

# Information retention in multi-platform discussions of science

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## Online spread of science across platforms

Public interest in science communication [1], highlighted by recent public health crises, underscores how content loses critical pieces of information as it spreads [2]. Yet, multi-platform analyses remain limited due to challenges in reliable data collection. In this work, we leverage a large dataset to examine information retention in online discussions of scientific research findings “in the wild” across 5 platforms. We ask two main questions:

**RQ1.** How is information retained over time?

**RQ2.** As different types of platforms present different constraints about text, content, and posting, how does information retention differ across platforms?

## Research Design

**Data.** We leverage the 4+ million online mentions of 9,765 research articles tracked by Altmetric LLC [3] on blogs, Facebook, News, Twitter, and Wikipedia.

**Measure development.** We construct a keyword-based measure of “information retention”, extracting keywords using the TextRank algorithm[4]; we validated the measure via a survey collecting expert labels on which mentions have more information retention:

$$\frac{\text{sum}(\text{importance of abstract keyphrases found in post text})}{\text{sum}(\text{importance of all abstract keyphrases})}$$

### Burst-based framework.

We present and use a burst-based [5] framework to identify meaningful aggregated cross-platform moments of attention to science online.

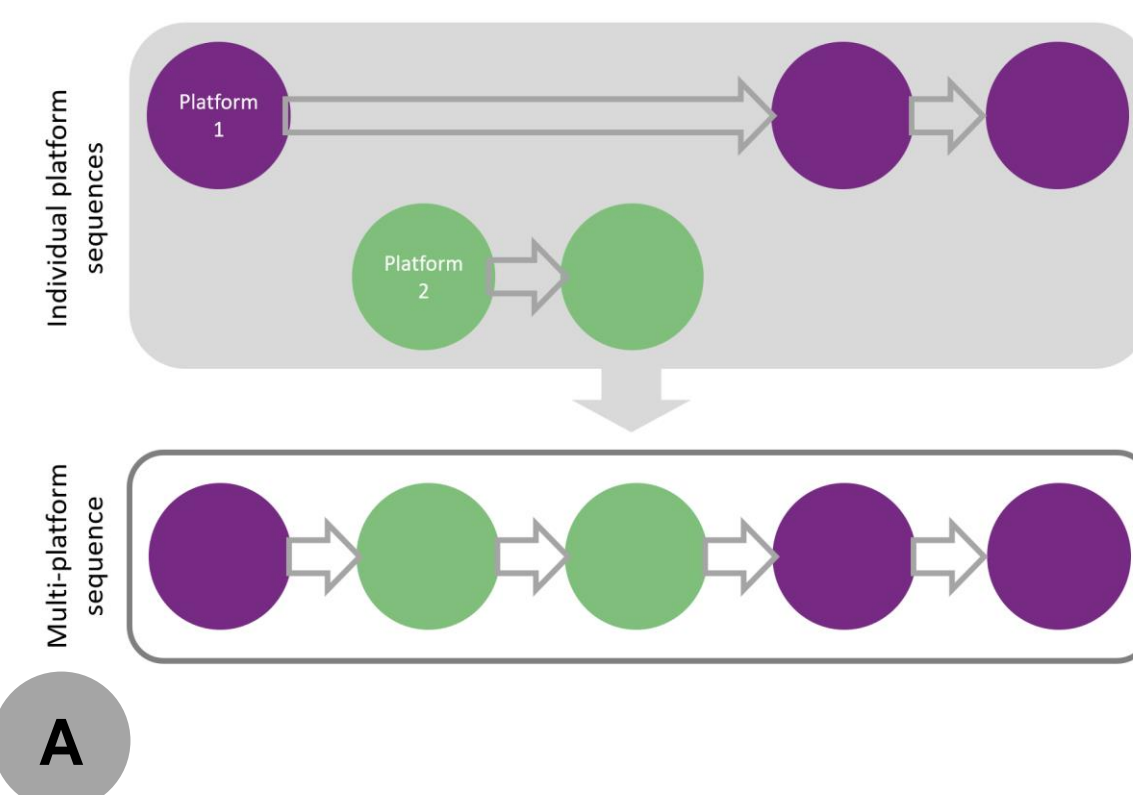


FIG A. shows a conceptual model of the burst-based framework.

## RQ1. Information retention over time

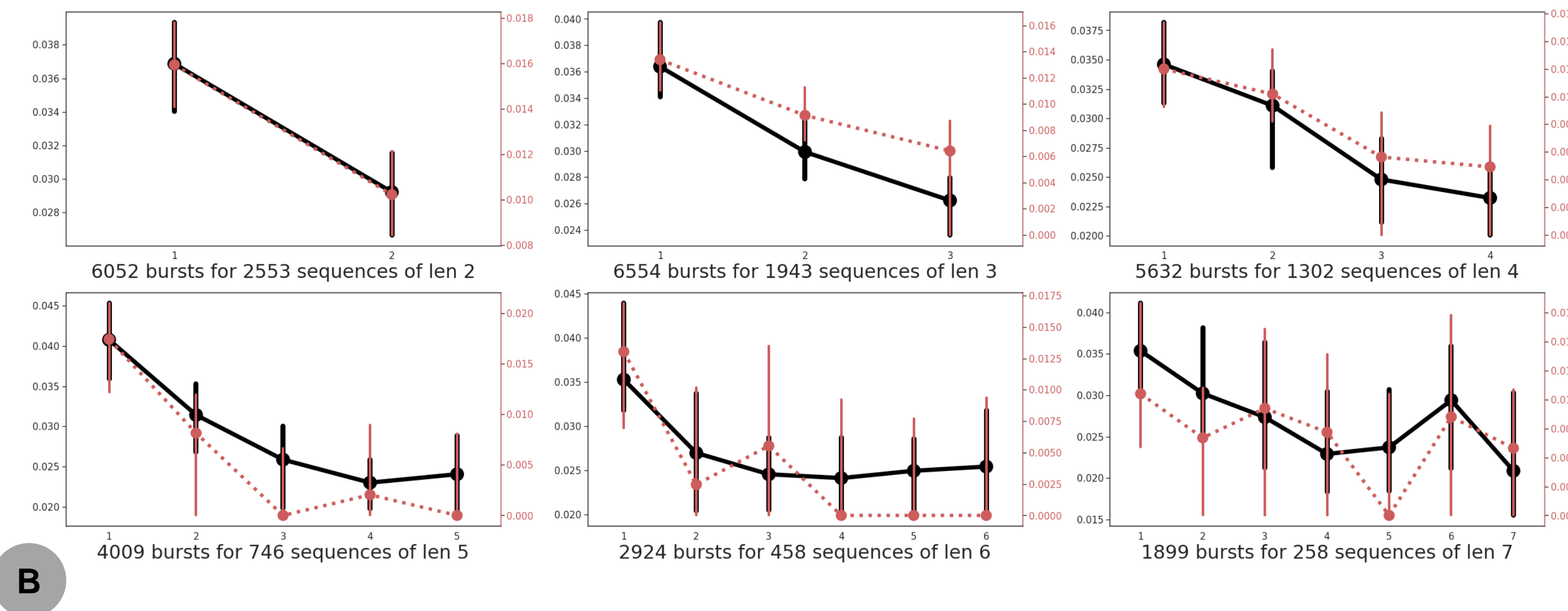
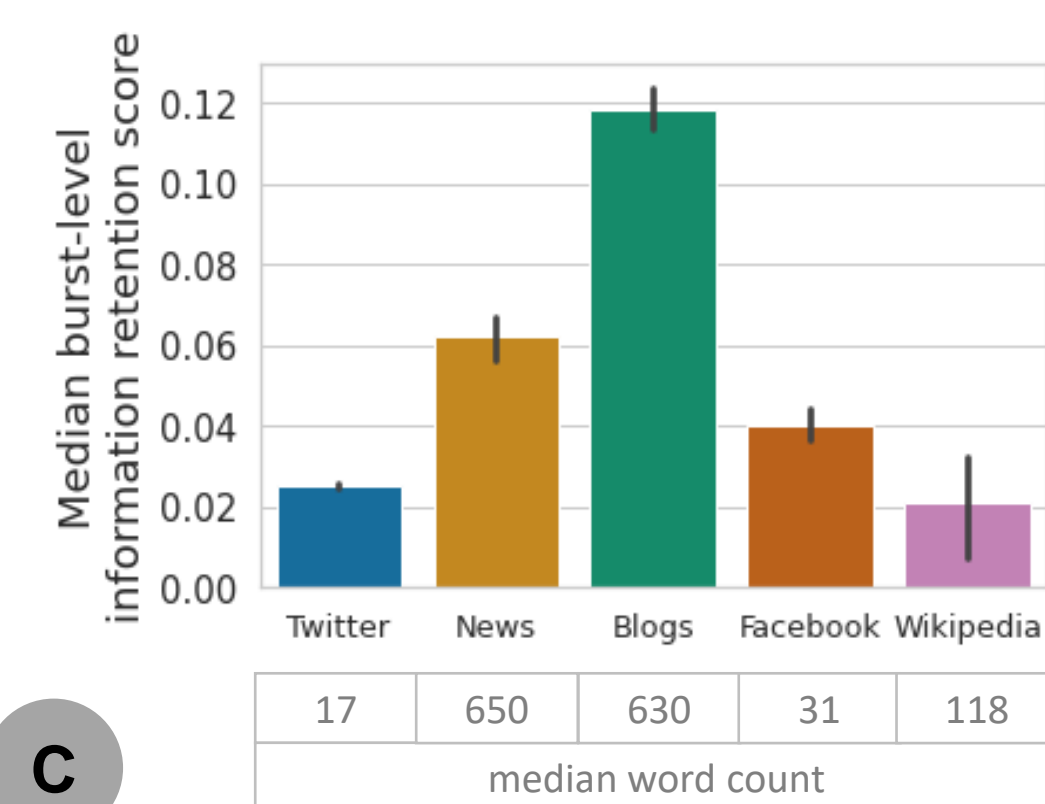


FIG B. shows the median information retention score at each sequential point over burst sequences of lengths 2-7; in dotted red is a robustness check, with our analysis replicated with RAKE-extracted keywords [6].

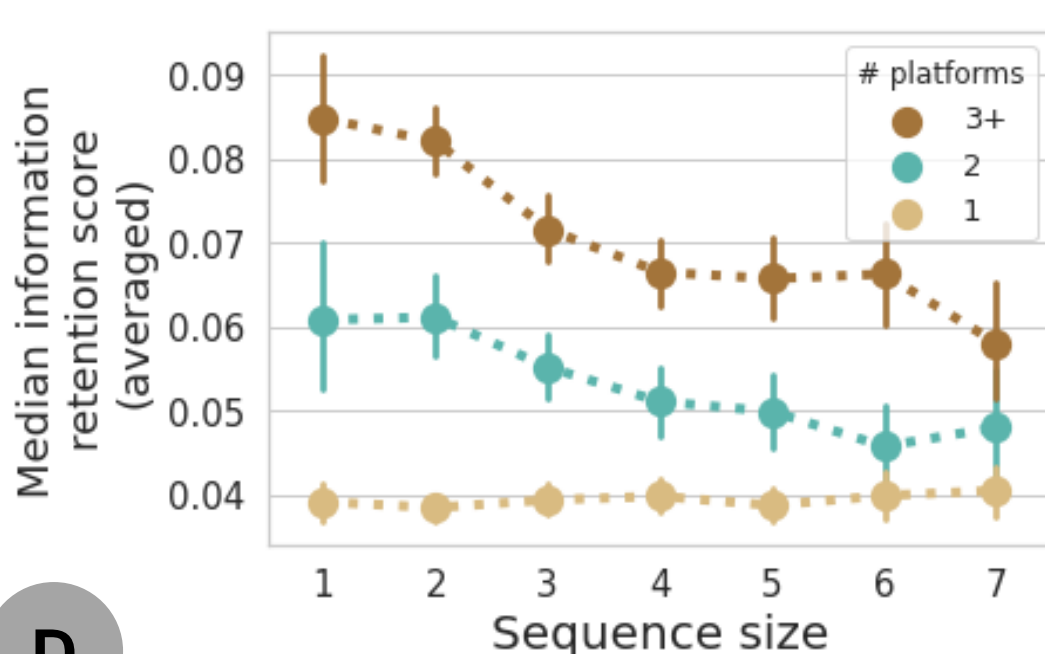
- Examining median information retention scores at the burst level, we found a strong propensity towards information loss in online mentions of science over time, for sequences of multiple lengths.
- However, sequences that started on social media platforms tended to start with and maintain low information retention.

## RQ2. Information retention across platforms



- Median **information retention** scores **varied across platforms**, and differences were not simply attributable to text length differences.

C



- Sequences containing more platforms had higher median scores**, at all sequence lengths.

D

FIG C. shows the median information retention scores for mentions of different platform categories. FIG D. shows median scores stratified by number of platforms, for sequence lengths 2-7.

## Implications + Future work

- Patterns of information *loss* over time underscore a need to devise ways to mitigate such loss and test potential mechanisms driving it, such as research relevance and platform effects.
- Science discussions on *more* platforms tend to have *higher* information retention scores, suggesting multi-platform strategies can improve information retention. Future work should examine how to improve and synchronize information retention across platforms.

### References

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