

# LOGISTIC AND MULTINOMIAL REGRESSION WITH MUSIC ANALYSES WITH R SHINY

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## MOTIVATION

- Three bands – The Front Bottoms, Manchester Orchestra, and All Get Out – contributed to a collaborative track, *Allentown*
- Goal:** Using musical and lyrical features of *Allentown* and previous tracks from the three bands, can we disentangle contributions from the different groups?

## THE MUSIC

- The Front Bottoms Releases (61 tracks):** The Front Bottoms; Talon of the Hawk; Rose; Back on Top; Needy When I’m Needy; Going Grey; Ann; and End of Summer (Now I Know)
- Manchester Orchestra Releases (77 tracks):** You Brainstorm, I Brainstorm, but Brilliance Needs a Good Editor; I’m Like a Virgin Losing a Child; Fourteen Years of Excellence; Mean Everything to Nothing; Simple Math; Cope (Deluxe Version); Hope; A Black Mile to the Surface
- All Get Out Releases (42 tracks):** All Get Out; The Season; Movement; Nobody Likes a Quitter; No Bouquet

## THE “SOUNDS LIKE” DATA

- Essentia Music Extractor:** loudness, silence rates, beats per minute, danceability, key, mode, etc. as extracted from the spectrogram [1, 2].
- Essentia Models:** approachability, engagement, arousal, valence, happy, sad, etc. as predicted using models built from existing databases.

## THE “READS LIKE” DATA

- Simple:** We use the bing lexicon to extract the number of negative and positive words from the lyrics of each track [4].
- Complicated:** We use the Linguistic Inquiry and Word Count (LIWC or ‘Luke’) to use psychometric dictionaries that provide insight into a writer’s psychology, social concerns, or writing style [3]

## RESULTS

**Essentia Multinomial: Manchester Orchestra (0.859)**  
Andy Hull of Manchester Orchestra worked out the melody and music.

**Bing Multinomial: The Front Bottoms (0.593)**  
Brian Sella of The Front Bottoms then helped develop the chorus.

**LIWC Multinomial LASSO: All Get Out (0.553)**  
The creation of this track started when Nate Hussey of All Get Out sent the first four lines of the track [5].

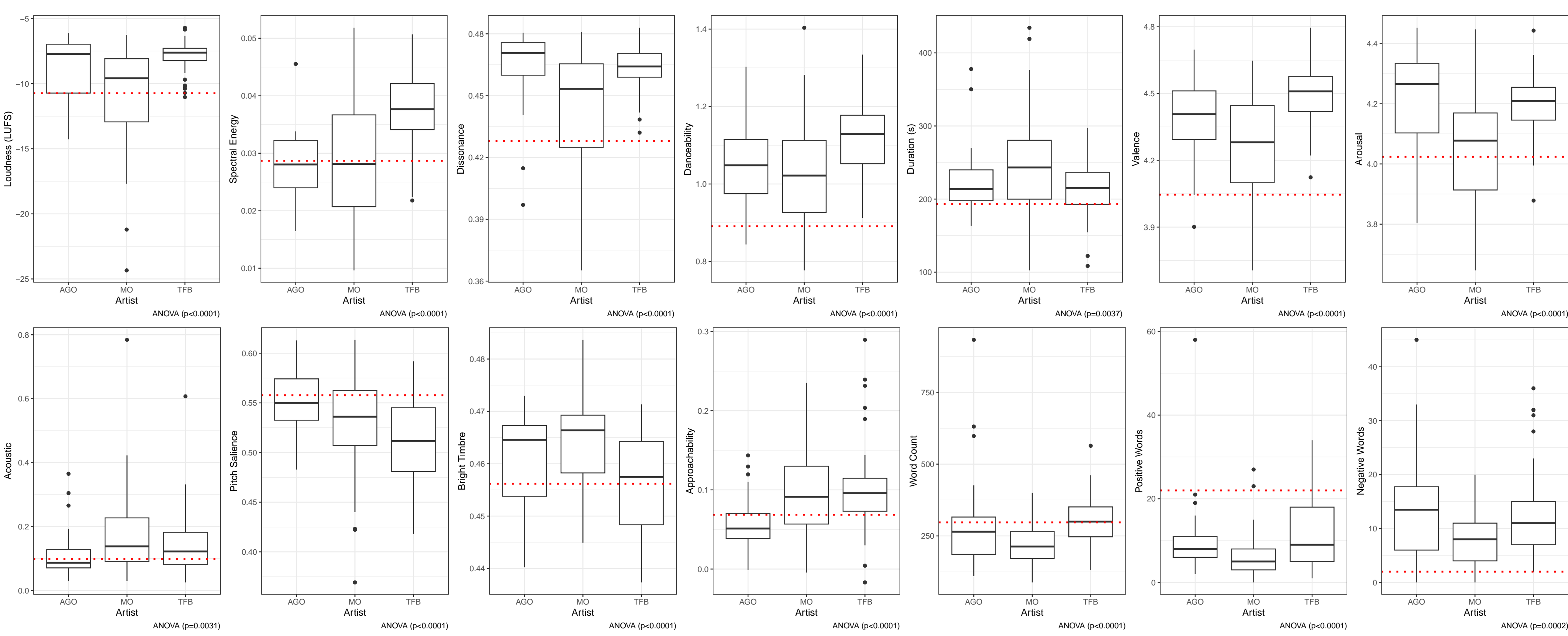
## RSHINY APPS

<https://shiny.colgate.edu/apps.html>

## REFERENCES

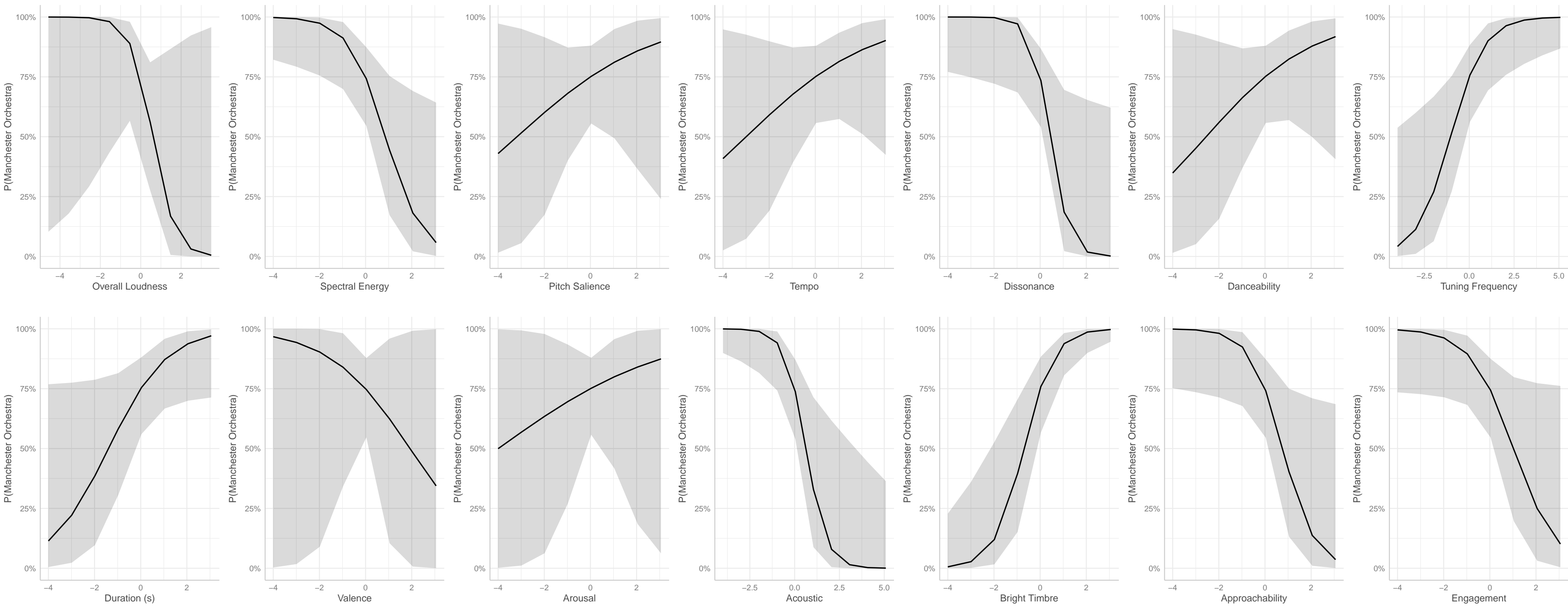
- [1] Pablo Alonso-Jiménez, Dmitry Bogdanov, Jordi Pons, and Xavier Serra. Tensorflow audio models in Essentia. In *ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 266–270. IEEE, 2020.
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- [3] Ryan L Boyd, Ashwini Ashokkumar, Sarah Seraj, and James W Pennebaker. The development and psychometric properties of LIWC-22. *Austin, TX: University of Texas at Austin*, 2022.
- [4] Mingqiang Hu and Bing Liu. Mining and summarizing customer reviews. In *Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining*, pages 168–177, 2004.
- [5] Alex Robert Ross. Manchester orchestra and the front bottoms are finally together on “allentown”, November 2018. <https://www.vice.com/en/article/manchester-orchestra-and-the-front-bottoms-are-finally-together-on-allentown/>.

## EXPLORATORY DATA ANALYSIS



## LOGISTIC REGRESSION

Emmeans for Significant Predictors Below

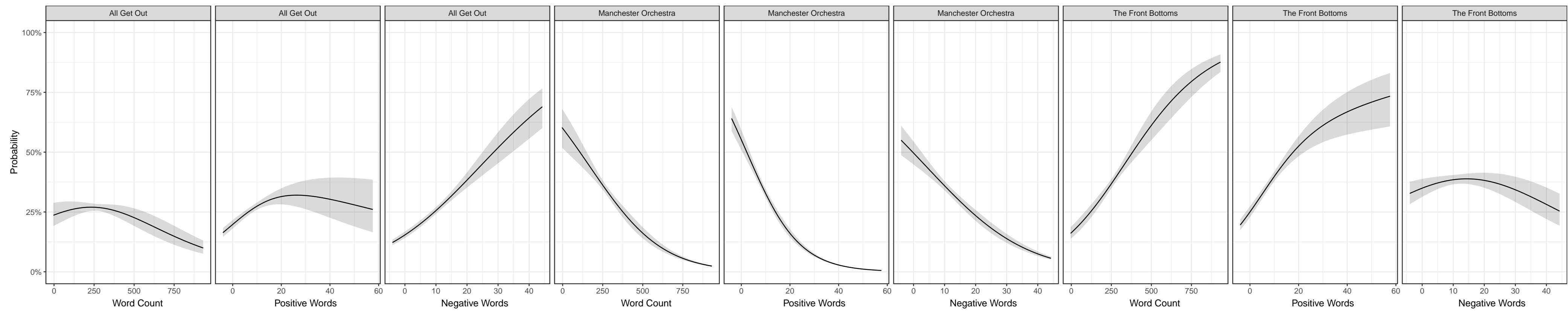


Predictions \ Truth	The Front Bottoms	Manchester Orchestra
The Front Bottoms	50	10
Manchester Orchestra	11	67

ROC AUC: 0.9144

## MULTINOMIAL REGRESSION

Try: Significant marginal effects plots; confusion/ROC [loocv]



Predictions \ Truth	The Front Bottoms	Manchester Orchestra	All Get Out
The Front Bottoms	32	19	23
Manchester Orchestra	25	45	18
All Get Out	4	1	1

Multi-class AUC: 0.6426

## STUDENT PERCEPTIONS

