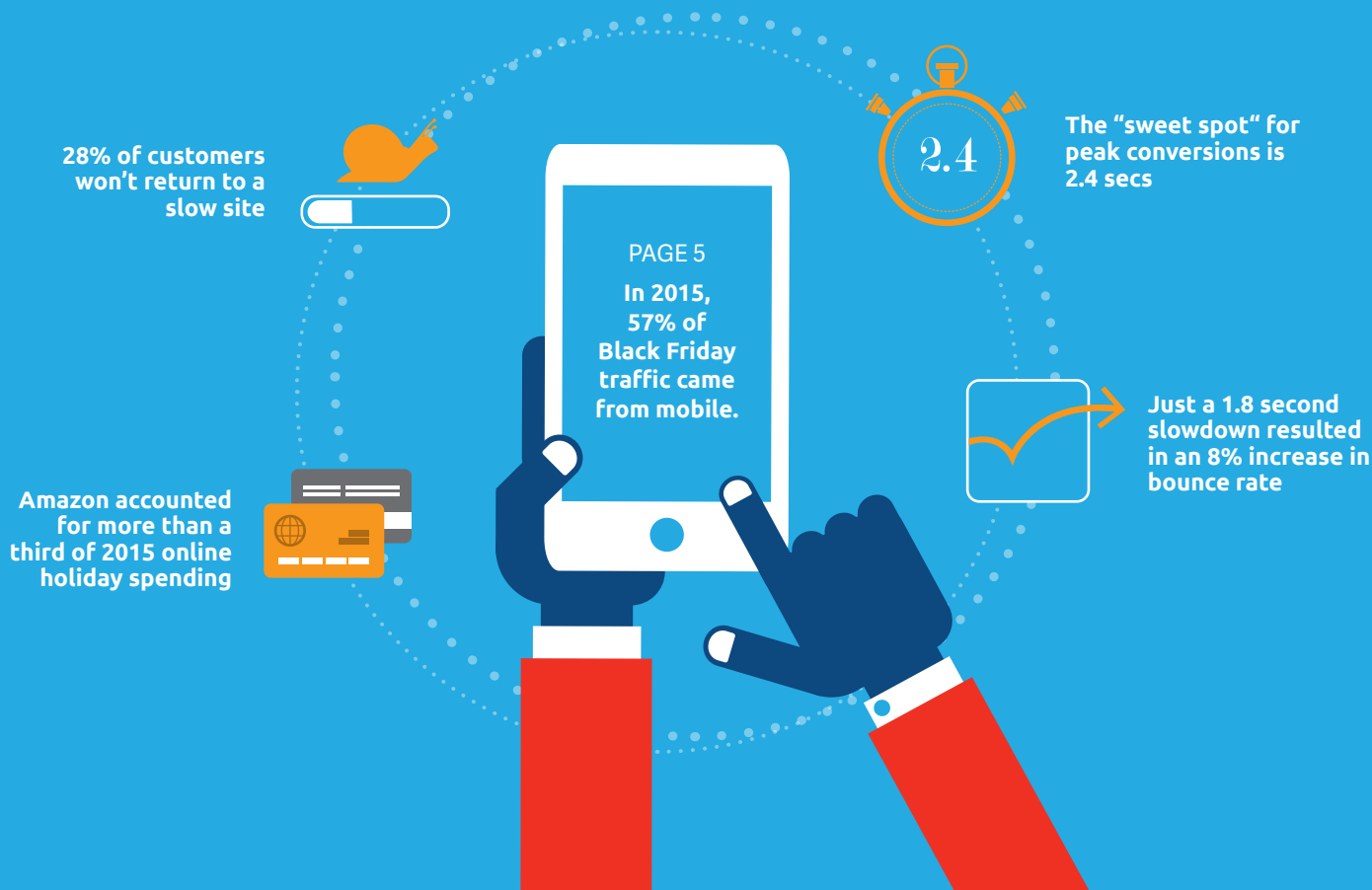SPRING 2017

THE STATE OF ONLINE RETAIL PERFORMANCE

KEY INSIGHTS

- While almost half of all consumers browse via their phones, only 1 in 5 complete transactions on mobile (page 5).

- Optimal load times for peak conversions ranged from 1.8 to 2.7 seconds across device types (page 6).

- Just a 100-millisecond delay in load time hurt conversion rates by up to 7% (page 7).

- Bounce rates were highest among mobile shoppers and lowest among those using tablets (page 9).

- Optimal load times for lowest bounce rates ranged from 700ms to 1.2s across all device types (page 10).

- A two-second delay in load time hurt bounce rates by up to 103% (page 10).

- Pages with the lowest bounce rates had start render times ranging from 0.9 to 1.5 seconds (page 12).

- A two-second delay correlated with up to a 51% decrease in session length (page 14).

28% of customers won't return to a slow site

PAGE 5

In 2015, 57% of Black Friday traffic came from mobile.

2.4

The "sweet spot" for peak conversions is 2.4 secs

Amazon accounted for more than a third of 2015 online holiday spending

Just a 1.8 second slowdown resulted in an 8% increase in bounce rate

What's the cost of a few seconds in the digital marketplace?

Retail businesses today face enormous challenges in delivering the fast, reliable, 24x7 omnichannel experience that users demand. And those users won't wait around for you to get it right: 53% of mobile site visitors will leave a page that takes longer than three seconds to load.[1]

In recent years, many leading retailers have discovered that the page load times of their websites and apps have a significant and measurable impact on metrics like conversions and engagement:

- **Walmart** saw up to a 2% increase in conversions for every second of improvement in load time. Every 100ms improvement resulted in up to a 1% increase in revenue.

- **Fanatics** shaved two seconds off its median page load time and almost doubled mobile conversions.

- **Staples** improved page load times by 1-6 seconds and improved conversions by 10%.

You may already be familiar with the idea that page load times have a negative impact on user engagement and business metrics, but you may be surprised to learn that these impacts are being felt much earlier than have been reported in the past. This could be due to the fact that there have been no previous studies that analyzed such a large dataset using such a nuanced set of correlated metrics. Or it could be due to accelerating changes in user expectations. It's too early to say. This research project marks the inauguration of a long-term benchmark study that seeks to answer these questions.

1. Background and approach

What this report is:

A semi-annual (spring and fall) study of aggregated performance metrics for leading retail sites. We share performance metrics from three different perspectives – IT, business, and user experience – and explain how they intersect.

How we did it:

We gathered one month's worth of beacon[2] data from leading retail sites, comprised of Akamai customers who have given permission for their data to be anonymized, aggregated and used in this type of research. Our data science team then used our industry-leading analytics engine to analyze the data.

Why this study is meaningful:

- **It's the only study of its kind.** No other web performance technology provider has the data gathering and analysis tools – and the customer list – to conduct a study like this.
- **This study represents an unprecedented amount of user data.** This study represents 27.7 billion beacons' worth of data – which equates to roughly 10 billion user visits.
- **We have the only analytics engine that can correlate all this data to business-critical user experience metrics and KPIs such as bounce rate, conversion rate, and session length.** This gives us unprecedented insight into how performance affects users – and ultimately businesses.

What we hoped to learn when we started this project:

- What is the "magic number" for page load time that yields the highest conversion rate?
- What is the impact of one second of performance improvement (or slowdown) on conversion rate/bounce rate/session length?
- How are high-performance pages different – in terms of size, complexity and resources – from pages that perform poorly?

2. Online retail in the age of Amazon

**U.S. E-Commerce Sales &
The Web's Share of Total Retail 2012-2016**

● U.S. E-Commerce Sales (in $ billions) ● Share of Total Retail
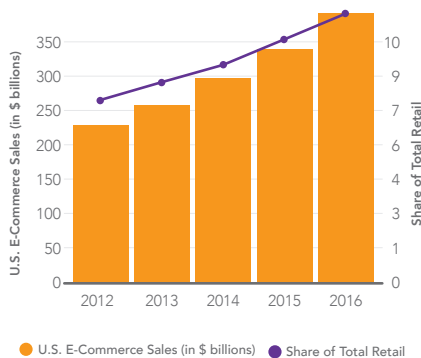
Source: Internet Retailer analysis of U.S. Commerce Department figures that factors out the sales of goods not normally purchased online such as automobiles, fuel, and sales in restauranrs and bars.

How Amazon became the gold standard for user experience

In 2016, e-commerce sales in the US grew 15.6%, representing 11.7% of total sales – but many of those gains were swallowed up by Amazon.[3] Amazon comprised 65.9% of the $53.1 billion growth in U.S. online retail last year, and 27.4% of the $127.6 billion increase in the total retail market.

In fact, Amazon's market cap is now greater than the combined total of the largest eight traditional retailers in the US.[4]

For more than two decades, Amazon has excelled at innovating its digital business and motivating the rest of the industry to either adapt or lose market share. While the rest of the digital marketplace was simply driving visitors to websites, Amazon built an online business based on understanding those visitors through data science and performance analytics.

Amazon was an extremely early adopter in the study of how seconds – and sometimes even milliseconds – of latency can affect bounce rates, conversion rates, sales and revenue. The company uses this knowledge to drive the evolution of better and better customer experiences. Today, Amazon's ability to offer a superior buying experience has driven other businesses to extinction across multiple categories.

3. How does load time correlate to conversion rate?

While almost half (47%) of all consumers browse via their phones, only 1 in 5 complete transactions on mobile.

all visits

all visits that ended in conversion
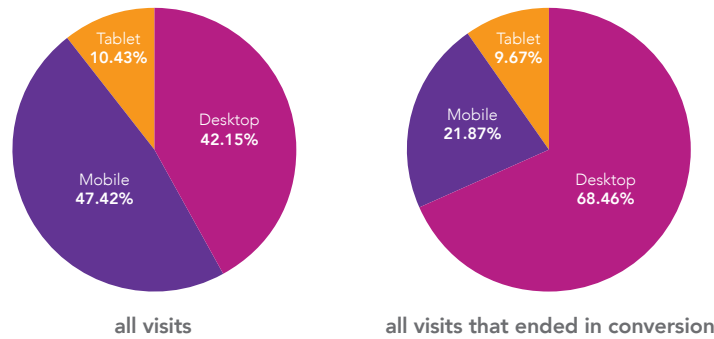
There are many reasons why shoppers use their phones in the purchase process – from consulting reviews to in-store price-checking. Mobile is a critical tool in the browsing process. To turn more of these browsers into shoppers, retailers should examine the barriers to completing transactions on their mobile sites.

While only 22% of visits to mobile sites ended in conversions, this number is expected to grow. Retailers that invest in mobile, email and social see 30% more sales on average and 25% higher average order values.[5] Some retailers have already experienced the mobile tipping point, with the majority of their sales coming from smartphones and tablets: Fanatics, an online retailer of licensed team sports apparel, found that 56% of its Thanksgiving Day sales happened on mobile – 42% via phones and 14% via tablets.

## Pages that converted were up to 26% faster than those that did not.

Pages that were visited by shoppers who converted loaded more quickly than those that did not convert.

What were the average conversion rates for each device type?

Average load times: Converted vs. non-converted sessions

	Desktop	Mobile	Tablet
Converted Sessions	3.1s	3.7s	3.8s
Non-Converted Sessions	4.2s	4.3s	4.8s

● Converted Sessions   ● Non-Converted Sessions
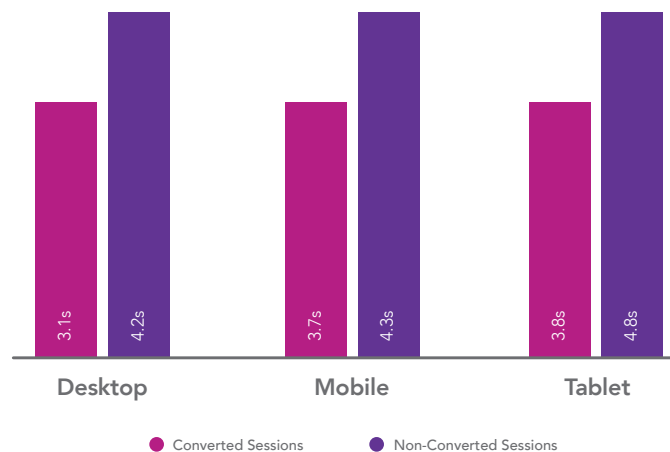
While these averages fall within industry norms, it's important to note the gap between the average conversion rates and the peak conversion rates. For example, the average conversion rate for desktop shoppers was 4.1% but the peak conversion rate for desktop shoppers was 12.8%.
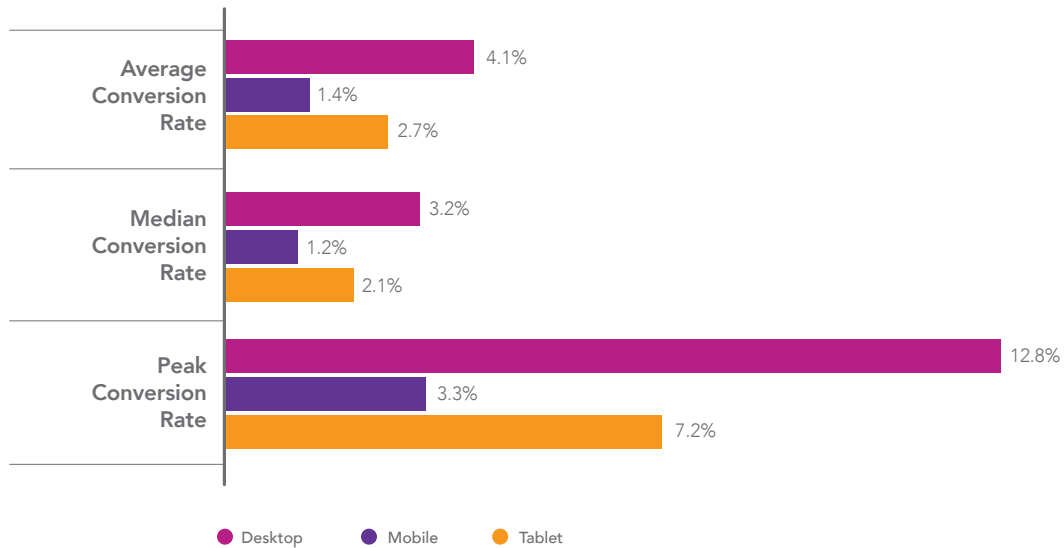

Optimal load times for peak conversions ranged from 1.8 to 2.7 seconds across device types.

Consumers have similar expectations and behaviors, regardless of whether they're using their desktop or their tablet. While the peak conversion rate for desktop was much higher than the peak conversion rate for tablets, the average and median conversion rates were closer in range. (Note that in this research, "load time" refers to the median load time for pages in a user session.)

- On desktop, pages that loaded in 1.8 seconds experienced the highest conversion rate (12.8%).
- On mobile, pages that loaded in 2.7 seconds experienced the highest conversion rate (3.3%).
- On tablets, pages that loaded in 1.9 seconds experienced the highest conversion rate (7.2%).

While mobile users lagged in all metrics, it's important to note that user expectations are still quite high: 2.7 second load times are difficult to achieve on mobile, but this is what consumers expect.
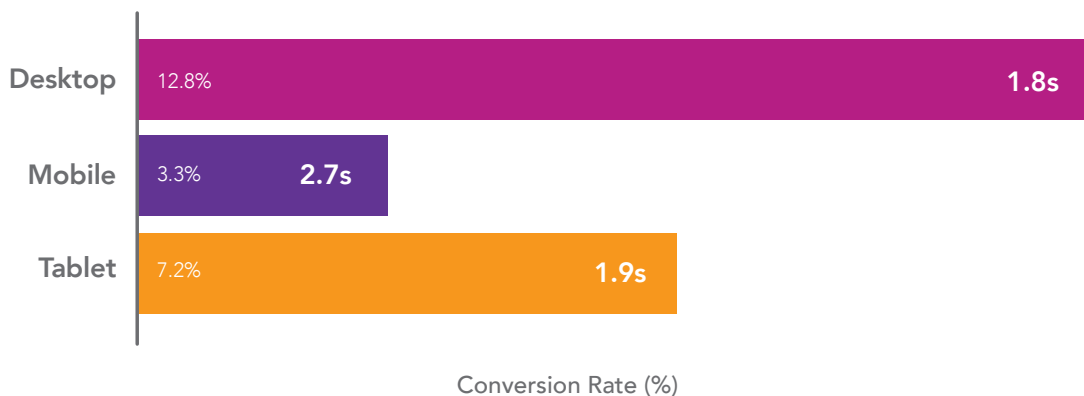
Just a 100-millisecond delay in load time hurt conversion rates by up to 7%.

Even tenths of a second count. As discussed on the previous page, desktop pages that loaded in 2.7 seconds experienced a peak conversion rate of 12.8%. Pages that loaded 100 milliseconds slower – in other words, in 2.8 seconds – experienced a 2.4% decrease in conversion rate.

Smartphones and tablets were affected more, with 7.1% and 3.8% decreases in conversion rates, respectively.

These impacts were felt even more with pages that were one and two seconds slower. Desktop pages that experienced a two-second delay – loading in 3.8 seconds instead of the optimal 1.8 seconds – had conversion rates that were almost 37% lower.

### Impact of page slowdowns on conversion rates (by device type)
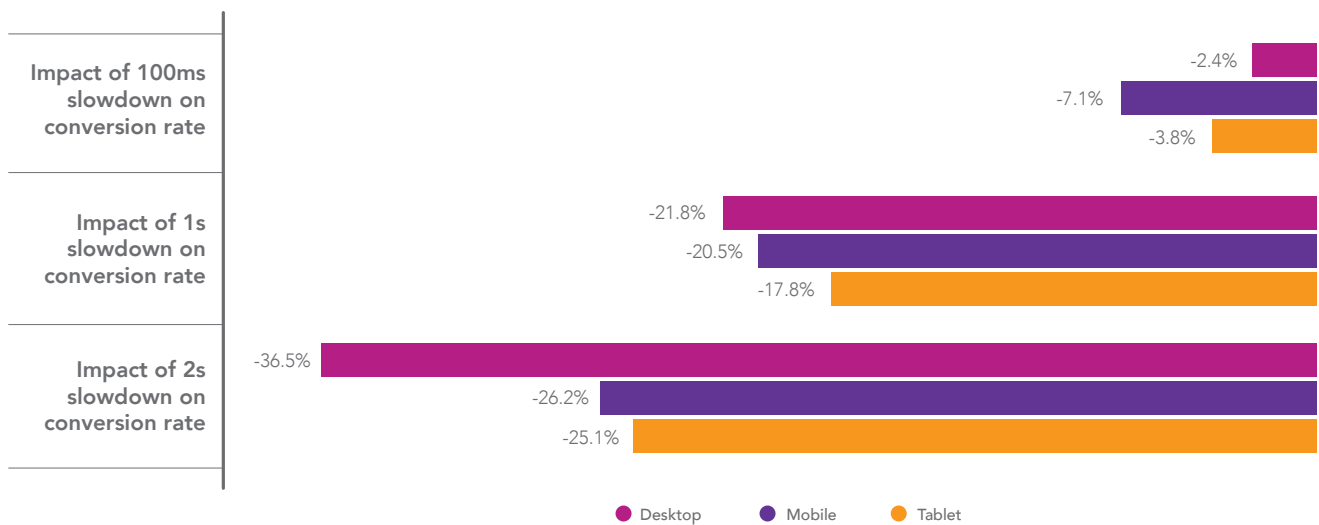
As the graphs below show, conversion rates decline steeply after the peak. Viewing these graphs, you may wonder: Why don't the fastest pages correlate with higher conversion rates? This is because the faster end of the bell curve is primarily comprised of 404 pages and other pages that, while fast, do not fall on the conversion path.
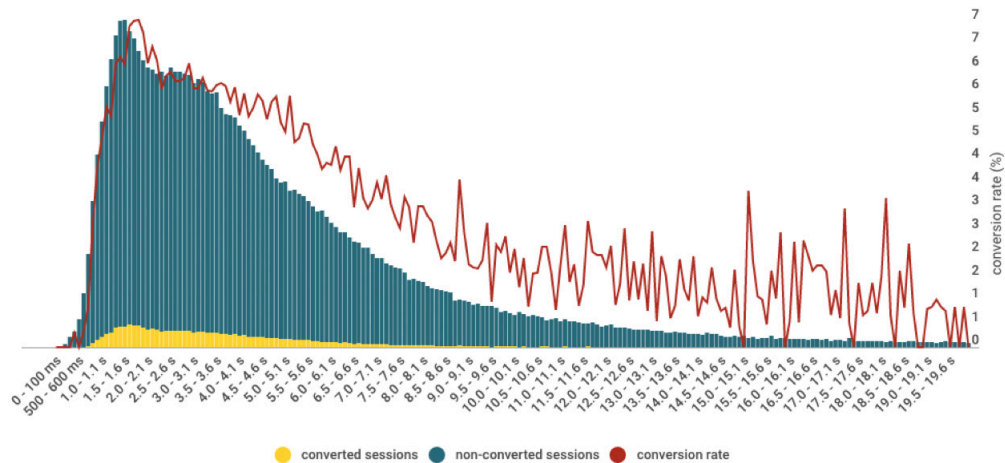
How does load time correlate to conversion rate? (desktop)
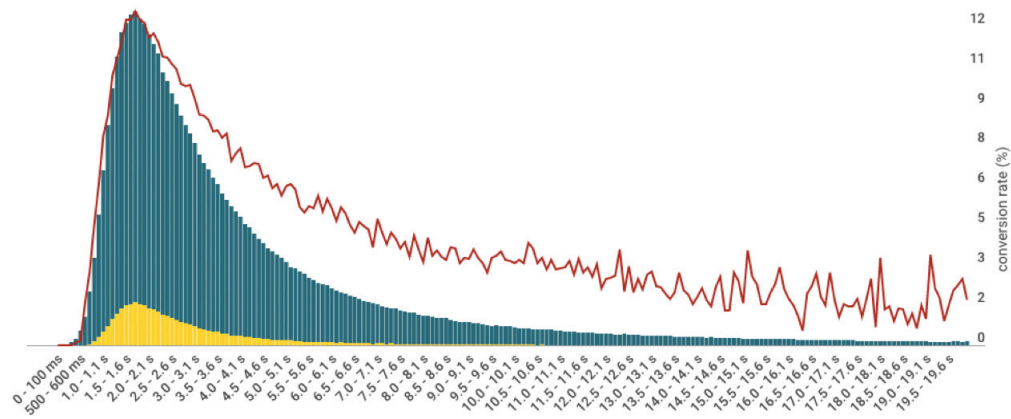
How does load time correlate to conversion rate? (mobile)
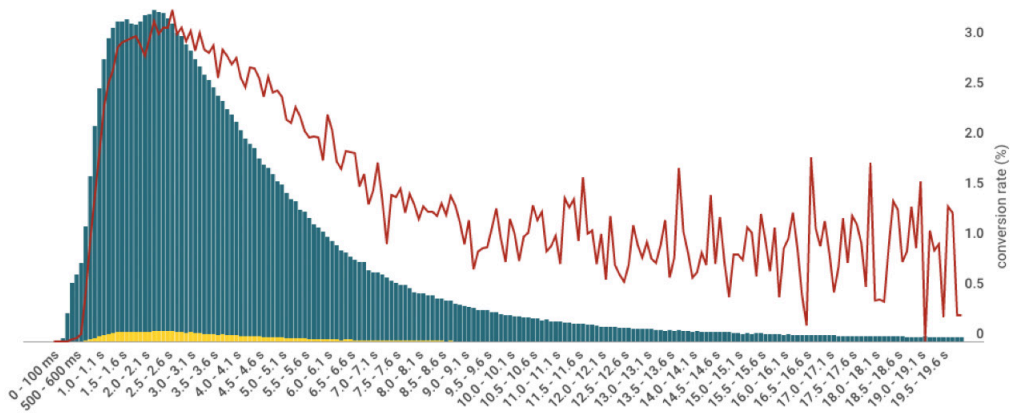
How does load time correlate to conversion rate? (tablet)

converted sessions   non-converted sessions   conversion rate

4. How does load time correlate to bounce rate?

## Mobile visitors are more likely to bounce than desktop and tablet visitors.

As mentioned earlier in this research, almost half of all retail site visitors come via mobile devices; however, these visitors are also much more likely to bounce.

While slightly more than half (50.9%) of bounced sessions happened on mobile devices, only 28.6% of non-bounced sessions took place on mobile.

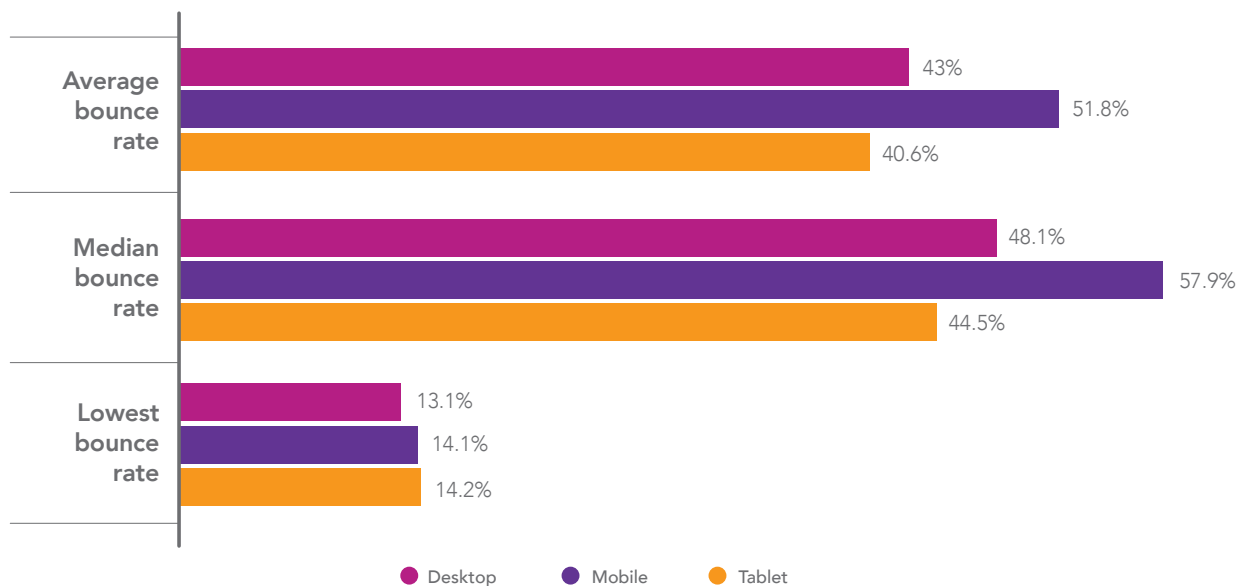**Traffic breakdown for all bounced sessions**

Tablet
8.47%

Desktop
40.60%
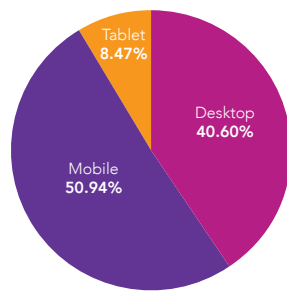
Mobile
50.94%

Traffic breakdown for all non-bounced sessions

Tablet
9.97%

Mobile
28.60%

Desktop
61.44%
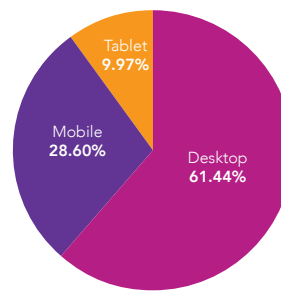
Bounce rates were highest among mobile shoppers and lowest among those using tablets.

The median bounce rate for shoppers using mobile devices was almost 58%, while tablet shoppers had a median bounce rate of almost 45%.
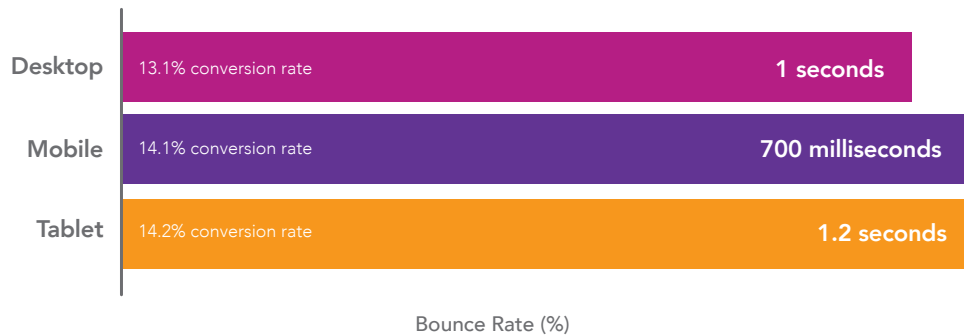
Bounce Rates (by device type)

Average bounce rate
- 43%
- 51.8%
- 40.6%

Median bounce rate
- 48.1%
- 57.9%
- 44.5%

Lowest bounce rate
- 13.1%
- 14.1%
- 14.2%

● Desktop   ● Mobile   ● Tablet

Optimal load times for lowest bounce rates ranged from 700ms to 1.2s across all device types.

The closeness of this range suggests that user expectations are similar despite the type of device they are using. And those user expectations are extremely high.

- On desktop, pages that loaded in 1 second experienced the lowest bounce rate (13.1%).

- On mobile, pages that loaded in 700 milliseconds experienced the lowest bounce rate (14.1%).

- On tablets, pages that loaded in 1.2 seconds experienced the lowest bounce rate (14.2%).

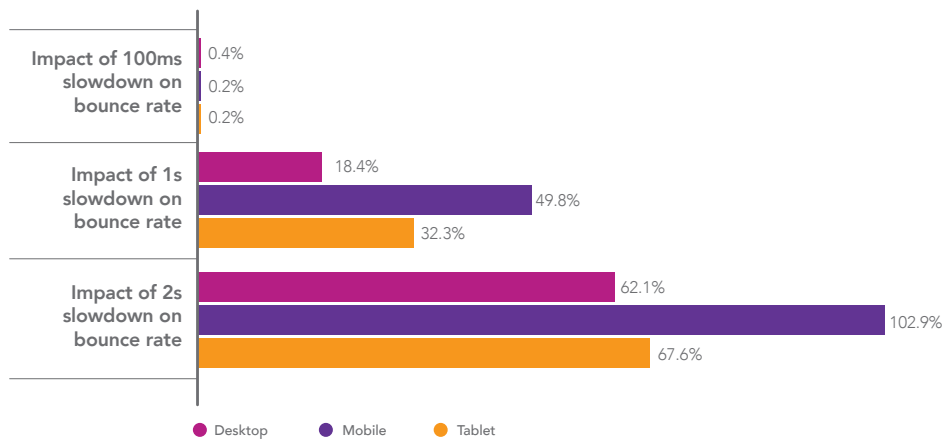| Desktop | 13.1% conversion rate | 1 seconds |
| Mobile | 14.1% conversion rate | 700 milliseconds |
| Tablet | 14.2% conversion rate | 1.2 seconds |

Bounce Rate (%)

A two-second delay in load time hurt bounce rates by up to 103%.

Unlike the conversion rate findings, a 100-millisecond delay was not significantly impactful. However, as load times slowed down further, delays of one and two seconds had a powerful negative effect on bounce rates.

These impacts were felt even on tablets and mobile, with mobile being the most affected by delays. For mobile users, the optimal load time – which correlated to a 14.1% bounce rate – was 700 milliseconds. Pages that loaded in 1.7 seconds experienced a median bounce rate of 21% – representing an increase of almost 50%. At 2.7 seconds, the bounce rate was almost 29% – representing a 103% increase.

Impact of page Slowdowns on bounce rates (by device type)

| Impact of 100ms slowdown on bounce rate | 0.4% / 0.2% / 0.2% |
| Impact of 1s slowdown on bounce rate | 18.4% / 49.8% / 32.3% |
| Impact of 2s slowdown on bounce rate | 62.1% / 102.9% / 67.6% |

● Desktop ● Mobile ● Tablet

As with the conversion graphs in section 3, you may wonder: Why don't the fastest pages correlate with lower bounce rates? This is because the faster end of the bell curve is primarily comprised of 404 pages and other pages that, while fast, do not fall on the conversion path.
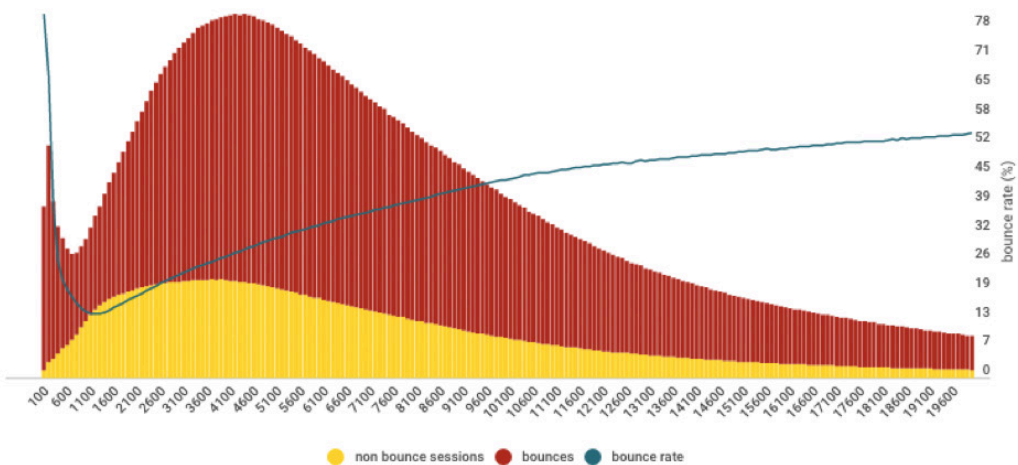
How does load time correlate to bounce rate? (desktop)
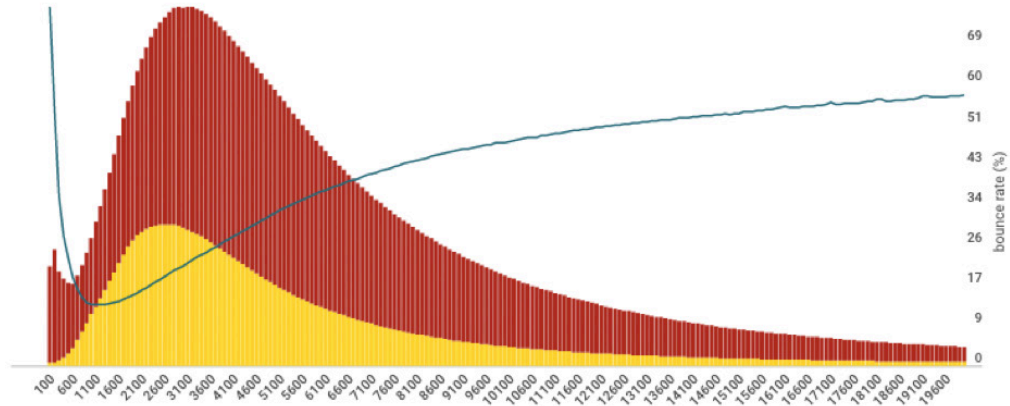
How does load time correlate to bounce rate? (mobile)
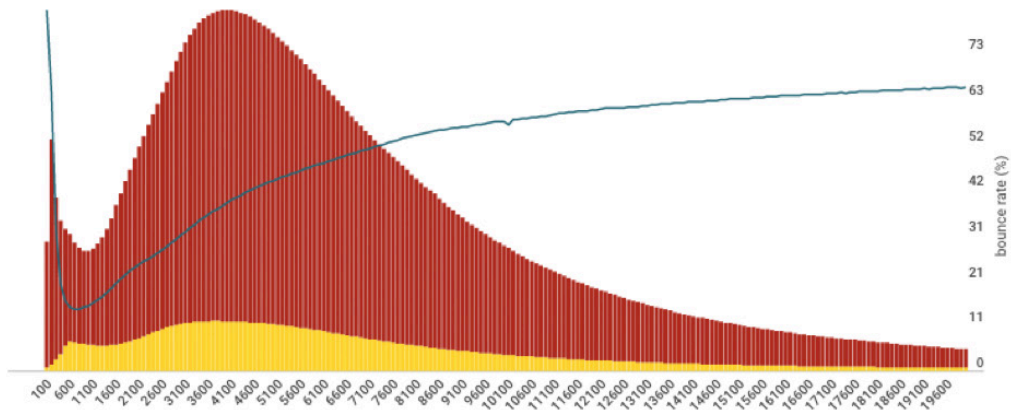
How does load time correlate to bounce rate? (tablet)

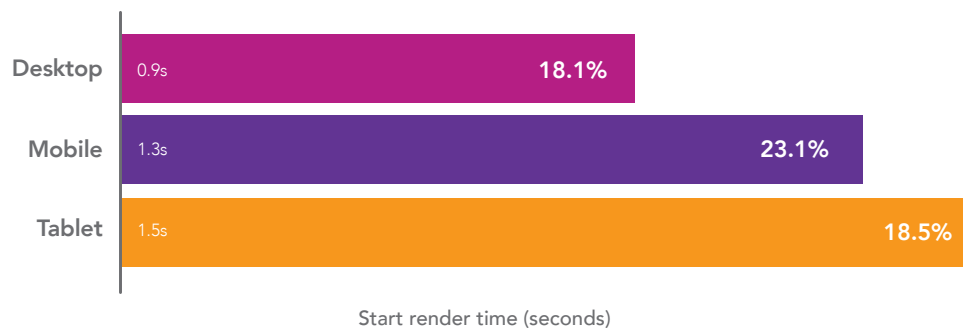● non bounce sessions ● bounces ● bounce rate

5. How does start render time correlate to bounce rate?

Pages with the lowest bounce rates had start render times ranging from 0.9 to 1.5 seconds.

Start render time – the moment when content begins to render in the browser – is a strong metric for measuring the user-perceived performance of a page. This metric is a solid measure of how long visitors are willing to look at a blank screen before they begin to leave a site. Not surprisingly, this user patience threshold is low. The optimal start render time for desktop users was under one second. Mobile and tablet user expectations were not far behind.

- On desktop, pages with a start render time of 900 milliseconds experienced the lowest bounce rate (18.1%).

- On mobile, pages with a start render time of 1.3 seconds experienced the lowest bounce rate (23.1%).

- On tablets, pages with a start render time of 1.5 seconds experienced the lowest bounce rate (18.5%).
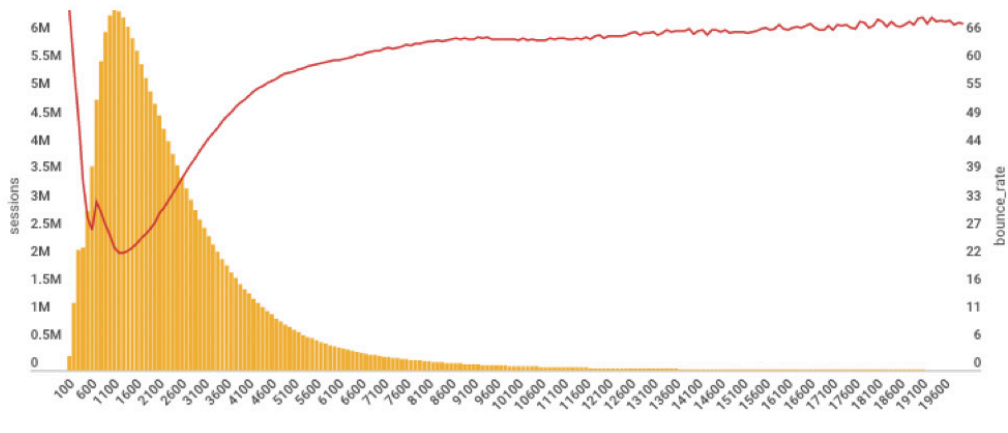
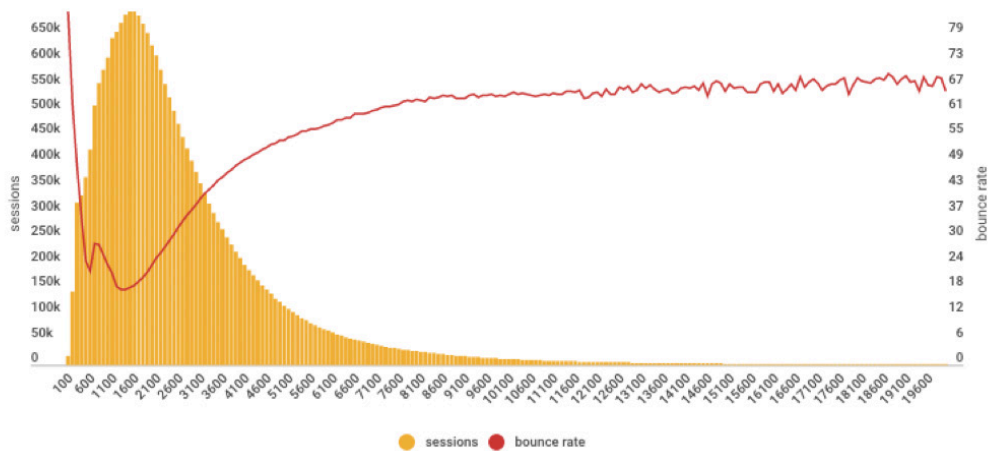### Correlation of start render times with lowest bounce rate

Desktop	0.9s ████████████ **18.1%**
Mobile	1.3s ██████████████ **23.1%**
Tablet	1.5s ████████████████ **18.5%**

Start render time (seconds)

How does start render time correlate to bounce rate? (desktop)
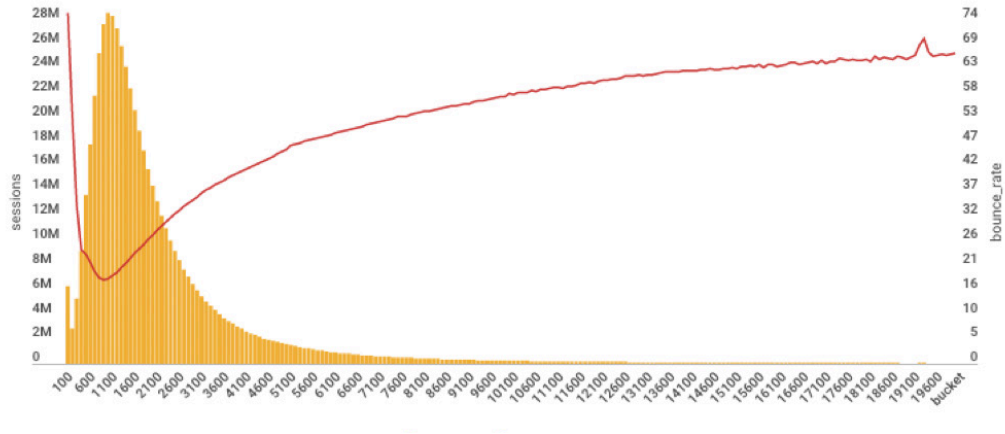
How does start render time correlate to bounce rate? (mobile)

How does start render time correlate to bounce rate? (tablet)
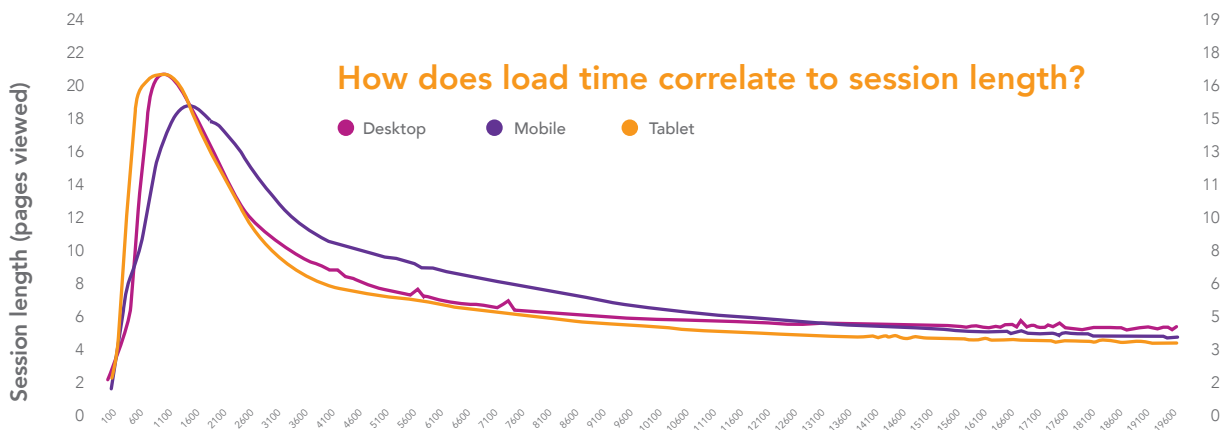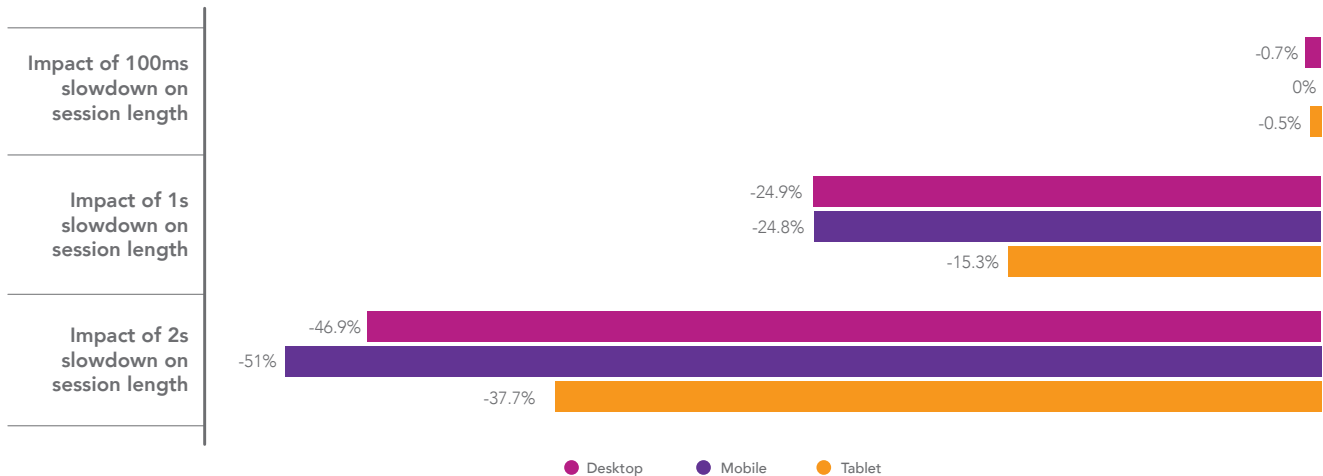

sessions   bounce rate

6. How does load time correlate to session length?

A two-second delay correlated with up to a 51% decrease in session length.

There is an existing body of research that indicates faster pages compel shoppers to spend more time on retail sites, visit more pages and add more items to their carts. When examined alongside metrics like bounce rate and conversions, session length (defined as the number of pages visited in a single visit) is a strong indicator of user engagement and satisfaction.

Similar to the effects of slowdowns on bounce rate, the 100-millisecond increment had little to no impact on session length. At the one- and two-second points, however, the effects were significant. Sessions with median page loads that were one second slower than optimal speeds were also up to 25% shorter. A two-second delay correlated with a 51% decrease in session length for mobile users, a 47% decrease for desktop users and an almost 38% decrease for tablet users.

Impact of Page Slowdowns on session length (by device type)

Impact of 100ms slowdown on session length	-0.7% (Desktop), 0% (Mobile), -0.5% (Tablet)
Impact of 1s slowdown on session length	-24.9% (Desktop), -24.8% (Mobile), -15.3% (Tablet)
Impact of 2s slowdown on session length	-46.9% (Desktop), -51% (Mobile), -37.7% (Tablet)

● Desktop   ● Mobile   ● Tablet

How does load time correlate to session length?

● Desktop   ● Mobile   ● Tablet

Session length (pages viewed)

7. Third-party scripts

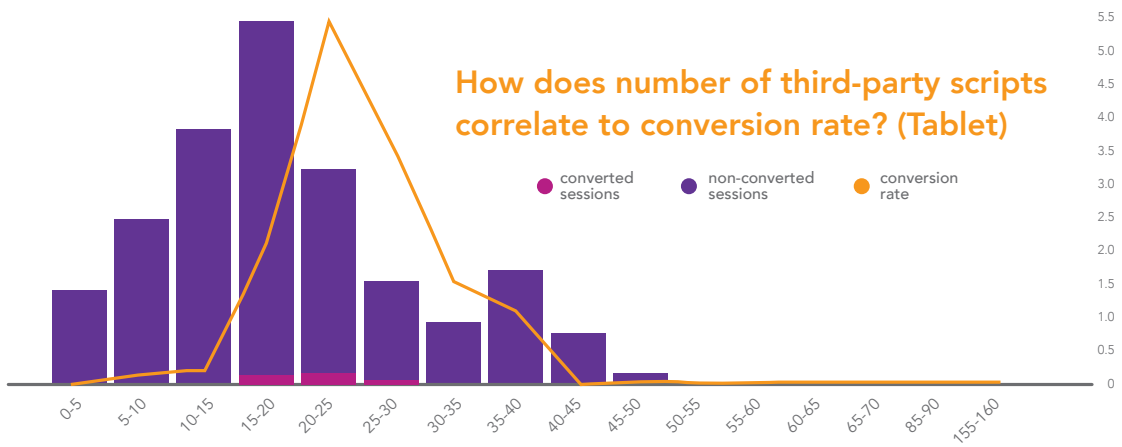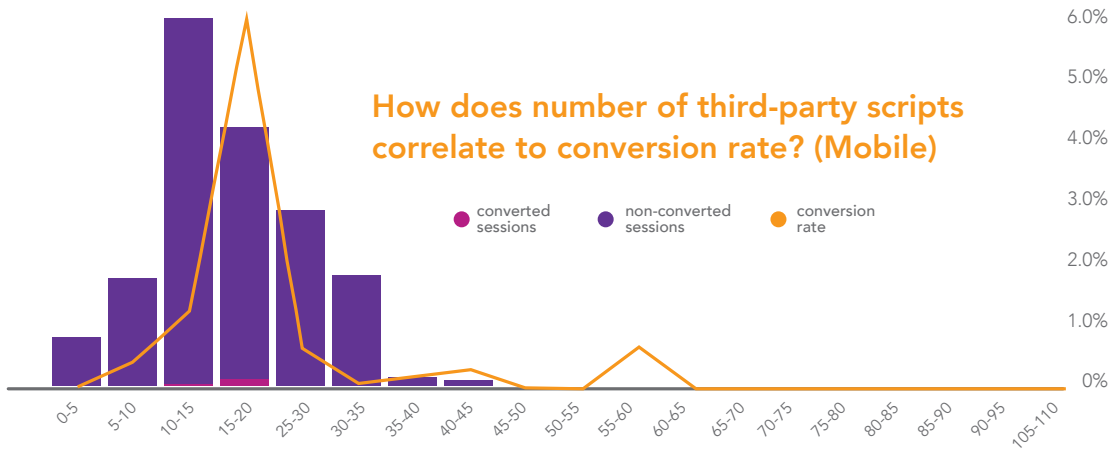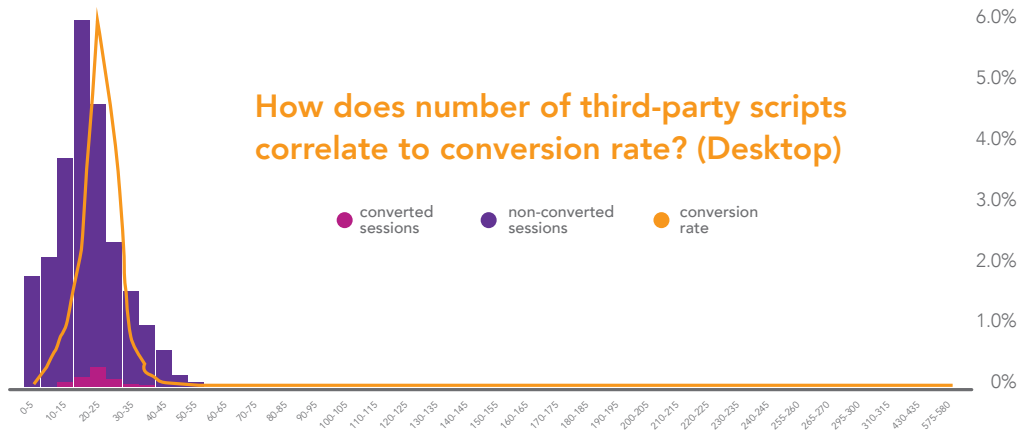## How does the number of third-party scripts correlate to conversion rate?

The average page served to desktop and tablet contained 21.9 third-party scripts. Not surprisingly, the average page served to mobile contained slightly fewer (18.7), no doubt partly due to the fact that some retailers serve leaner mobile-optimized pages.

However, fewer third parties doesn't correlate to higher conversion rates. As the graphs on the following page show, the highest-converting pages served to mobile users tended to contain between 15-20 third-party scripts, and the highest-converting pages served to desktop and tablet users contained 20-25 scripts. This finding is consistent with a joint machine learning project conducted by Akamai and Google, which found that user sessions that converted contained 48% more scripts than sessions that did not convert.[6]

This does not mean that site owners should arbitrarily insert more third-party tags on their pages (as these tags could have a negative impact on page performance), but rather should be taken to mean that, used judiciously and optimized well, third parties have their place in a conversion optimization strategy.

How third-party scripts correlate to conversion rates

Desktop	21.9 scripts
Mobile	18.7 scripts
Tablet	21.9 scripts

How does number of third-party scripts correlate to conversion rate? (Desktop)

converted sessions • non-converted sessions • conversion rate

How does number of third-party scripts correlate to conversion rate? (Mobile)

converted sessions • non-converted sessions • conversion rate

How does number of third-party scripts correlate to conversion rate? (Tablet)

converted sessions • non-converted sessions • conversion rate

Takeaway

You **can** compete like Amazon.

When it comes to the performance of your retail properties, even milliseconds can matter. How can you create and monitor the user experience your customers demand?

The complexities of online business – and the sophistication of digital marketing – are evolving rapidly. Understanding and managing digital performance has never mattered more than it does now. Only those retail brands that adapt their current approaches can survive.

To compete with Amazon, you need to understand how real users are experiencing your site, and how even small or intermittent slowdowns could be hurting your business. The challenge for online businesses today is to adopt Amazon-like culture, practices and tools to enable end-to-end digital performance management – continuously and in real time.

In order to compete like Amazon, you need:

- A unified view and control of customer experience, business, and IT performance

- Real-time visibility into your marketing campaigns

- Data science as a competitive advantage

- Testing and data science engine for 24x7 optimal performance

- Embedded performance experts to lead and transform digital transformation

The Akamai Cloud Delivery Platform gives online retailers a crystal-clear view of the relationship between revenue, user experience and IT performance.

Akamai Digital Performance Management (DPM) provides the contextual intelligence you need to perform at your best. Spend less time seeking performance intelligence and more time putting it to work. The Akamai DPM platform is a comprehensive solution set that includes:

- mPulse with Data Science for real user management (RUM) and deep data analytics

- CloudTest for continuous or on-demand load testing

- Professional Services for expertise in installing, configuring and optimizing your applications and your cloud infrastructure, from monitoring to optimization, and through to validation (available either as consultants or embedded within your company)

This complete cloud platform supports your digital transformation with end-to-end visibility and intelligence to continuously monitor, optimize and validate online performance in production, in real time, and at scale.

Sources

1. Google Data, Global, n=3,700 aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, March 2016.
2. In simple terms, a beacon is an HTTP(S) request embedded in a web page. It collects data about the user and session – from session length, to OS and browser type, to conversion and bounce rate. The Akamai mPulse beacon is the most sophisticated beacon in the performance measurement industry.
3. Internet Retailer, US e-commerce sales grow 15.6% in 2016, February 2017.
4. Yahoo Finance, Amazon is now worth more than America's 8 largest retailers combined, January 2017.
5. Adobe Digital Insights, 2016 Holiday Online Shopping Predictions
6. Google, Why Marketers Should Care About Mobile Page Speed, July 2016

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