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The rest is still unwritten: Exploring the relationship between artist authorship, song length, and popularity

Research question: what is the relationship between the amount of time a song spent at #1 on the Billboard Hot 100, its length, and whether or not its artist also wrote the song

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Let’s go more in depth..

Motivation:

- Many hit songs are not written by the performing artist
- Listeners often overlook behind-the-scenes production factors
- We want to understand what characteristics contribute to success

Research Focus:

We analyzed Billboard Hot 100 #1 songs to examine:

- Songwriter Status
  → Is the artist also the songwriter?
- Song Length
  → Does duration relate to success?

Data overview

- Dataset:
  - Billboard Hot 100 #1 songs (1958–2025)
    - Compiled by Chris Dalla Riva (TidyTuesday)
    - Source: Billboard chart records

What is in included in the data?

- Artist & songwriting credits
- Song length (seconds)
- Chart performance
- Release information

- 3. Analysis Goal
  - Compare weeks at #1 across authorship groups
  - Examine relationship between:
    - Songwriting involvement
    - Song length
    - Commercial success

- Key Variables:
  - weeks_at_number_one → outcome (success)
  - length_sec → song duration

Created new variable: artist_authorship

- No involvement → (0,0)
- Partial involvement → (1,0)
- Full involvement → (1,1)

Artist Authorship on Billboard Hot 100 Number Ones

Counts of artists by songwriting contribution

Authorship Type	Number of Songs
No authorship	406
One of several songwriters	453
Artist only songwriter	318

Analysis

Figure 1: Weeks at Number One by Artist Authorship

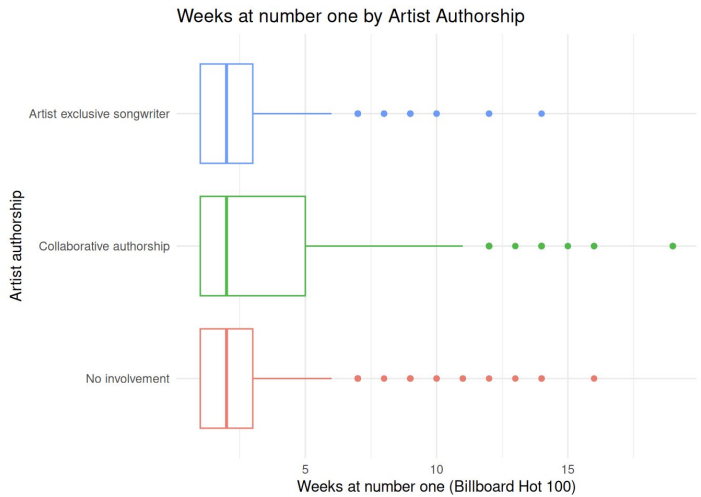


Figure 1 above explores the relationship between the songs that spent a certain number of weeks at number one on the Billboard Hot 100 and whether those songs were written only by the artist, written by a number of people including the artist, or not written by the artist in any capacity using side-by-side box plots.

Figure 2: Weeks at Number One & Song Length

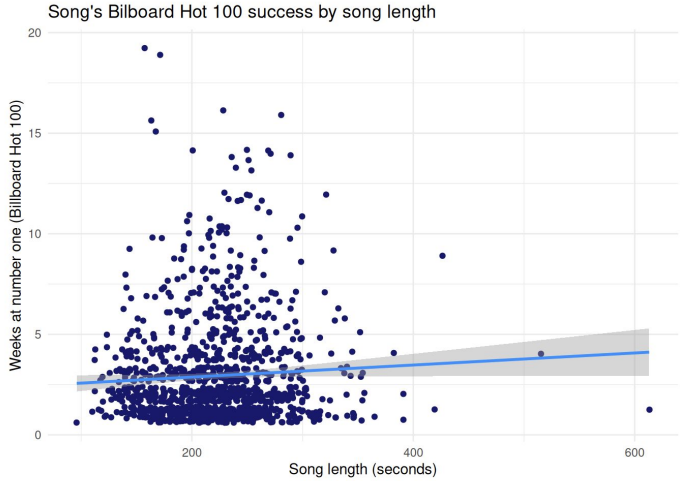
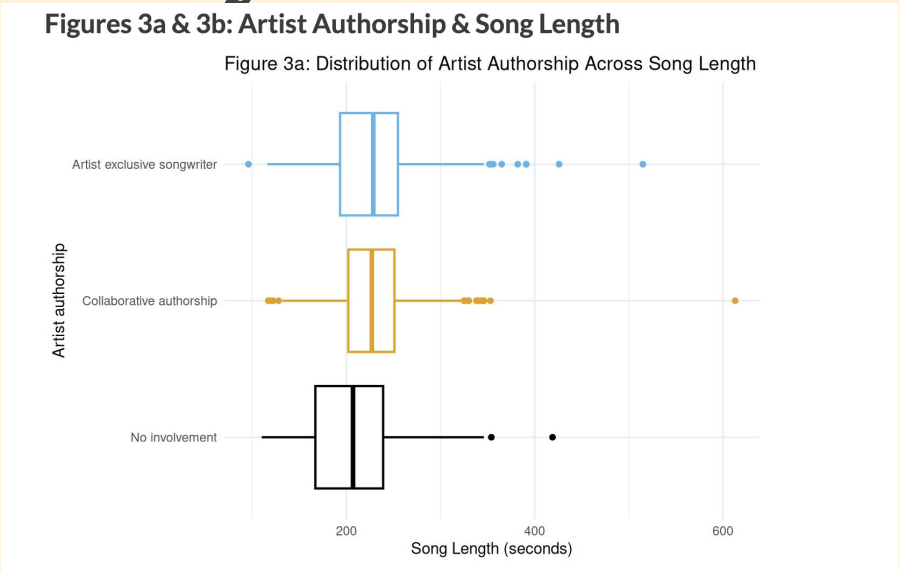


Figure 2 above explores the relationship between a song's length and the number of weeks it spent at number one on the Billboard Hot 100 using a jitter scatterplot with a line of best fit overlayed on top of it.

Analysis



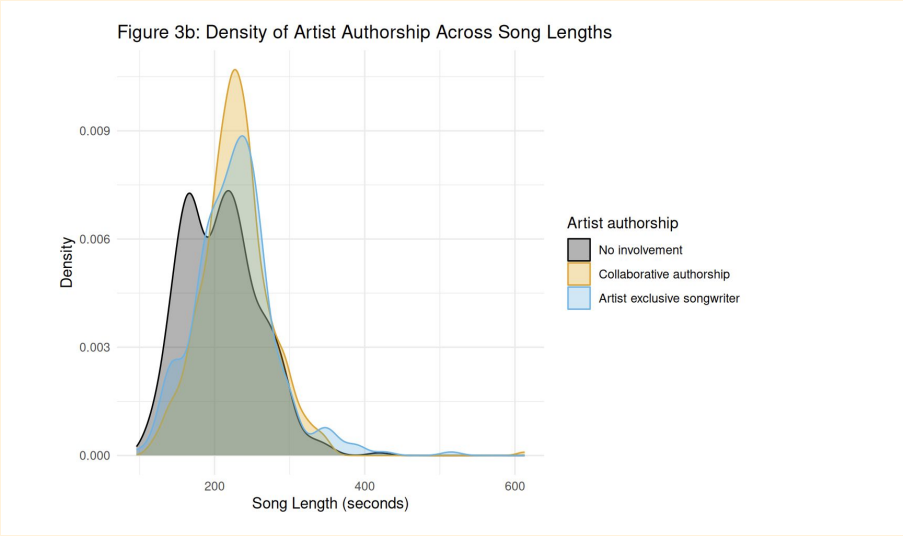


Figure 3a above explores the distribution of artist authorship and and length of a song, in seconds, using box plots, in order to visualize the distribution of song lengths across the different types of artist authorships.

Figure 3b above explores the relationship between artist authorship and the length of a song, in seconds, using a density graph in order to view the distribution of each among the entire share of songs in the data set.

Analysis

Figure 4: Weeks at Number One & Song Length by Artist Authorship

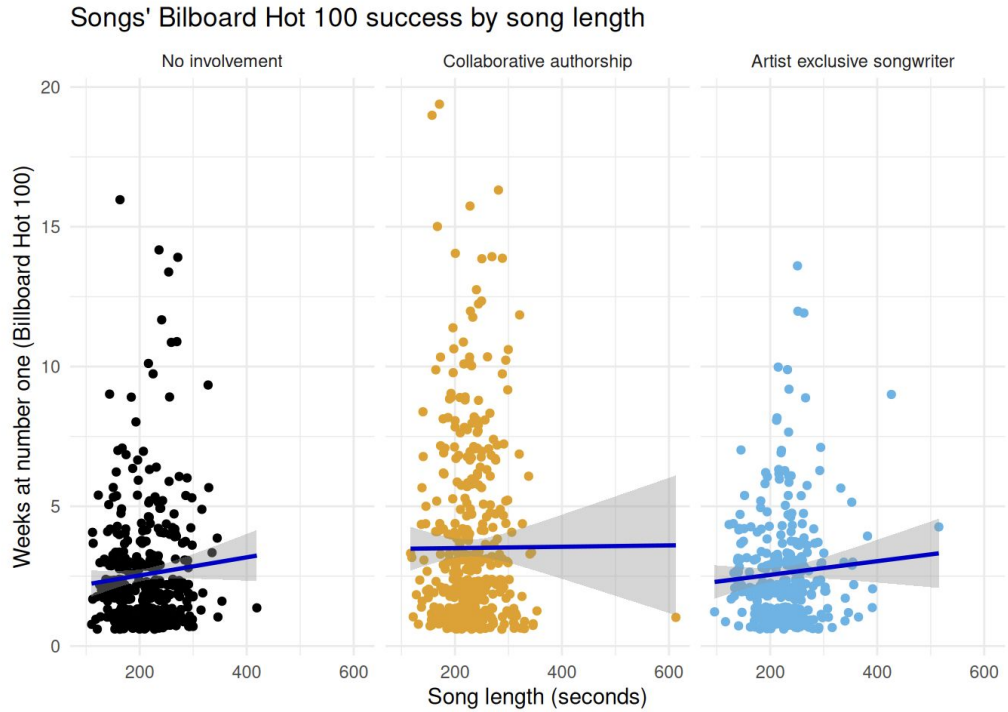


Figure 4 above is a series of jitter scatter plots that explore the relationship between a song's number of weeks at number one on the Billboard Hot 100 and its length in seconds, much like Figure 2; however, the scatterplots are disaggregated by artist authorship status in order to explore the relationships of the two variables in the context of artist authorship status.

Discussion

- **Neither** artist authorship nor song length strongly predict how long a song stays at #1 on the Billboard Hot 100.
- Median time at #1 is consistently **2 weeks** across all authorship categories.
- No authorship type provides a clear advantage in chart performance.
- **Collaboratively written songs** have a slightly higher average time at #1, suggesting a minor trend.
- Song length shows **no strong linear relationship** with weeks at #1.
- Songs with longer runs at #1 generally fall between **150–350 seconds**.

Limitations

1

Unaccounted External Factors

The analysis does not control for variables like genre, release timing, social media influence, or streaming algorithms, all of which can significantly impact chart performance.

2

Impact of Outliers

The distribution of weeks at #1 is right-skewed, meaning a small number of highly successful songs can inflate averages, making medians a more reliable measure.

3

Broad Authorship Categories

The “collaborative authorship” category groups together songs with very different numbers of writers (e.g., two vs. ten), which may obscure meaningful differences.

4

Lack of Time + Genre Controls

The analysis does not account for differences across release decades or genres, limiting its ability to isolate the true effects of authorship and song length

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Thank You!