

# Is Paul Dead?

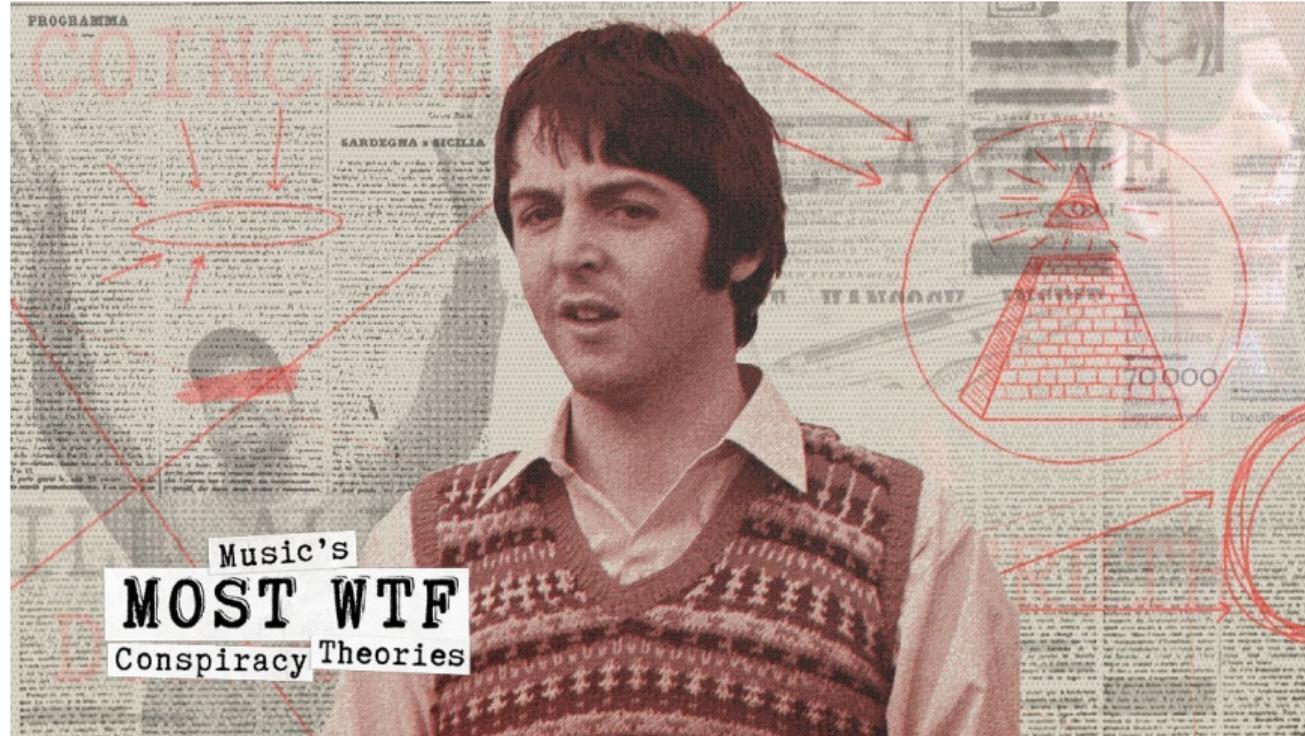
## Causal Evidence from Beatles-Song-Data

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# The Rolling Stone's Take on YT

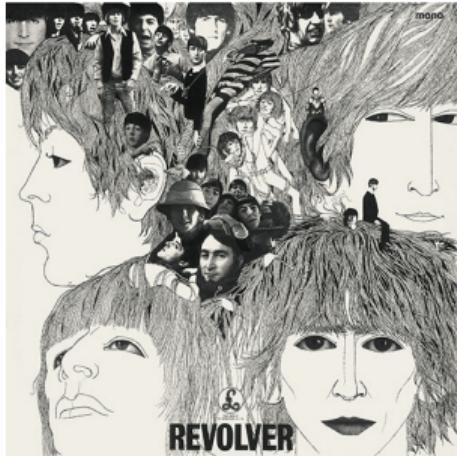


Rolling Stone:  
1.2 Mio. Views  
on YT



# Introduction

- In the 1960s, The Beatles took the world in a decisive swoop, becoming first the prototypical Boy-Band, later the overarching legends of the 60s
- From genre-typical Rock'n'Roll, The Beatles later moved on in 1965 / 1966 to more psychedelic / art-rock inspired music
- Ever since, their albums have become the stuff of legends:



# Why is Paul dead?

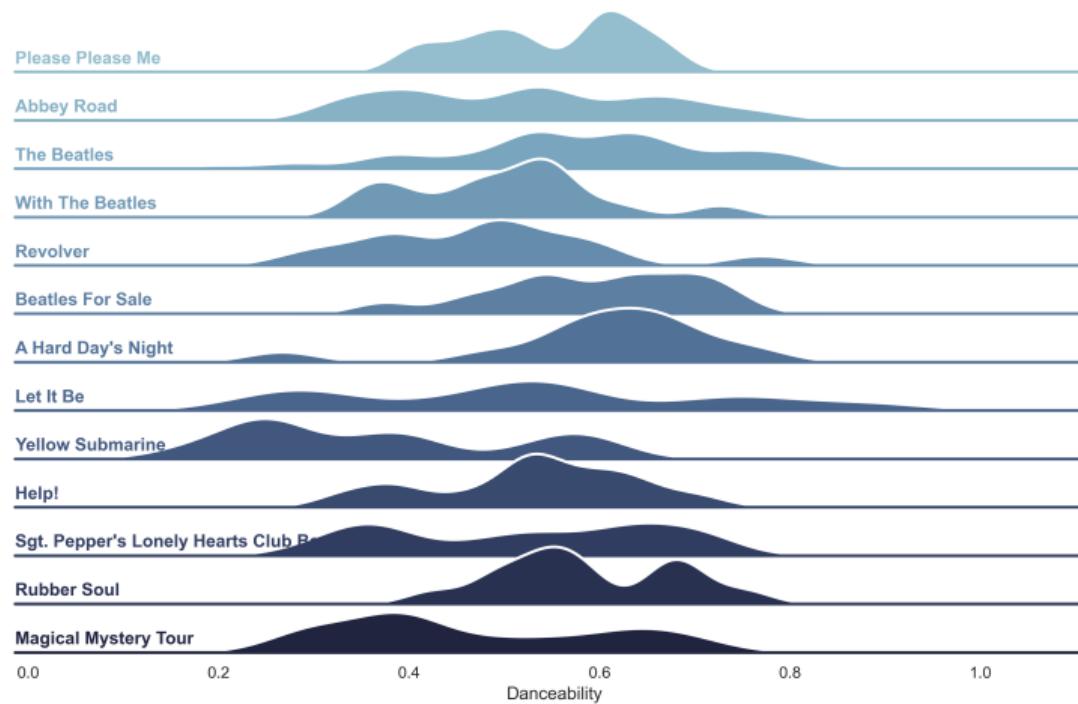
- In 1966/7, rumours started spreading that Paul McCartney had died in a car accident
- The Band and its managers confusedly denied those claims
- Naturally, this convinced believers even more of its truth
- A scavenger hunt took off in search for clues in Beatles' songs and on their album covers
- Allegedly, their albums were full of clues: McCartney had supposedly been distracted by a beautiful meter maid ('Lovely Rita') and overlooked a traffic light ('A Day in the Life')
- Upon his death, he received a funeral (album cover Abbey Road) with Lennon officiating as priest, Harrison as gravedigger, and Starr as undertaker ('Don't Pass Me By')
- Further hints include the flowers on the Sgt. Pepper album cover and Lennon's ramblings at the end of 'Strawberry Fields Forever'

# Why is Paul dead?



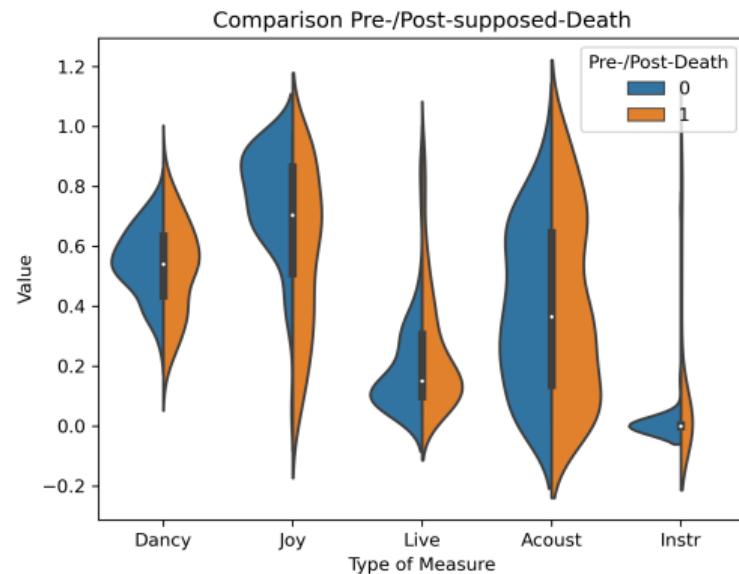
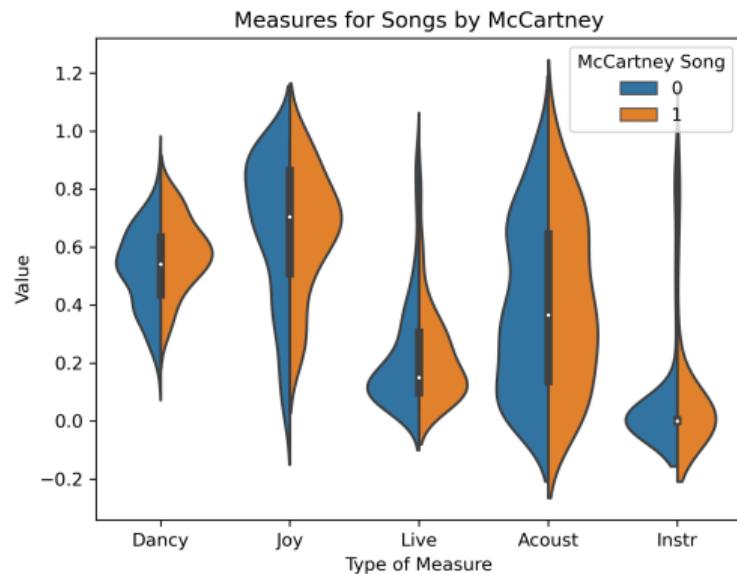
# Data

- Using SpotifyR-package, access Spotify-song-characteristics for Beatles : 'Danceability', 'Valence', 'Speechiness', 'Acousticness', 'Liveliness', and 'Mode'

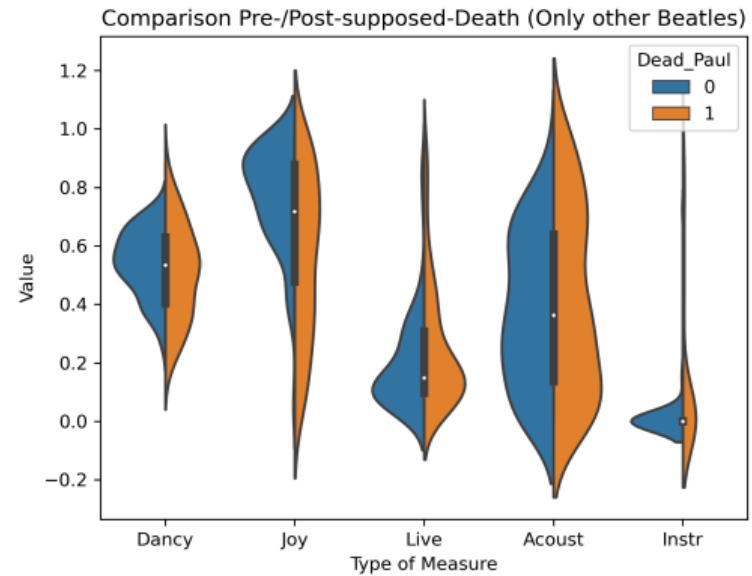
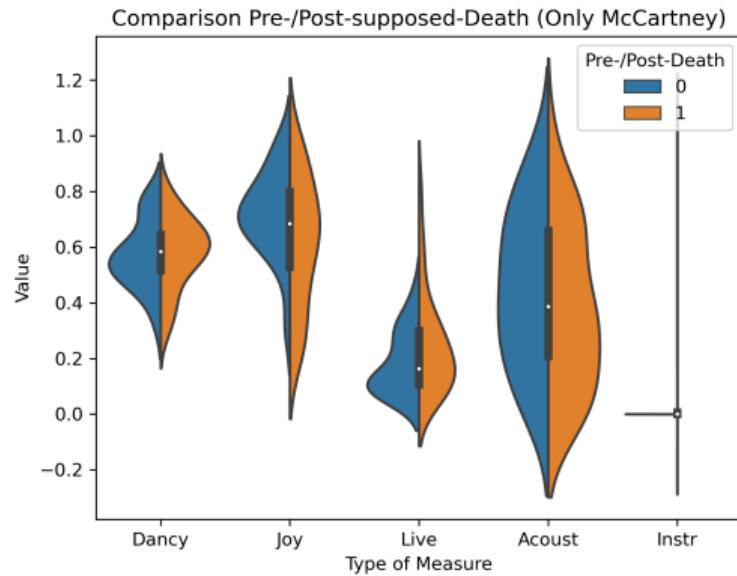


# Data

- Differences exist:



- Differences also exist Pre- / Post death separately



# Strategy of Identification

- Empirical Idea: suppose that the Paul is Dead Theory is true
- Assume that, as the Beatles were a tightly cohesive band, their musical style would have evolved in roughly similar ways
- An impersonator, however, could have never captured the unique style of Paul McCartney
- If Paul McCartney had been impersonated post-Pepper, we should see some differences in songwriting
- However, this is the mid-60s - songwriting exploded anyhow
- Hence, assumption that Paul McCartney's songwriting **would have evolved similarly** as that of the other Beatles
- I.e. it might start from a different starting point, but the trend would be similar

## Strategy of Identification

- Under these rather mild assumptions, I conclude that a 2x2 Diff-in-Diff model is well-suited to assess these questions
- Suppose that for a given song-characteristic, a given Beatles-song has baseline-characteristic  $\delta$
- Paul McCartney's songwriting might differ from that of other Beatles by some additive factor  $\beta$
- Given that in the 60s, bands evolved compared pre- / post 1967, assume that a common additive factor  $\alpha$  is added for after the release of Sgt. Pepper
- Finally, an impersonator would differ by his counterfactual Macca by a factor of  $\zeta$
- Then, the expected value of a given song-measure  $\mu$  of song  $s$  is given as:

$$\mu(s) = \delta + \beta * \mathbf{1}_{\text{Paul}} + \alpha * \mathbf{1}_{\text{Post-1966}} + \zeta * \mathbf{1}_{\text{Paul} \& \text{ Post-1966}} + \varepsilon_s \quad (1)$$

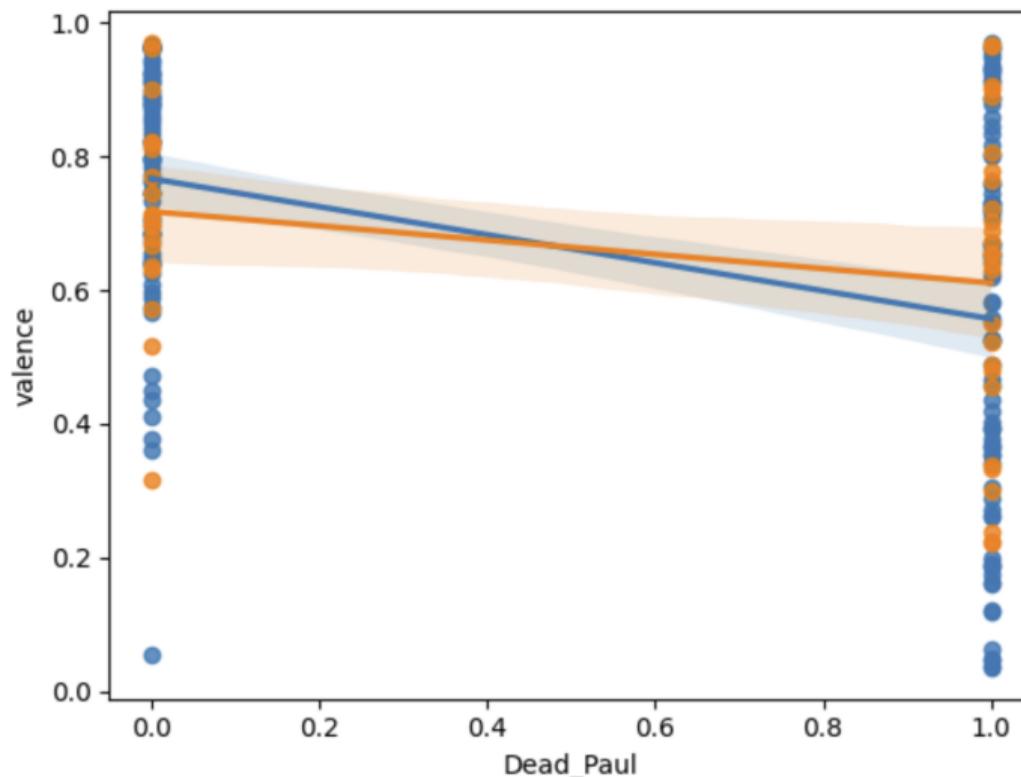
# Strategy of Identification

- DiD gives  $\zeta$  as ( $P = 1$  denotes if  $s$  was written by McCartney,  $S = 1$  if it was written post Sgt. Pepper):

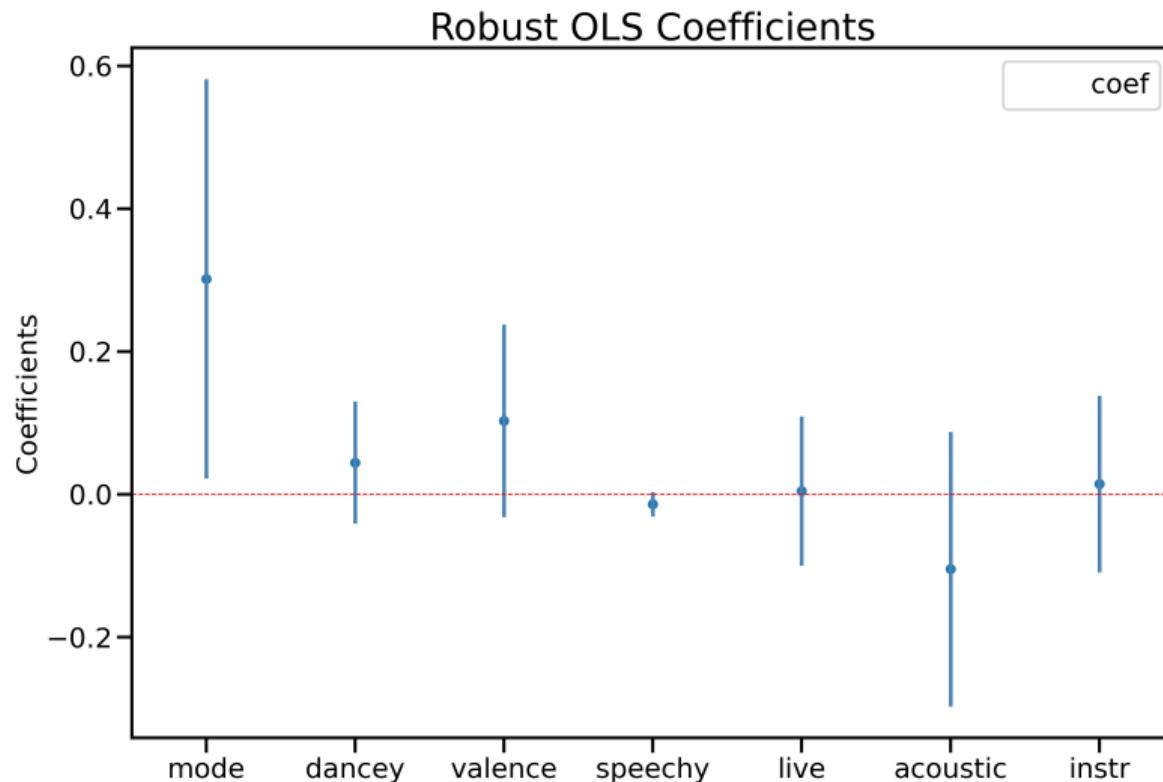
$$\left[ \underbrace{E[\mu(s)|P=1, S=1]}_{=\delta+\beta+\alpha+\zeta} - \underbrace{E[\mu(s)|P=0, S=1]}_{=\delta+\alpha} \right] - \left[ \underbrace{E[\mu(s)|P=1, S=0]}_{=\delta+\beta} - \underbrace{E[\mu(s)|P=0, S=0]}_{=\delta} \right] = \zeta$$

- I use OLS to estimate this in order to also obtain Standard Errors

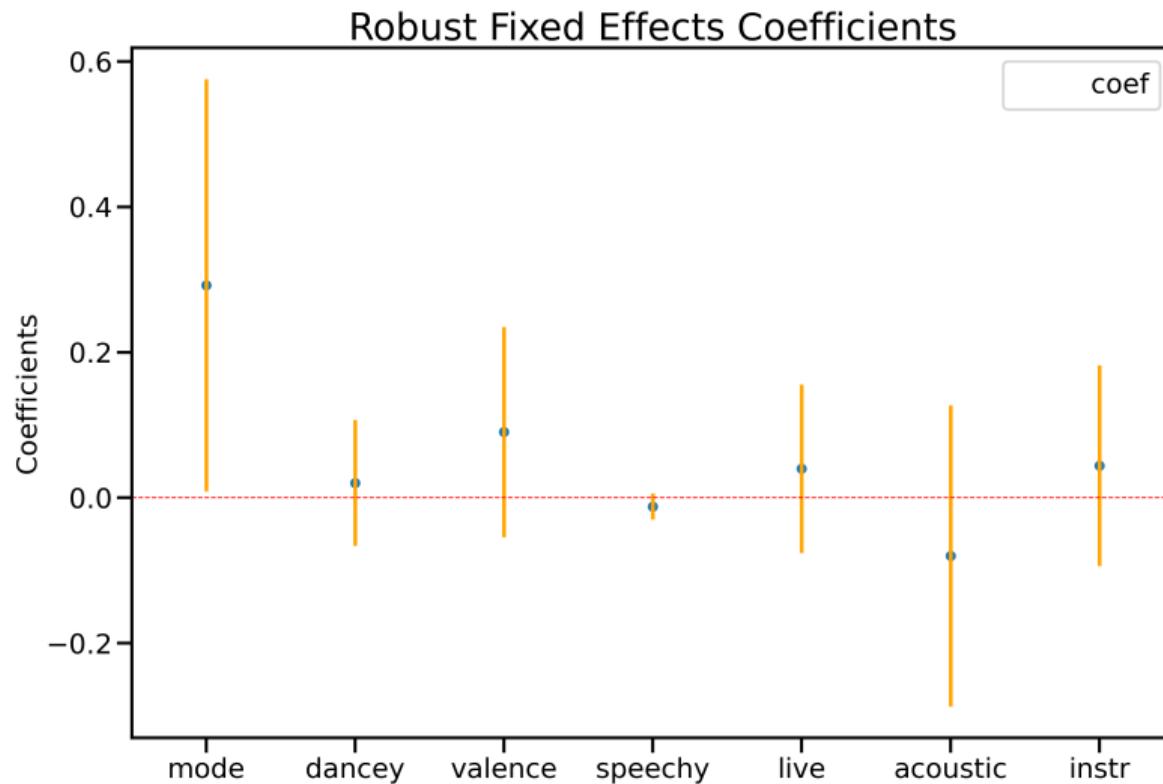
# A DiD example



# Results



# Results



# Conclusion

- Only for Mode do we see a (marginally) significant coefficient, not for any other measure
- Mode is 0-1 and therefore particularly noisy
- Might - even if true - be better explained by Harrison being mopey and Lennon being addicted to Heroin (and nobody let Ringo write songs)
- Then, overall, I find little evidence that McCartney's songwriting changed differentially over the years as compared to the other Beatles
- If we believe that an impostor McCartney would not be able to imitate him perfectly, this is tentative evidence against the 'Paul is Dead'-hypothesis
- However, other conspiracy theories that go even deeper might still explain that phenomenon...

Thank you for your attention!

# References

Raw Data



Google Collab (Python)



Write-Up

