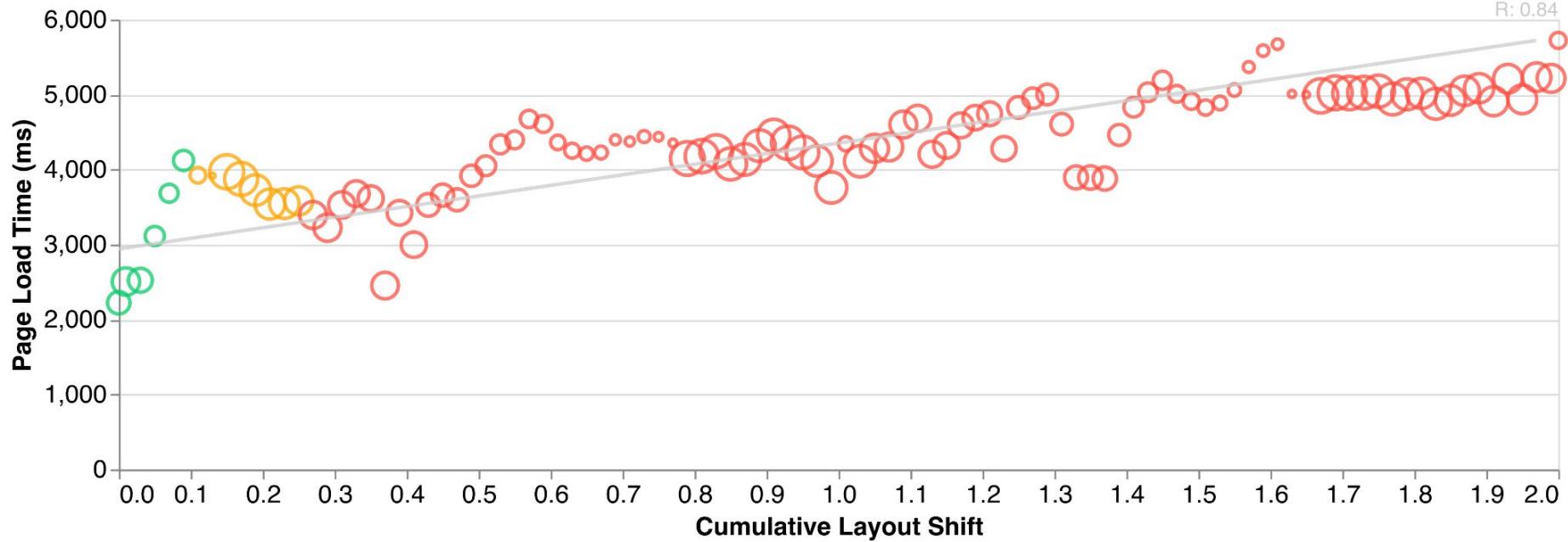
Cumulative Layout Shift Distribution - Across The Web - News (multiple sites) - 2020-09 (75th Percentile = 0.29)



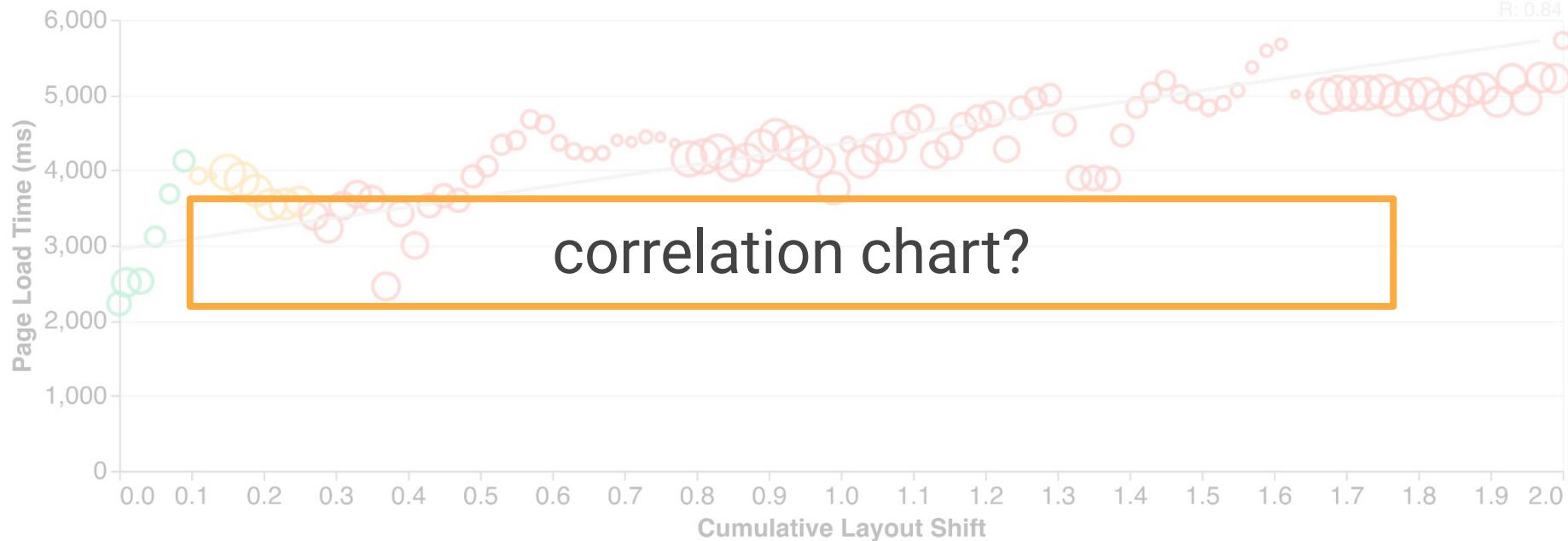
Cumulative Layout Shift Distribution - Across The Web - News (multiple sites) - 2022-09 (75th Percentile = 0.11)



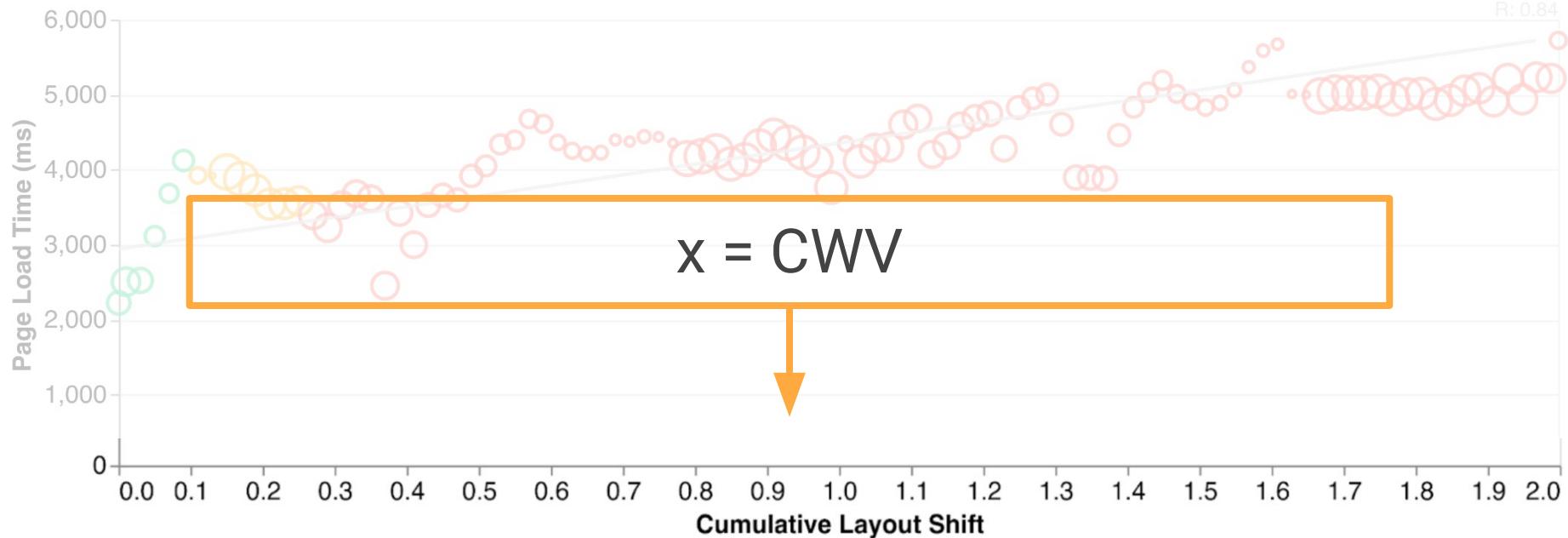
Cumulative Layout Shift vs. Median Page Load Time - Across the Web



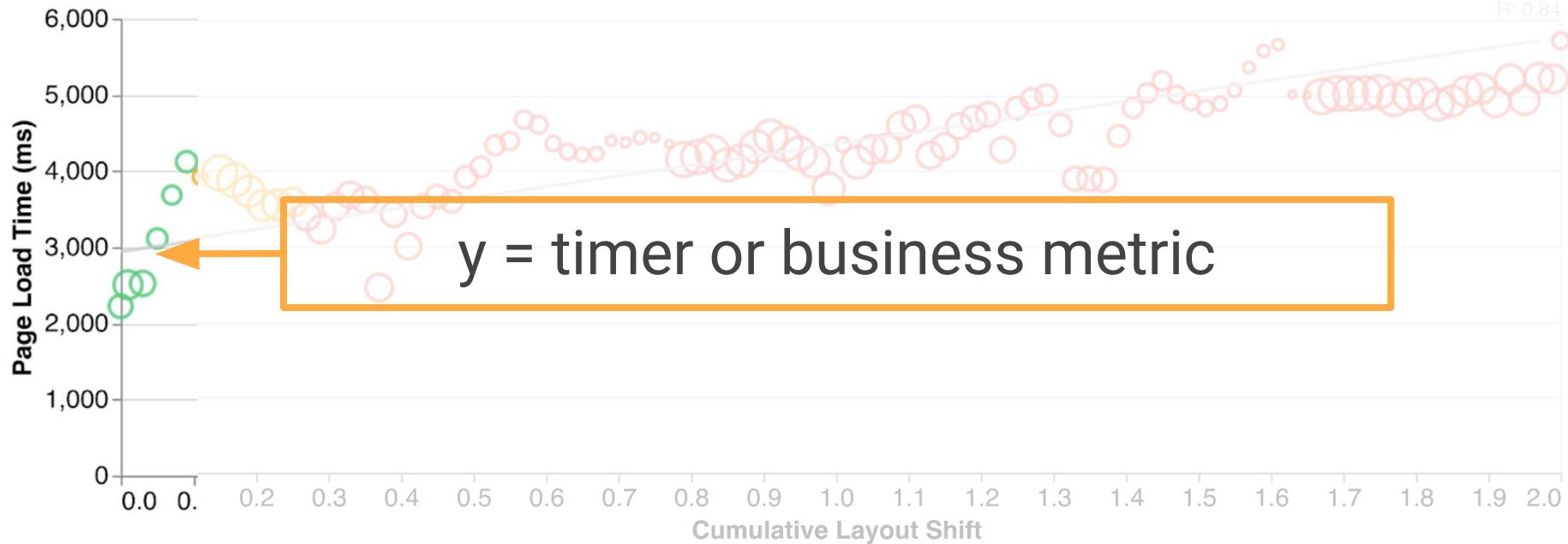
Cumulative Layout Shift vs. Median Page Load Time - Across the Web



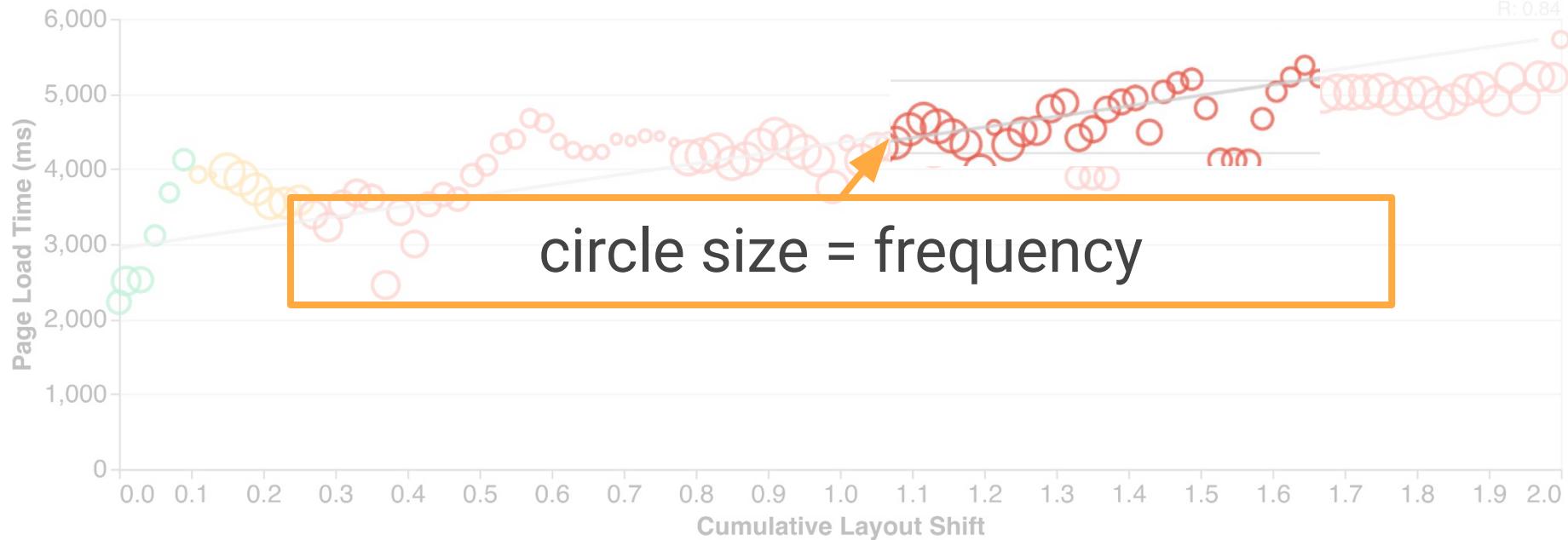
Cumulative Layout Shift vs. Median Page Load Time - Across the Web



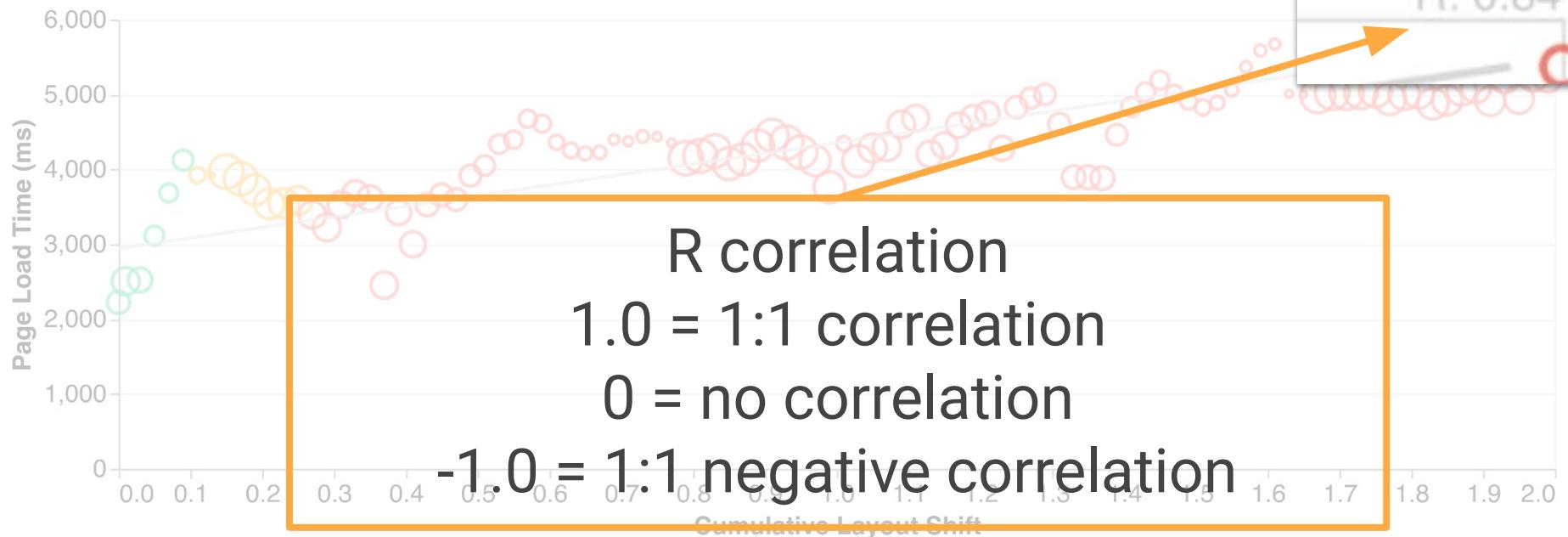
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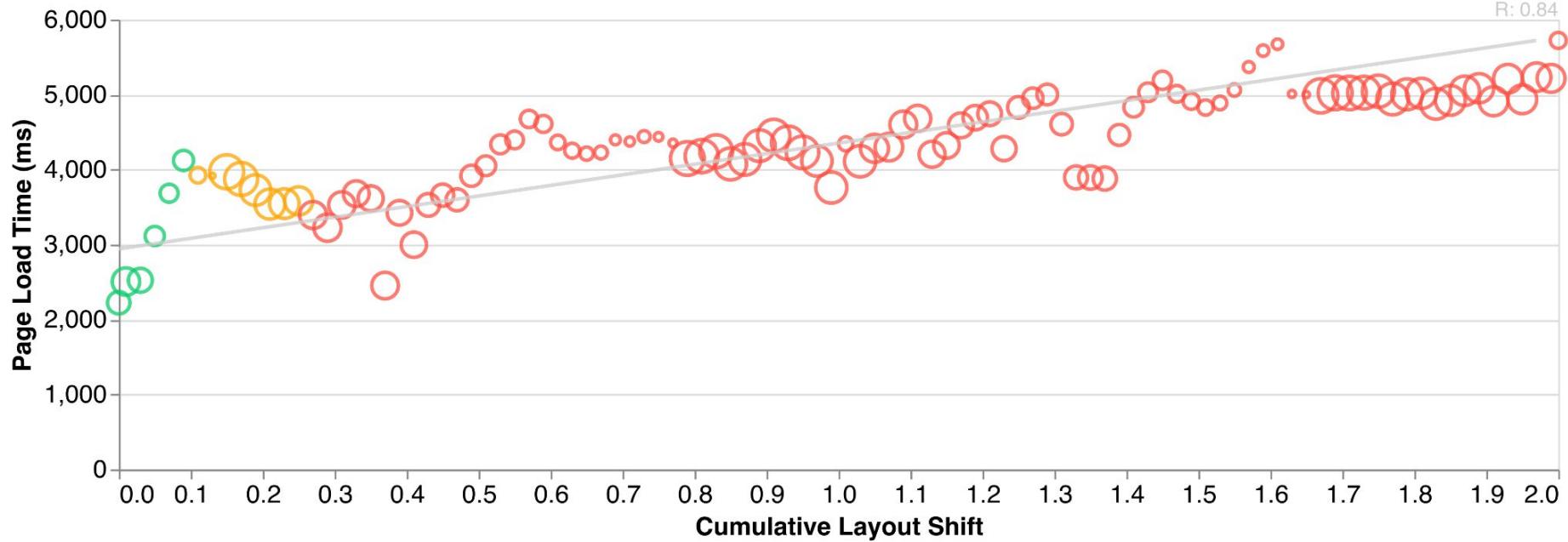
Cumulative Layout Shift vs. Median Page Load Time - Across the Web



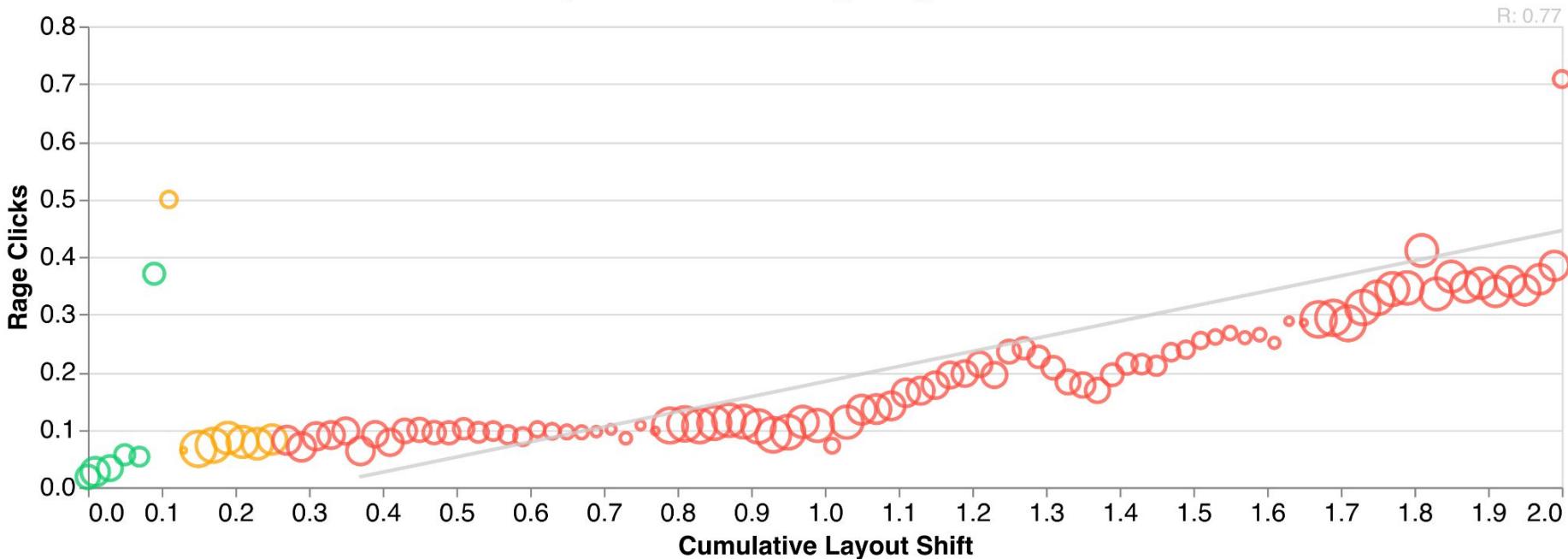
Cumulative Layout Shift vs. Median Page Load Time - Across the Web



Cumulative Layout Shift vs. Median Page Load Time - Across the Web



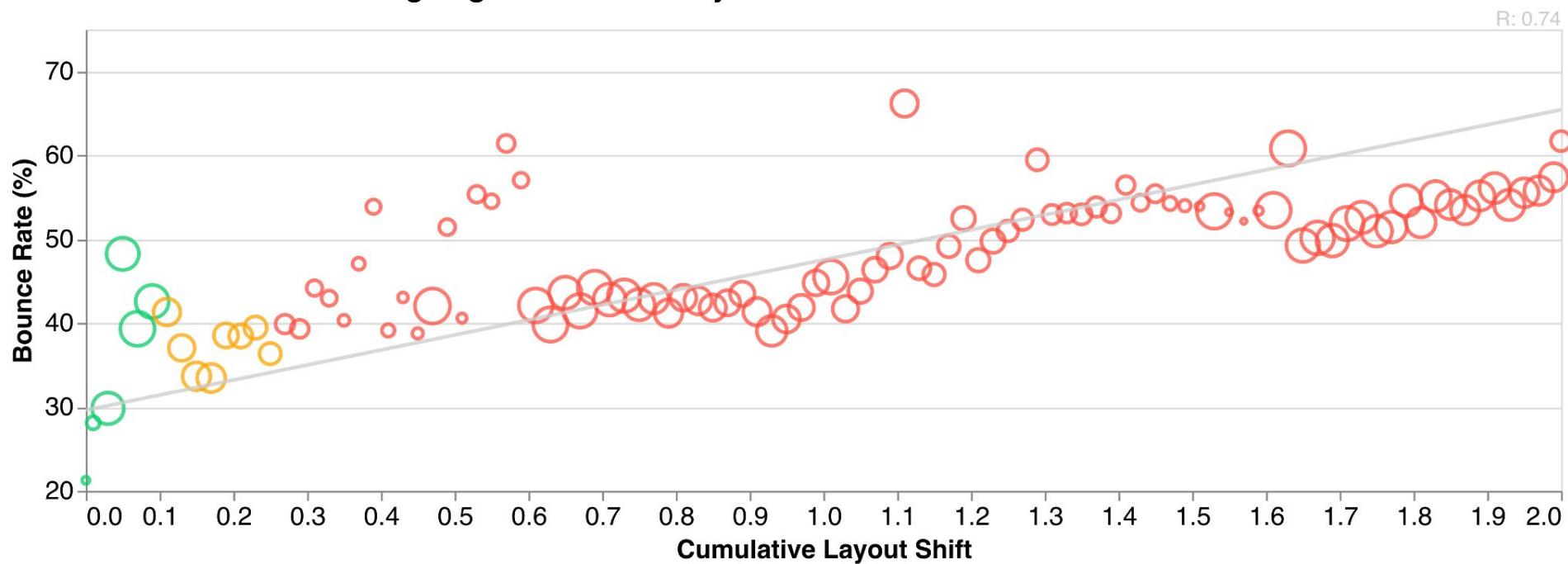
Cumulative Layout Shift vs. Average Rage Clicks - Across the Web



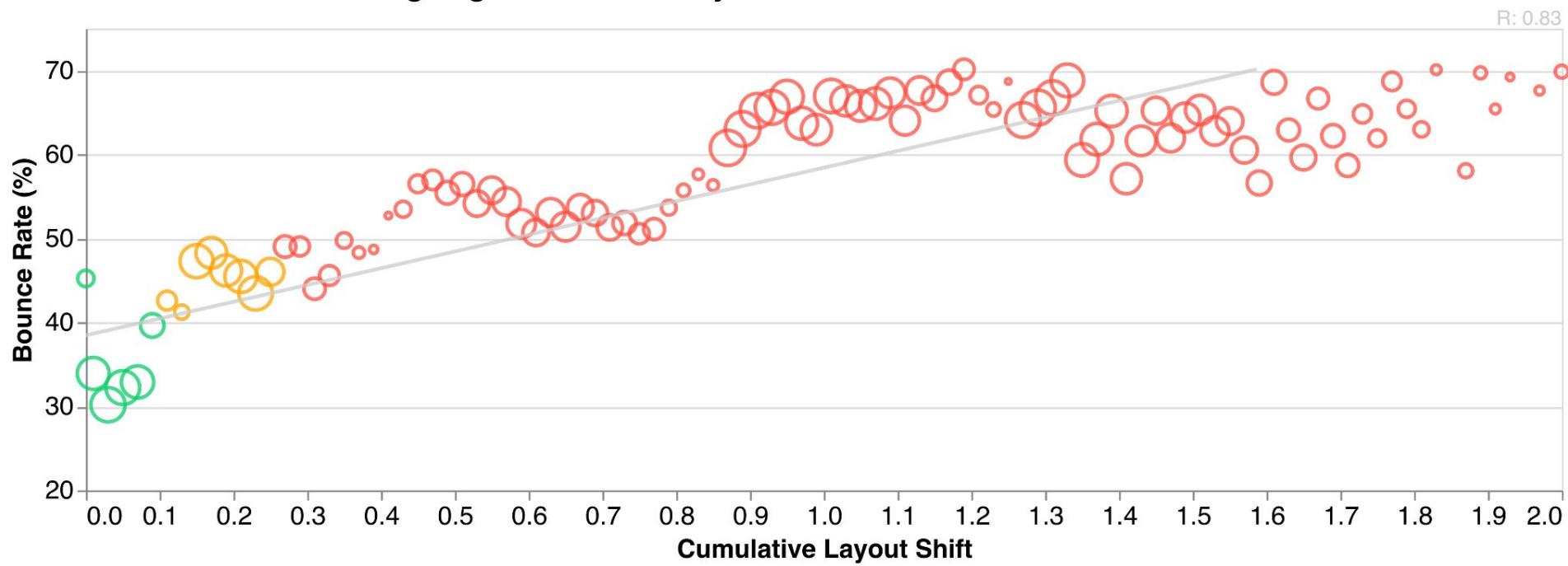
CLS - Data from individual websites

** unrandomly selected by Nic to make a point*

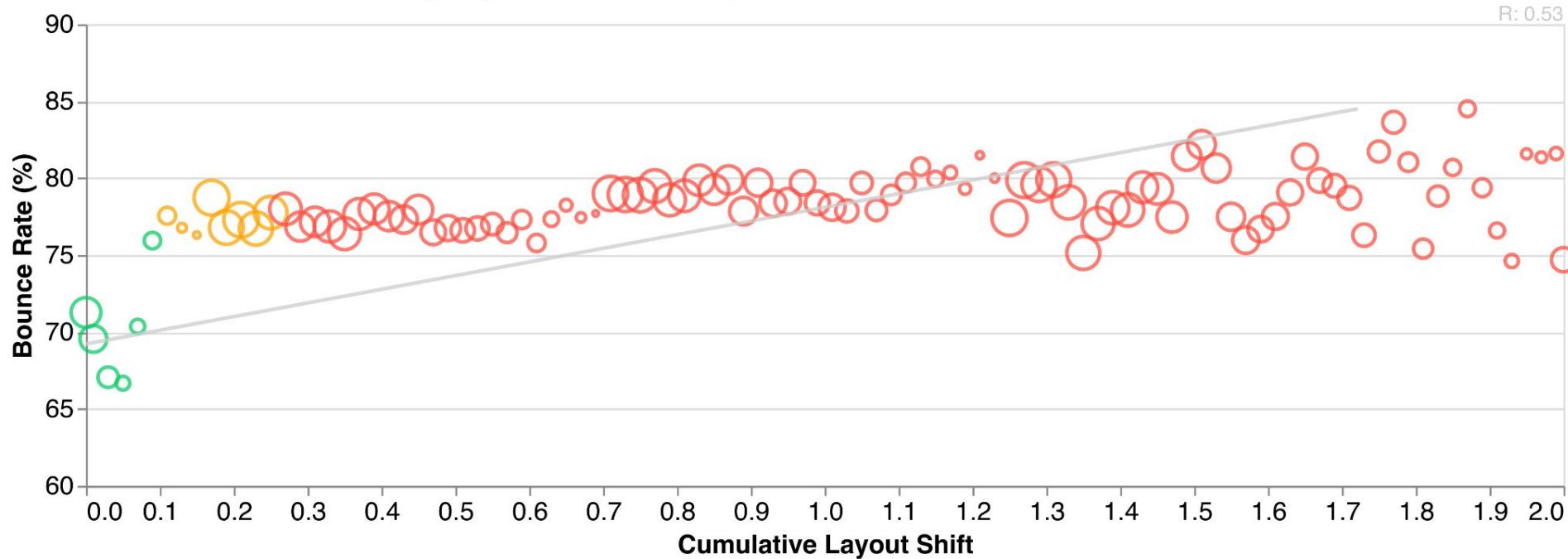
Landing Page Cumulative Layout Shift vs. Bounce Rate - Retail Website 1



Landing Page Cumulative Layout Shift vs. Bounce Rate - Retail Website 2



Landing Page Cumulative Layout Shift vs. Bounce Rate - News Website

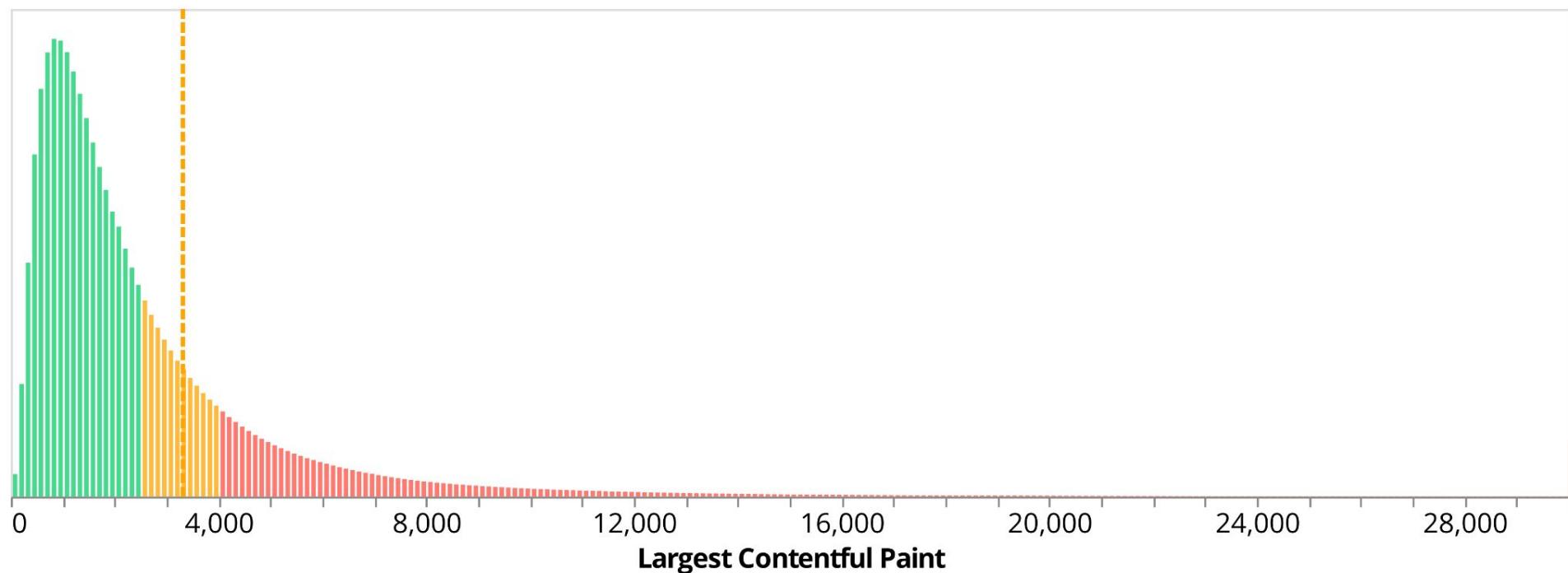


LCP

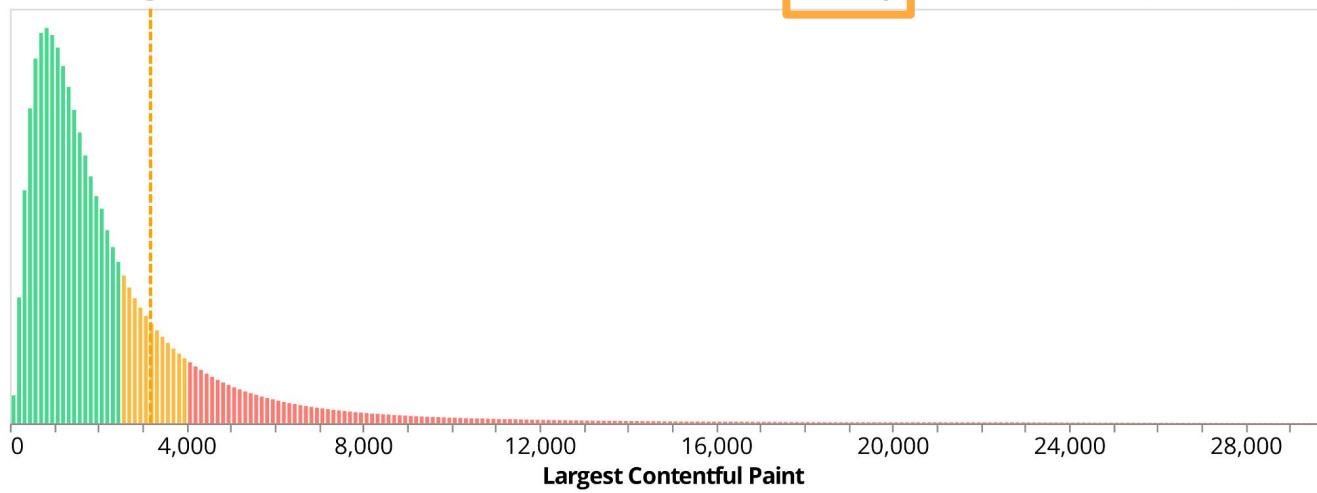
Largest Contentful Paint



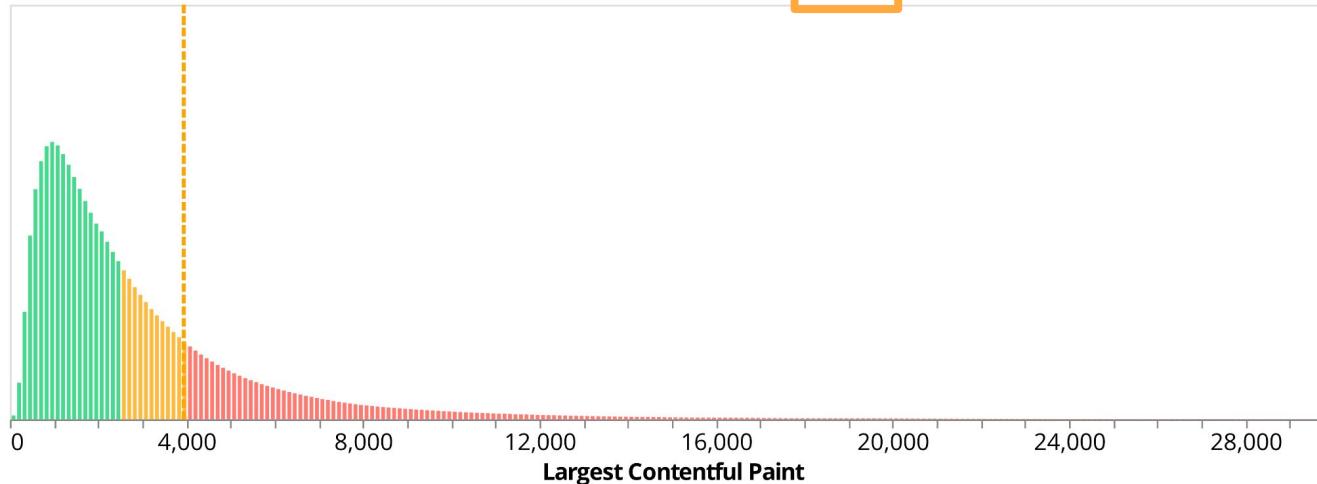
Largest Contentful Paint Distribution - Across The Web - 2022-09 (75th Percentile = 3,312ms)



Largest Contentful Paint Distribution - Across The Web · Desktop 75th Percentile = 3,187ms



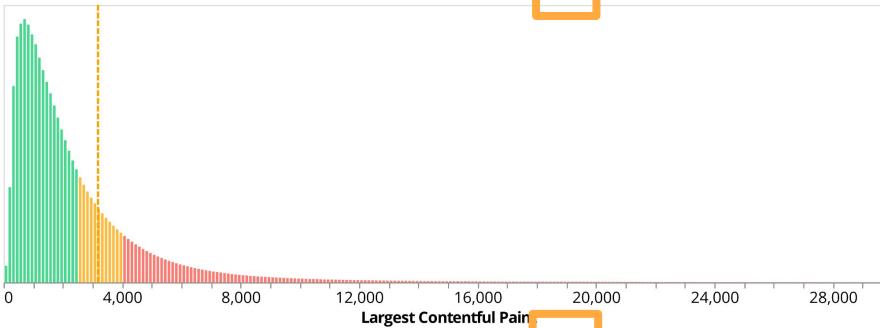
Largest Contentful Paint Distribution - Across The Web · Mobile 75th Percentile = 3,937ms



Largest Contentful Paint Distribution - Across The Web

Retail

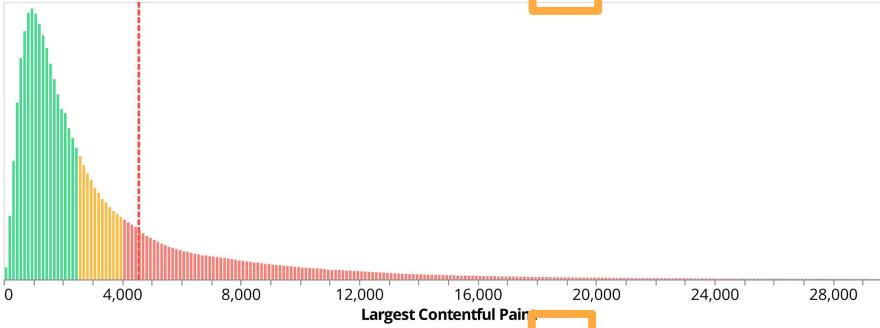
75th Percentile = 3,187ms



Largest Contentful Paint Distribution - Across The Web

Travel

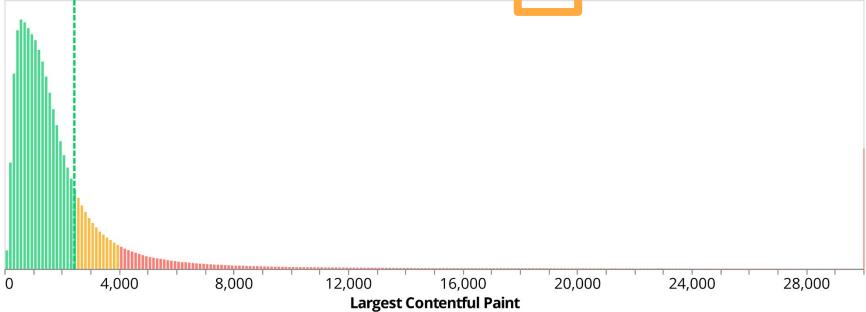
75th Percentile = 4,562ms



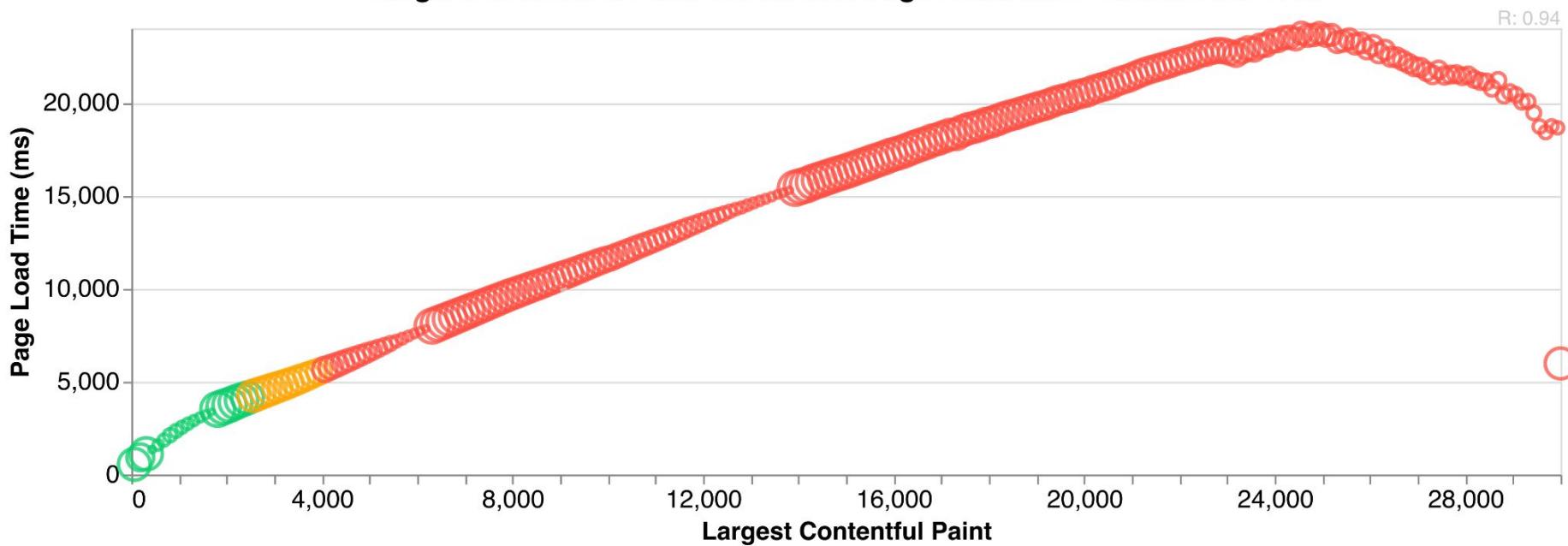
Largest Contentful Paint Distribution - Across The Web

News

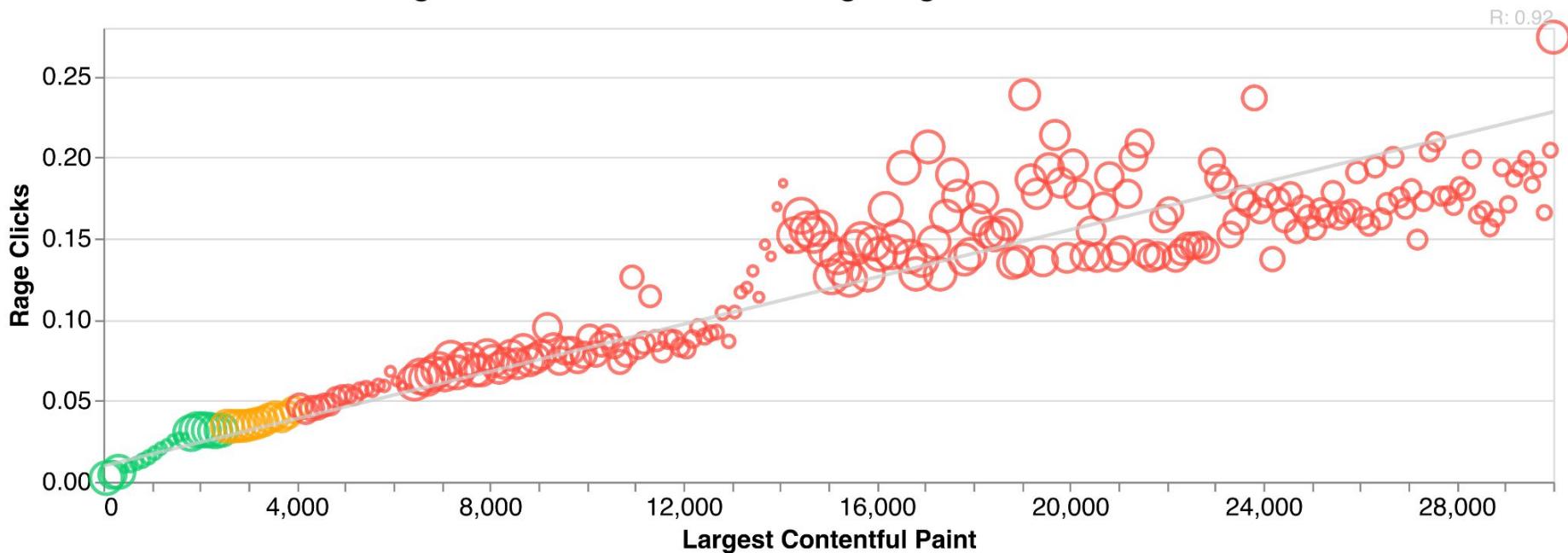
75th Percentile = 2,437ms



Largest Contentful Paint vs. Median Page Load Time - Across the Web



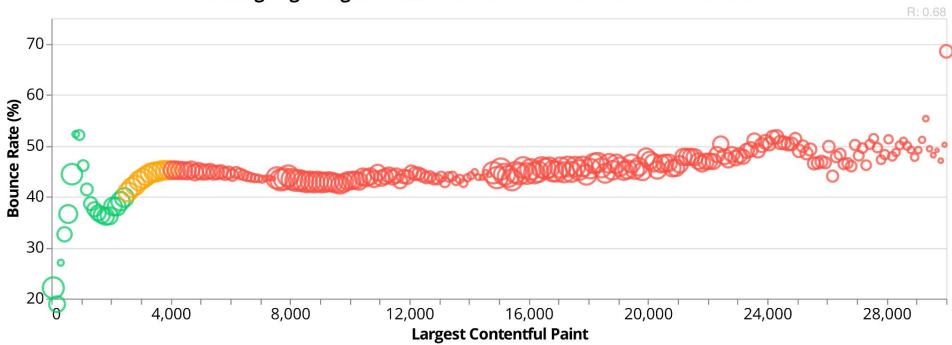
Largest Contentful Paint vs. Average Rage Clicks - Across the Web



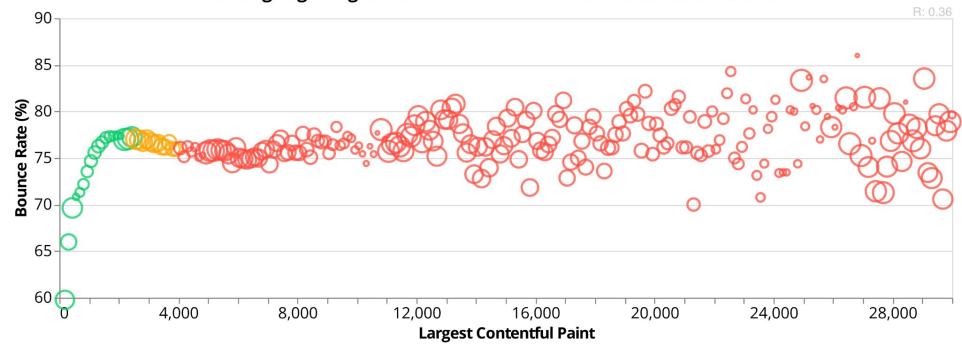
LCP - Data from individual websites

** unrandomly selected by Nic to make a point*

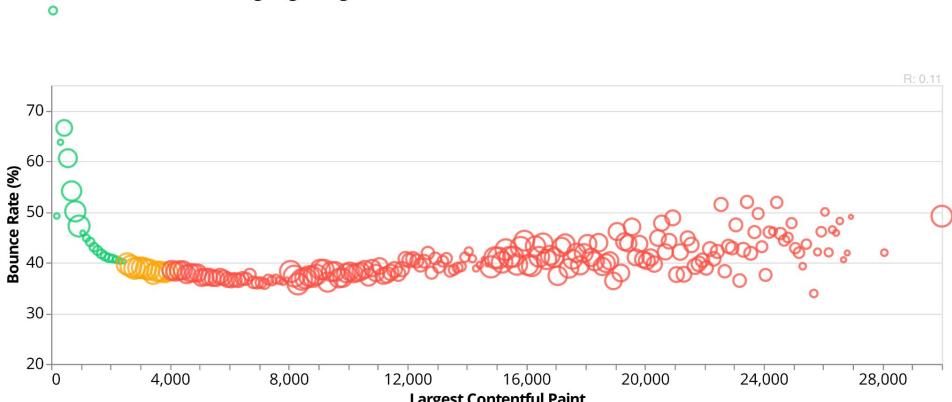
Landing Page Largest Contentful Paint vs. Bounce Rate - Retail Website 1



Landing Page Largest Contentful Paint vs. Bounce Rate - News Website 1



Landing Page Largest Contentful Paint vs. Bounce Rate - Retail Website 2

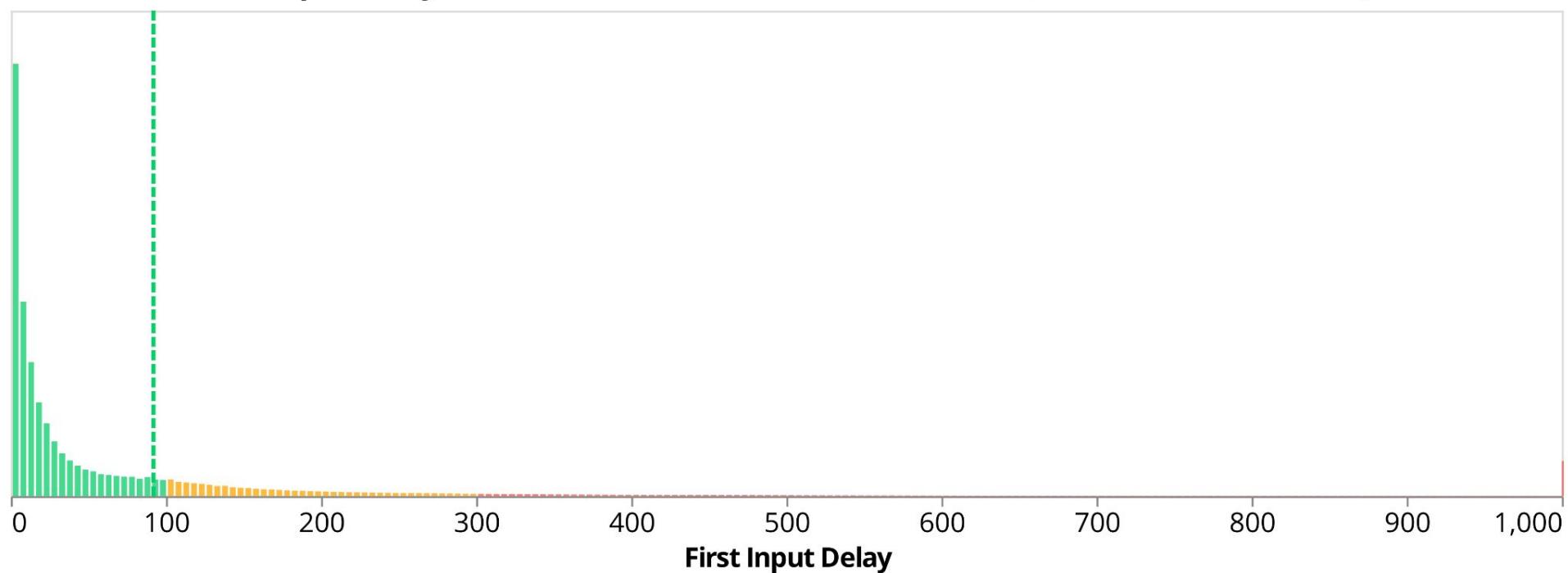


FID

First Input Delay

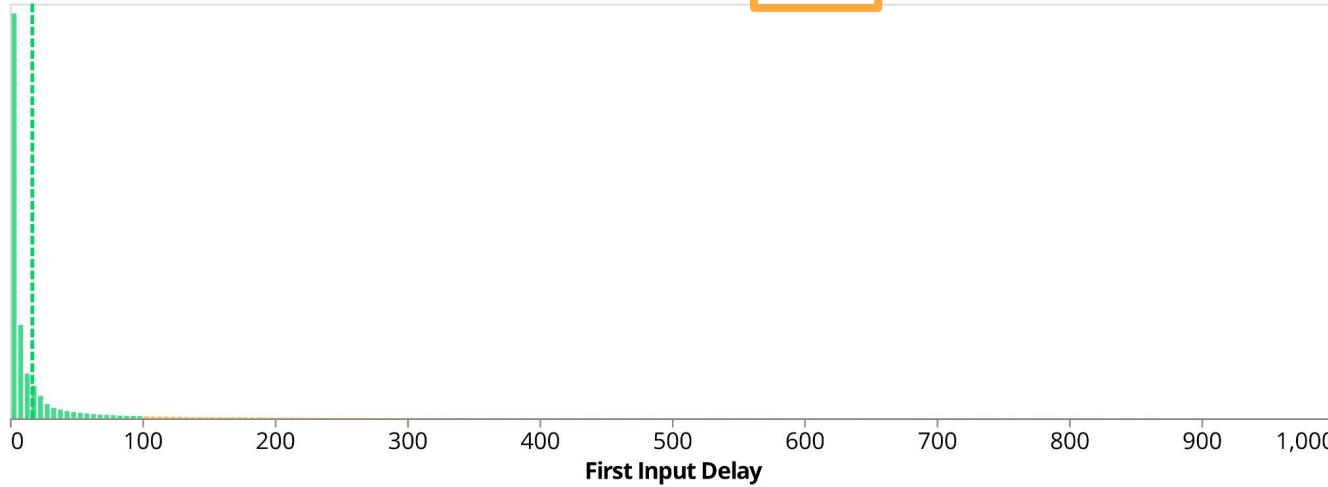


First Input Delay Distribution - Across The Web - 2022-09 (75th Percentile = 92ms)



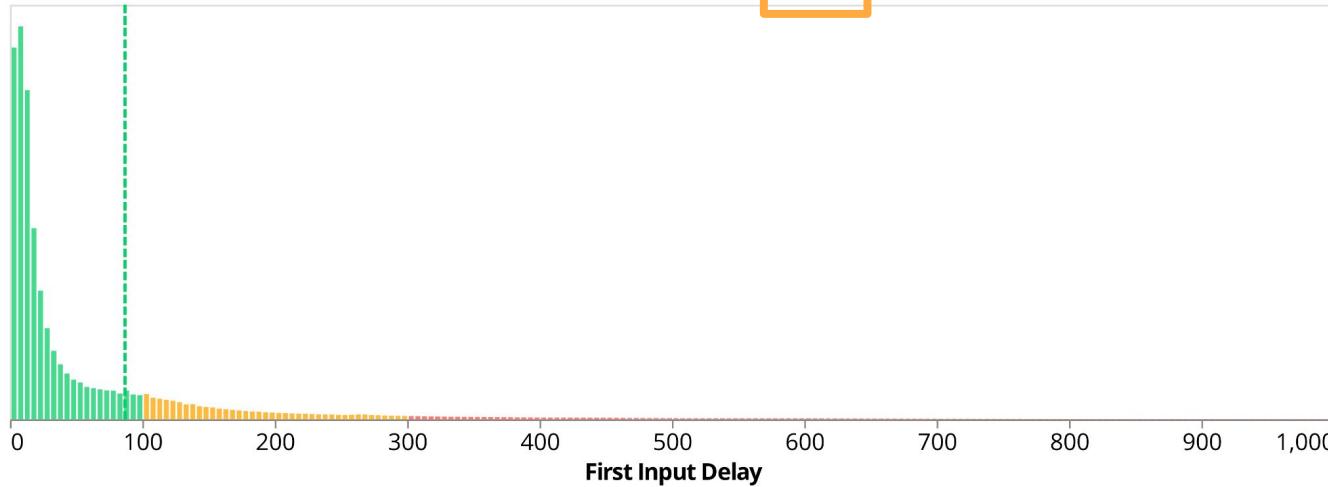
First Input Delay Distribution - Across The Web

Desktop 75th Percentile = 17ms

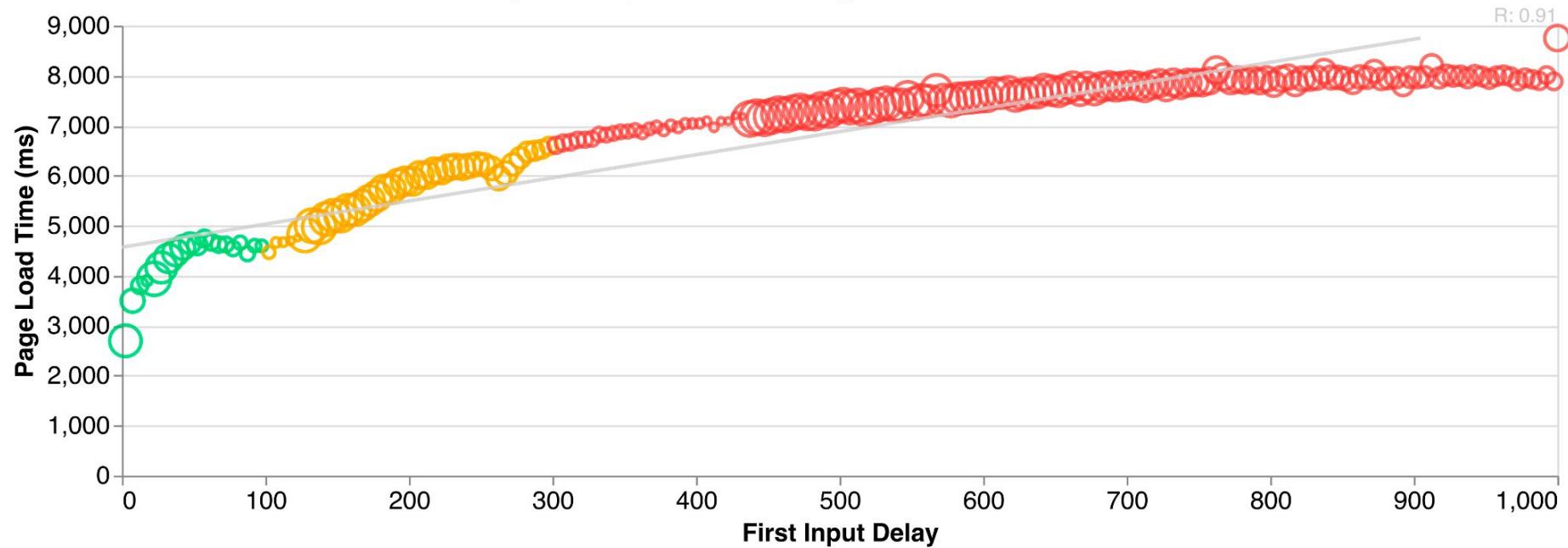


First Input Delay Distribution - Across The Web

Mobile 75th Percentile = 87ms



First Input Delay vs. Median Page Load Time - Across the Web

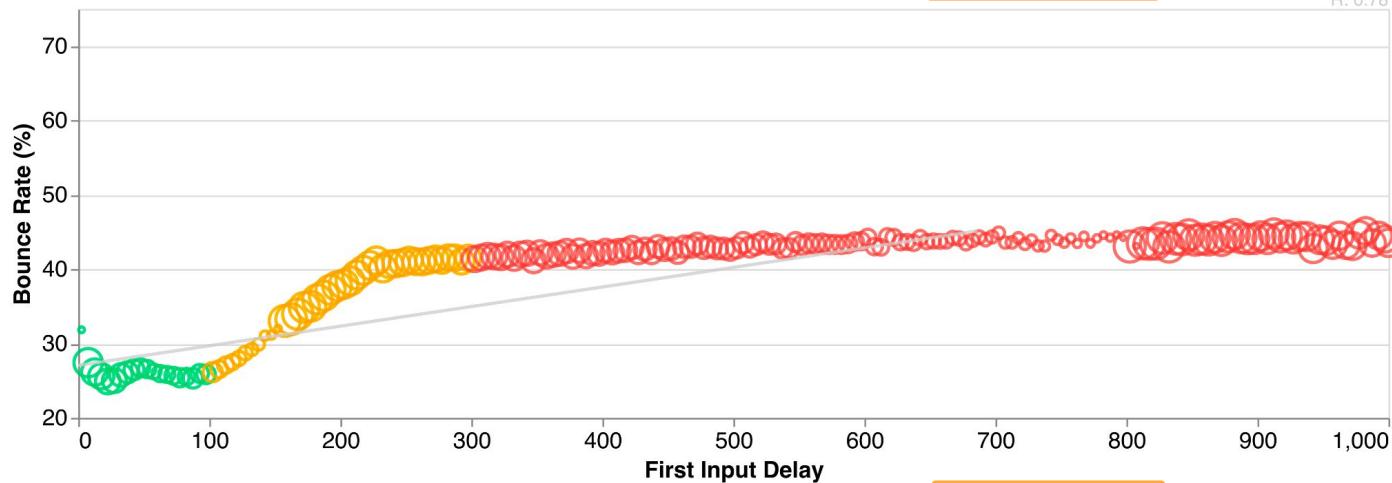


FID - Data from individual websites

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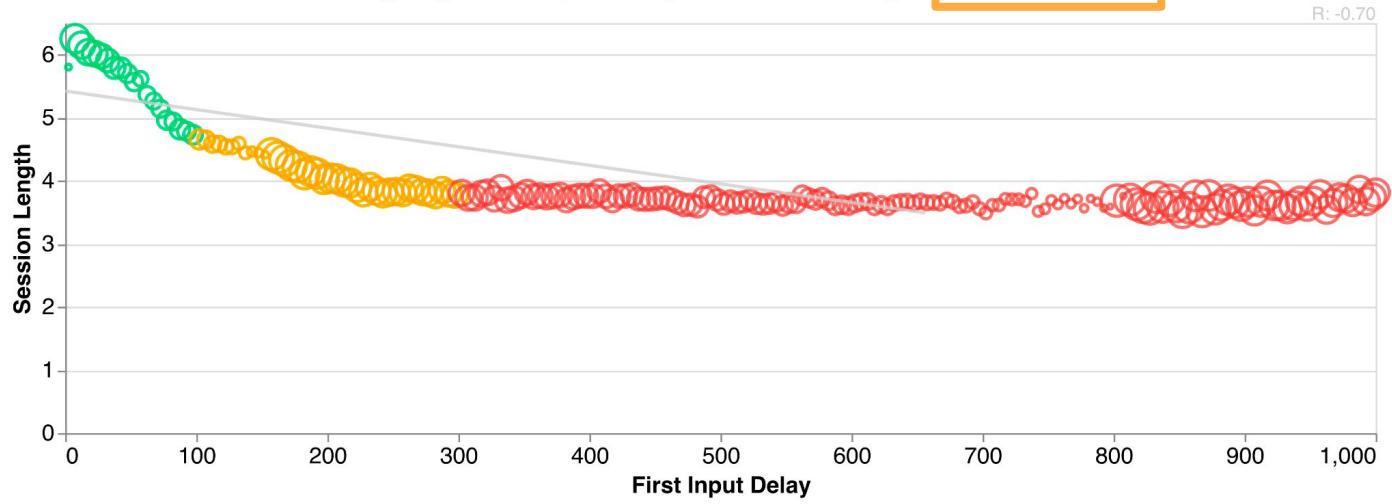
Landing Page First Input Delay vs. Bounce Rate Retail Website 1

R: 0.78



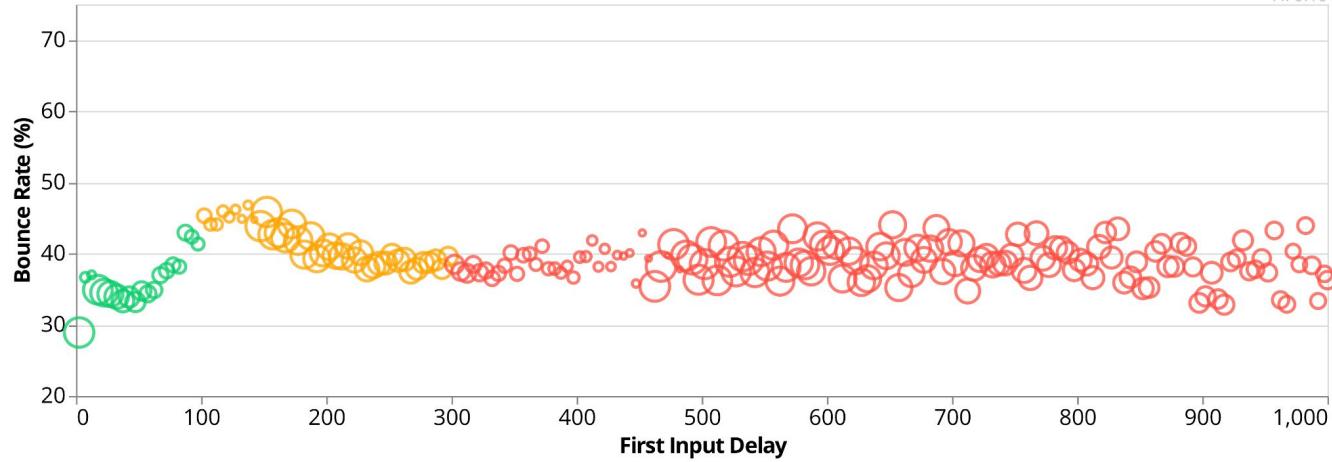
Landing Page First Input Delay vs. Session Length Retail Website 1

R: -0.70



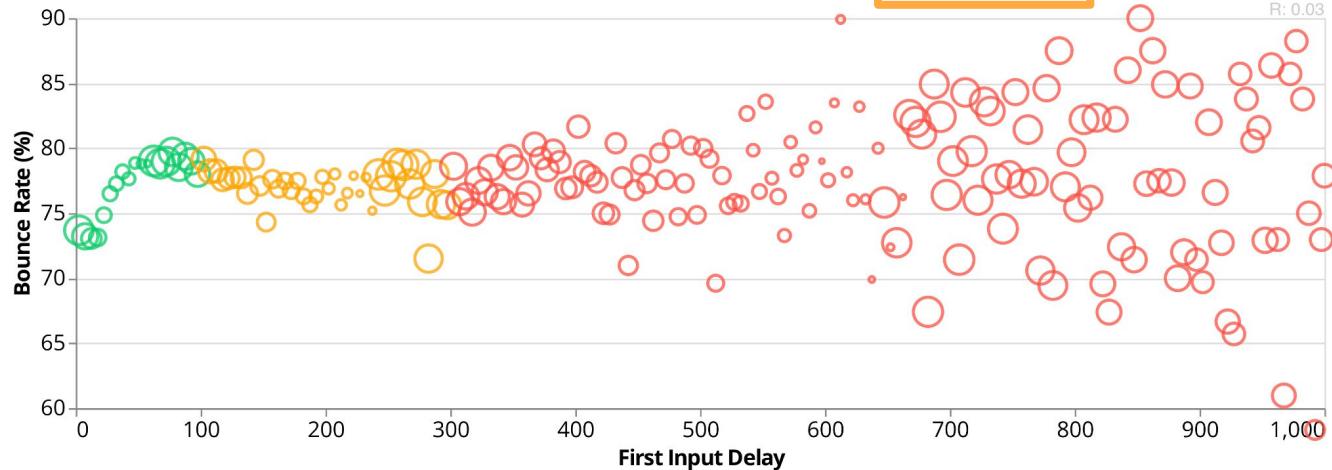
Landing Page First Input Delay vs. Bounce Rate · Retail Website 2

R: 0.10



Landing Page First Input Delay vs. Bounce Rate · News Website 1

R: 0.03



INP

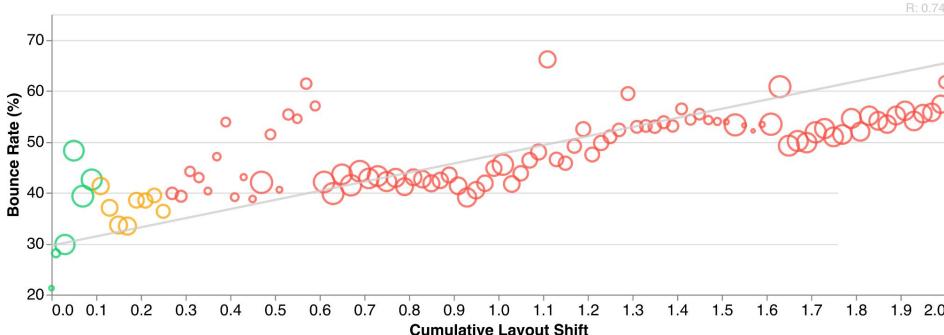
Interaction to Next Paint



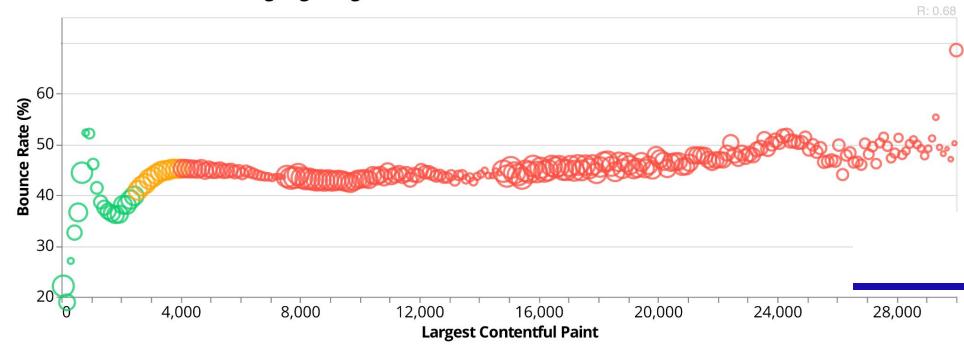
... ?

What CWV matters to "Retail 1"?

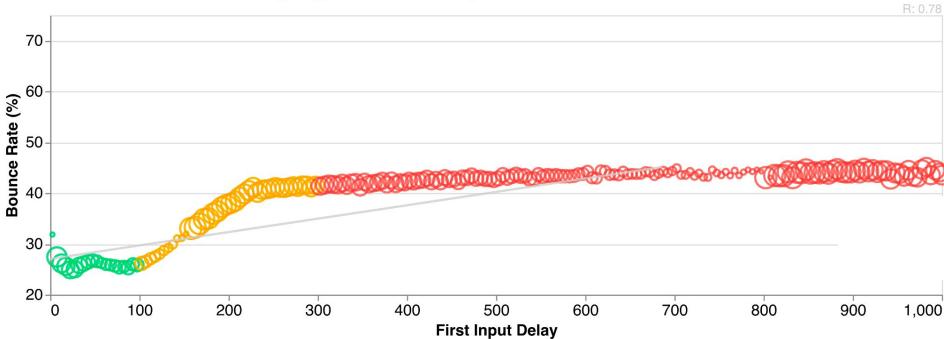
Landing Page Cumulative Layout Shift vs. Bounce Rate - Retail Website 1



Landing Page Largest Contentful Paint vs. Bounce Rate - Retail Website 1



Landing Page First Input Delay vs. Bounce Rate - Retail Website 1





How can I evaluate a "modern" metric?

How can I evaluate a "modern" metric?

By yourself

- RUM monitoring
- Synthetic monitoring

Others

- Developer evangelists
- Research papers
- Conferences
- Public datasets



RUM Archive?

rumarchive.com

RUM Archive

Goals:

- Public data set of RUM data
- via Google BigQuery
- We welcome others to contribute!
 - Individuals
 - Corporations
 - Other RUM Providers
- Open-source project description, documentation and methodology

```
SELECT COUNTRY,
       COUNT(*) AS ROWCOUNT,
       SUM(BEACONS) AS BEACONCOUNT,
       `akamai-mpulse-rumarchive.rumarchive.PERCENTILE_APPROX`(
           ARRAY_AGG(PLTHISTOGRAM),
           [0.0, 0.25, 0.50, 0.75, 0.90, 0.95, 1.0],
           100,
           false) as PERCENTILES,
       `akamai-mpulse-rumarchive.rumarchive.PERCENTILE_APPROX`(
           ARRAY_AGG(PLTHISTOGRAM),
           [0.50],
           100,
           false) as MEDIAN
  FROM `akamai-mpulse-rumarchive.rumarchive.rumarchive_page_loads`
 WHERE DATE = "2022-09-01"
 GROUP BY COUNTRY
 ORDER BY SUM(BEACONS) DESC
```

Query results

JOB INFORMATION		RESULTS	JSON	EXECUTION DETAILS	
Row	Country	RowCount	BeaconCount	Percentiles	Median
1	US	316228	139286298	{"0":0,"1":60999,"0.25":607,"0.5":1814,"0.75":3960,"0.9":7732,"0.95":12099}	1814
2	JP	56112	21096496	{"0":0,"1":60999,"0.25":1033,"0.5":2447,"0.75":5298,"0.9":10310,"0.95":15388}	2447
3	GB	85562	16861923	{"0":0,"1":60999,"0.25":1378,"0.5":2615,"0.75":5023,"0.9":10028,"0.95":15835}	2615
4	IN	99661	9155488	{"0":0,"1":60999,"0.25":1541,"0.5":3308,"0.75":6510,"0.9":13020,"0.95":26044}	3308

rumarchive.com

ty!

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