

# Understanding the Impact of Video Quality on User Engagement

Florin Dobrian Vyas Sekar Ion Stoica Hui Zhang

Asad Awan

Dilip Joseph

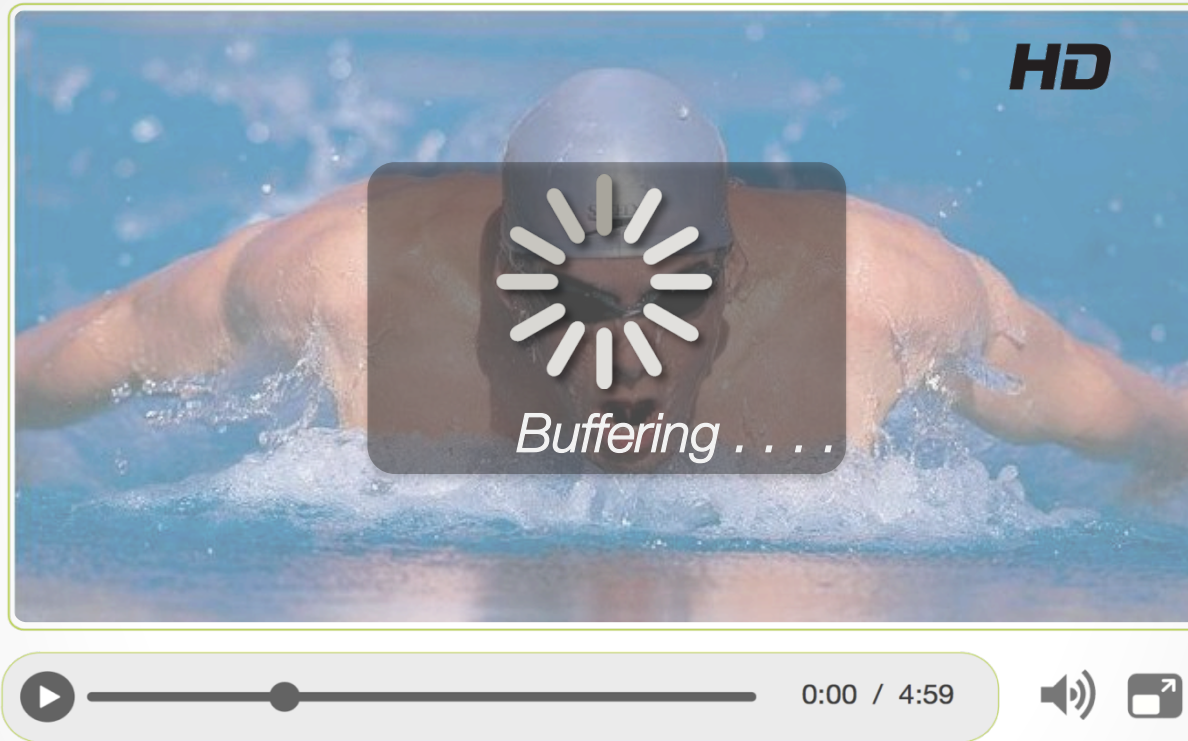
Aditya Ganjam



**Carnegie Mellon**

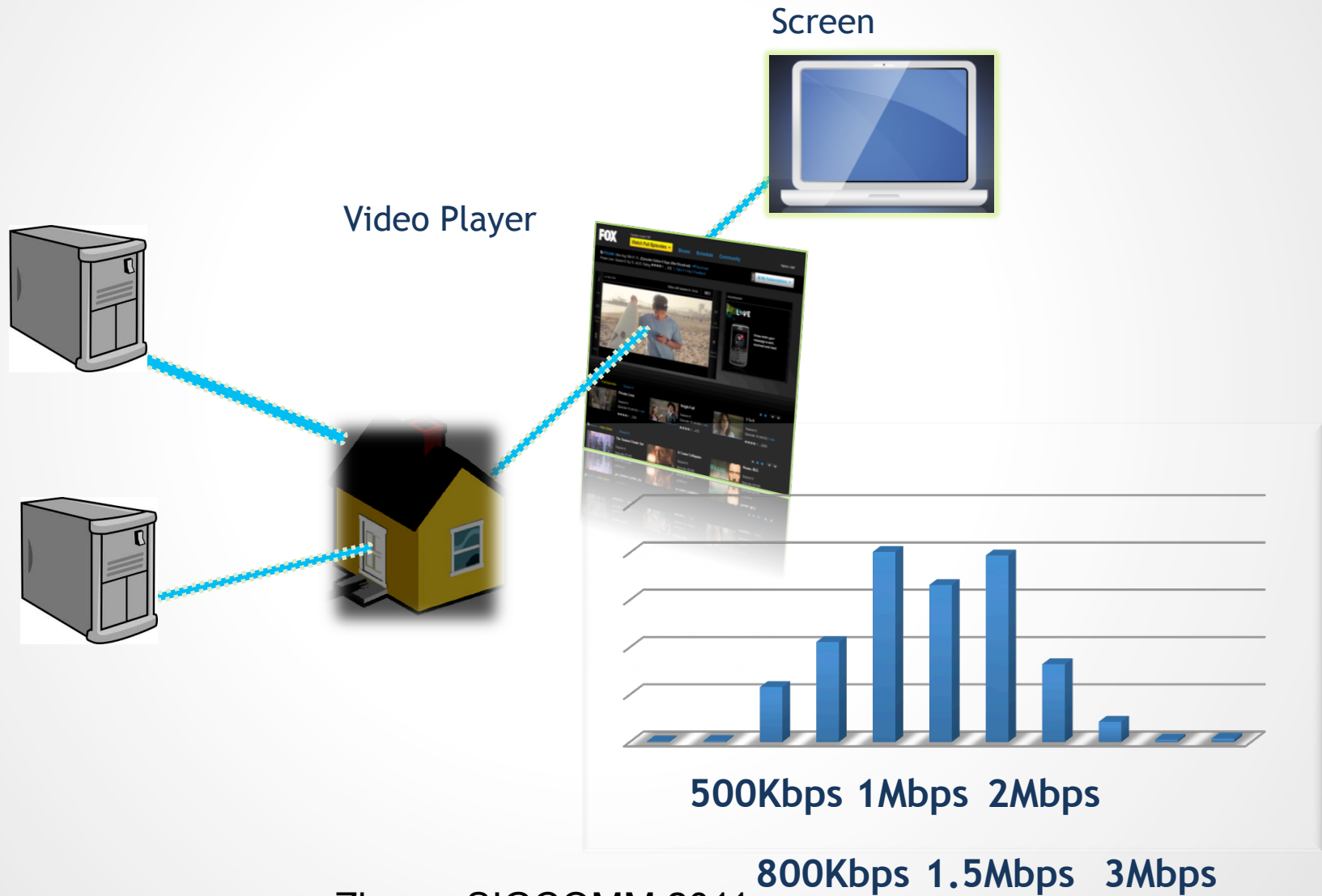


# Given the same video (content), Does **Quality** Impact **Engagement**?



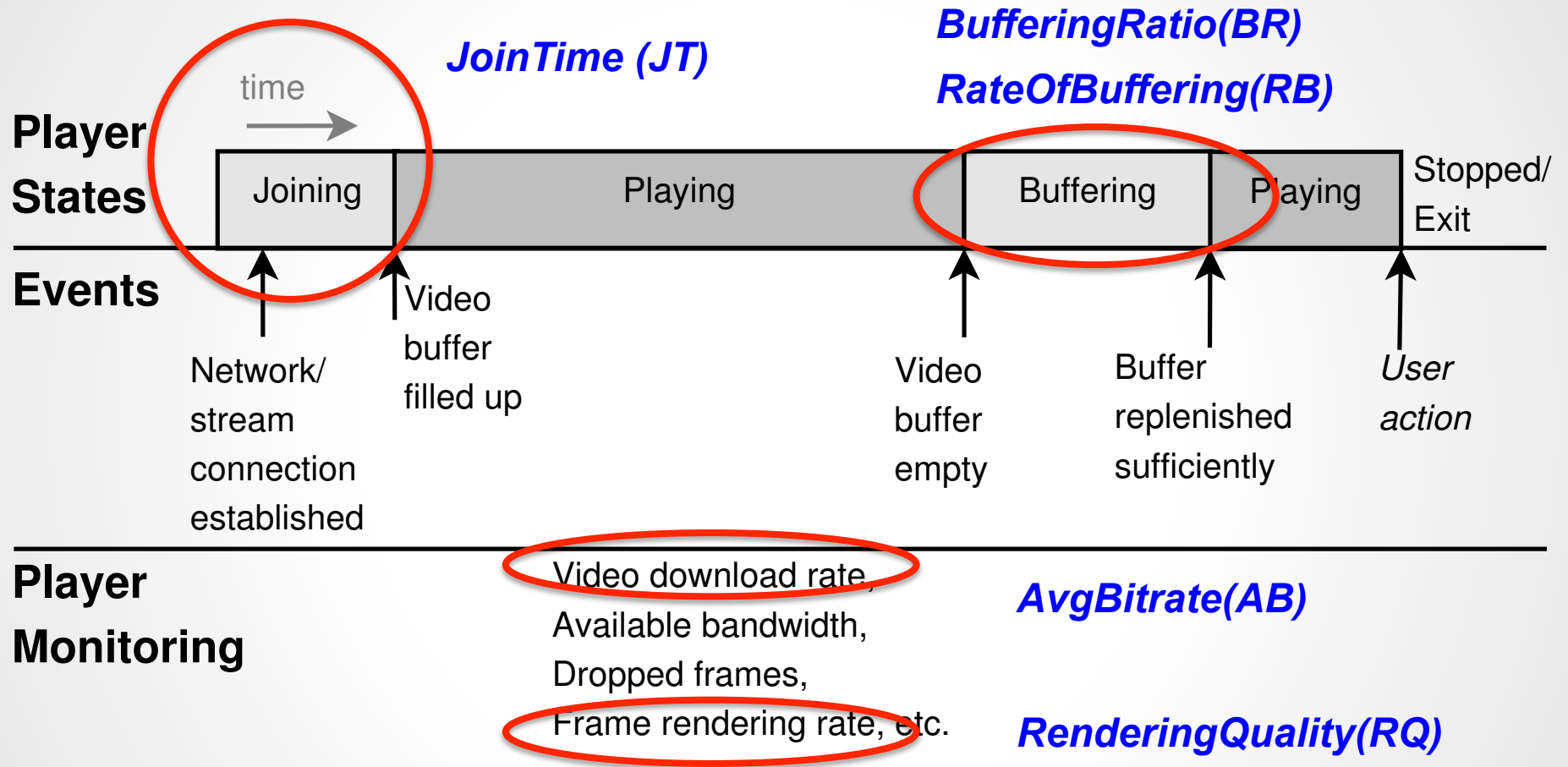
- What are the most critical metrics?
- Do these critical metrics differ across genres?
- How much does optimizing a metric help?

# Adaptive Multi-Bit Rate & Multiple Servers For the Same Stream



Zhang, SIGCOMM 2011

# Video Player Instrumentation



Quality Parameters **NOT** Available in ISP or CDN

Zhang, SIGCOMM 2011

# Engagement Metrics

## View-level

- Play time of a video session

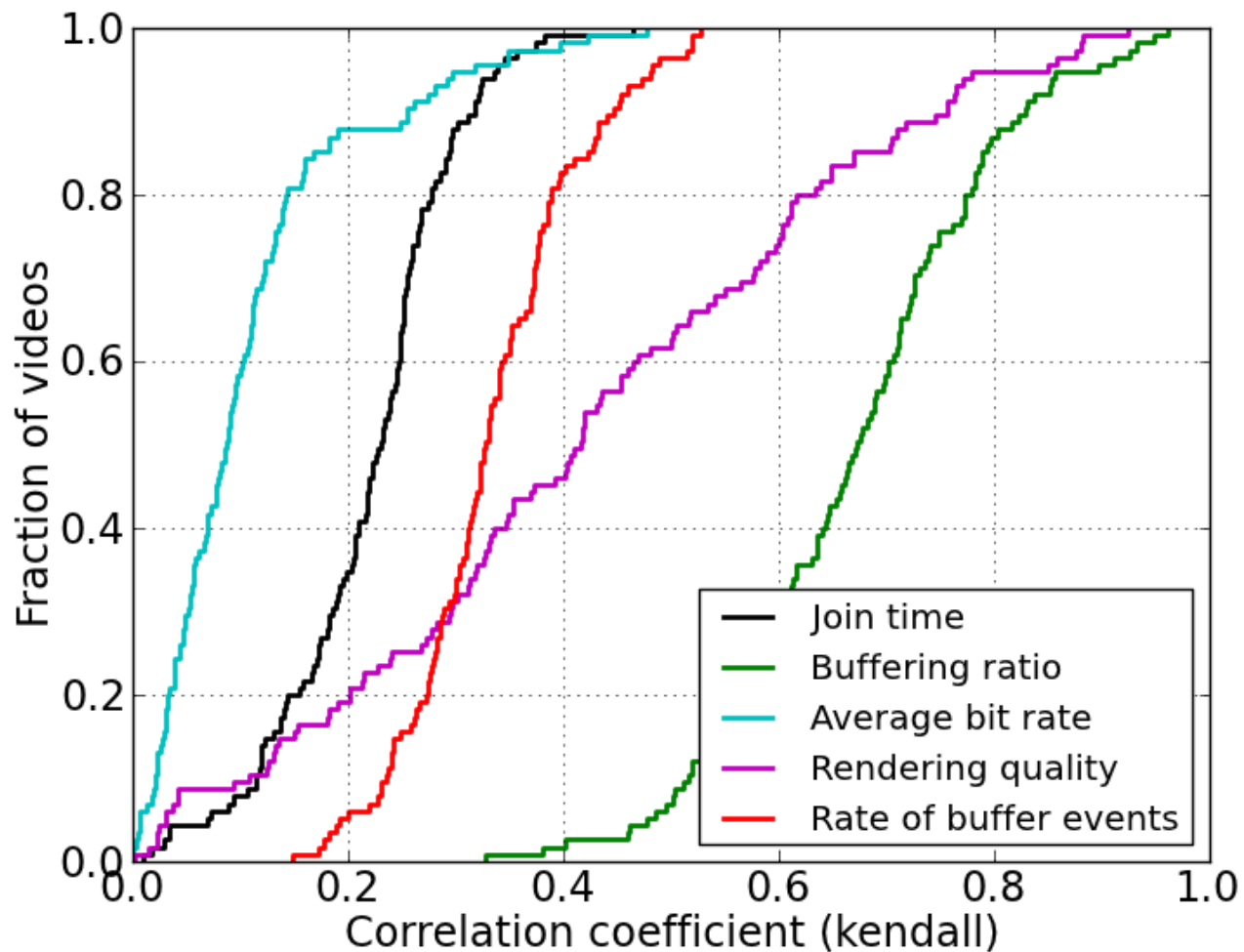
## Viewer-level

- Total play time by a viewer in a period of time
- Total number of views by a viewer in a period of time

# High-level questions & Analysis Techniques

- Which metrics matter most? → (Binned) Kendall correlation
- Are metrics independent? → Information gain
- How do we quantify the impact? → Linear regression

# LVoD at View Level



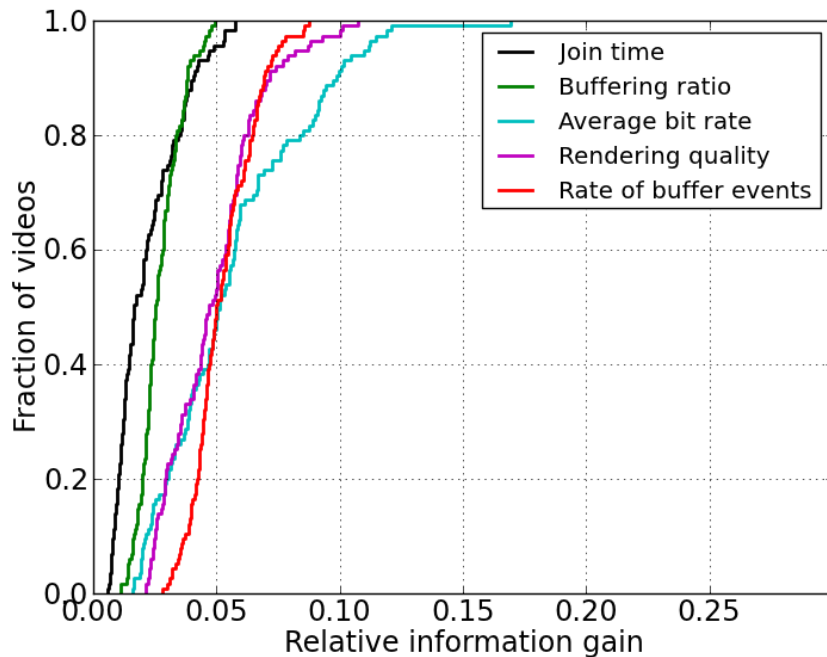
**Buffering Ratio** correlates with engagement the most

**Bit Rate** and **Join Time** not much?

Zhang, SIGCOMM 2011

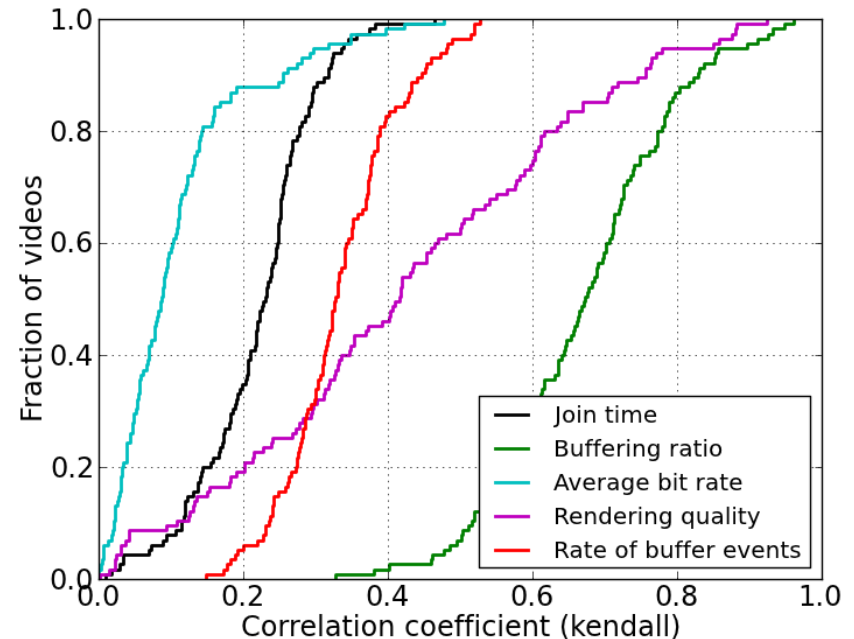
# Seeing the World via Two Lenses: (LVoD View level)

## Information Gain



**Bit Rate Gain High**

## Correlation



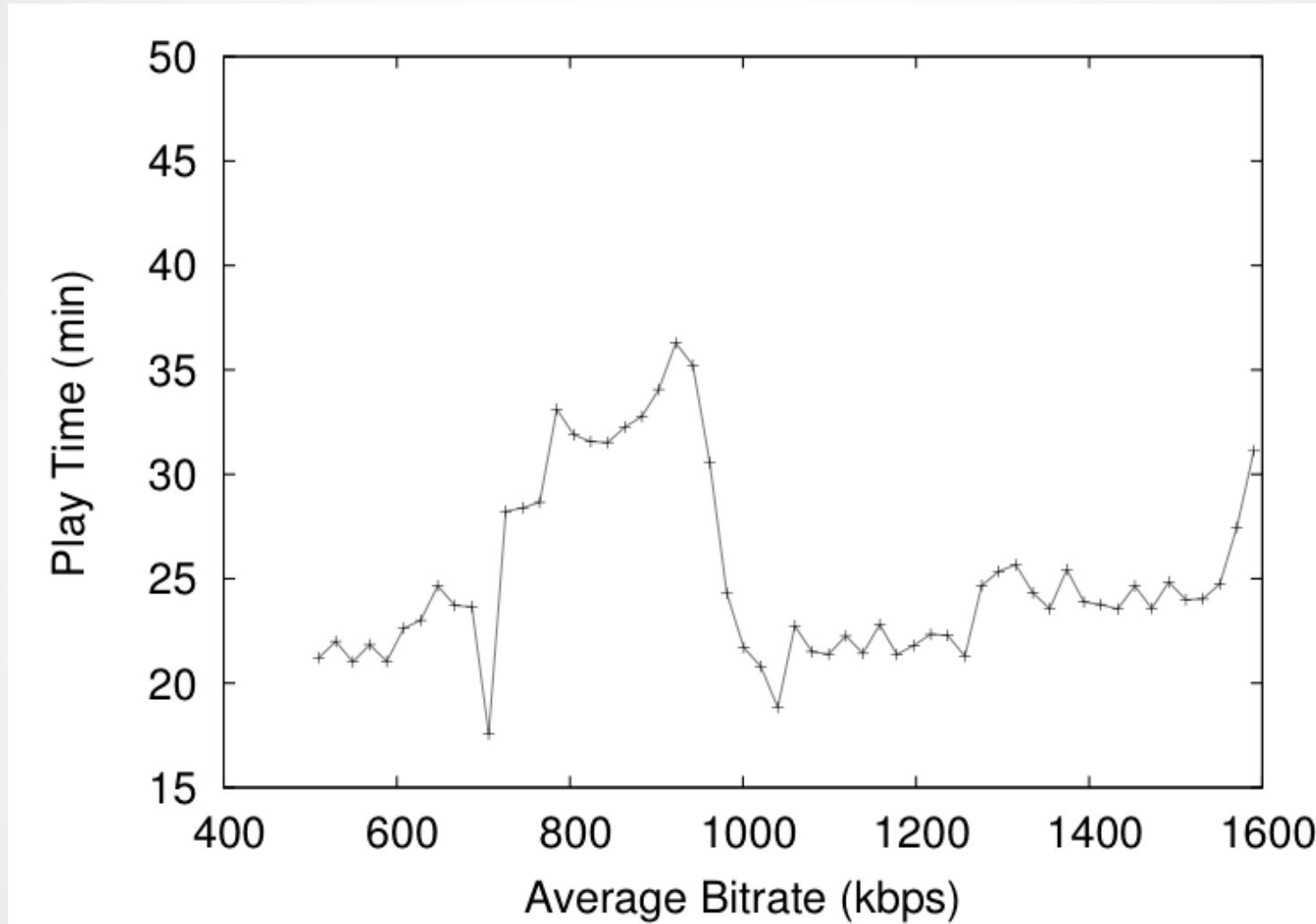
**Bit Rate Correlation Low**

## Why the Difference?

Zhang, SIGCOMM 2011



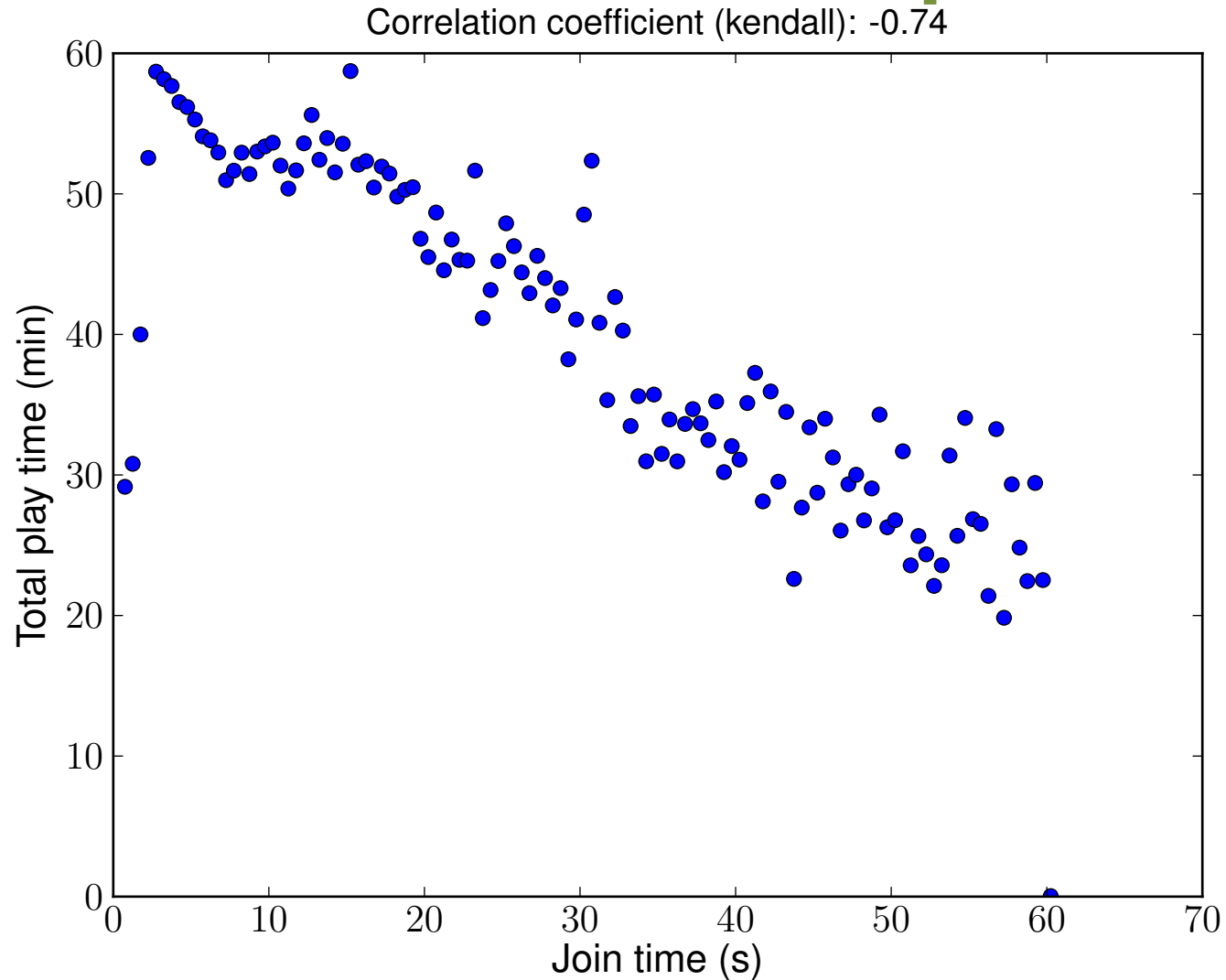
# Engagement vs. Bit Rate for LVoD View Level



Non-monotone → Low Correlation

Zhang, SIGCOMM 2011

# Join Time Analysis at Viewer Level (same viewer across multiple views)



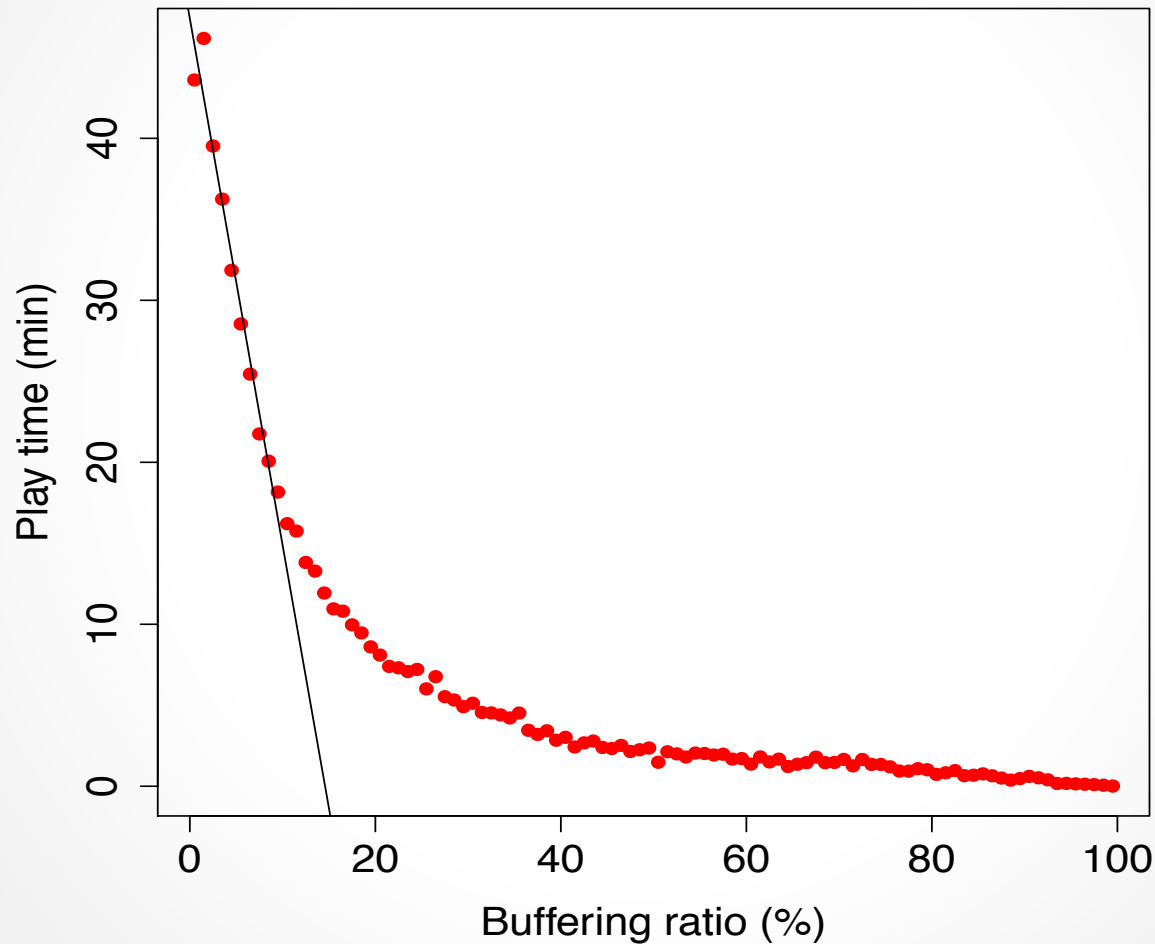
Join time is critical for user retention

Zhang, SIGCOMM 2011

# Quantitative Impact:



Correlation coefficient (kendall):  $-0.96$ , slope:  $-3.25$



1% increase in buffering reduces engagement by 3 minutes

Zhang, SIGCOMM 2011

# LVod Viewer level Play Time vs. Buffering Ratio:

